

Water Supply (combining Water Conservation)

Activity Management Plan

Long Term Plan 2015–2025

As amended through the Annual Plan 2016/17

1 July 2016

Quality Assurance Statement

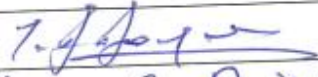
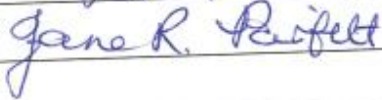

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1 Key Issues for the Water Supply Activity

1.1 Community Outcomes

Everything that the Council does in its day-to-day work is focused on achieving community outcomes. All activities outlined in this plan aim to deliver the results required to achieve these outcomes, contribute to Council strategies and meet legislative requirements. Likewise, all Council capital and operating expenditure is directed towards a level of service that moves the community closer to these outcomes now or at some future point.

The effective management of water supply for Christchurch means achieving the community outcomes that:

- The Council's water supplies meet the public's reasonable needs;
- Christchurch has clean, safe drinking water;
- Injuries and risks to public health are minimised;
- Statutory obligations are met by the Council;
- Stream and river flows are maintained;
- Water is used efficiently and sustainably;
- City assets, financial resources and infrastructure are well managed, now and in the future; and
- Energy is used more efficiently.

Section 4 shows how these outcomes flow down into and influence the Council's activities and levels of service in relation to water supply.

1.2 Effects of growth, demand and sustainability

Population Growth and Demand:

A forecast of population growth has been used to determine where and when Council infrastructure needs to be developed and at what capacity. Council has considered the influence of changing demographics, community expectations, industrial/commercial demand, technology and legislation on the demand for this service. As part of water supply planning Council has:

- Used the medium growth scenario from the Land Use Recovery Plan (LURP);
- Assumed the ratio of commercial to residential demand will remain constant;
- Assumed the water taken per connection targets in the Levels of Service are achieved.

Development of new subdivisions to support growth and house the residential red-zone population is resulting in a number of projects where growth is a contributing factor. Potential subdivision land in multiple directions has been made available at the same time under the LURP; this is resulting in multiple growth projects and adding to the financial pressure on the activity. Required funding to satisfy known growth projects has been included in the budgets in Section 13. The major growth projects are listed in Table 10-1 and are identifiable by the project driver column.

Intensification of residential land is encouraged under the LURP and the preceding UDS. Intensification will see a higher proportion of land used for dwellings and accesses and is anticipated to result in decreased consumption due to decreased requirements for gardening. Uncertainty over the rate of intensification makes it difficult to show how intensification will affect demand.

Sustainability:

The Local Government Act 2002 requires local authorities to take a sustainable development approach while conducting its business. Sustainable development is the fundamental philosophy that is embraced in Council's Vision, Mission and Objectives, and that shapes the community outcomes. The levels of service and the performance measures that flow from these inherently incorporate the achievement of sustainable outcomes as defined by:

- The Christchurch City Council Sustainability Policy;
- Christchurch City Council Biodiversity Strategy 2008-2035;
- Christchurch City Council Water Supply Strategy 2009-2039;
- Sustainable Energy Strategy for Christchurch 2008-2018.

1.3 Key Challenges and Opportunities for Water Supply

In working towards the community outcomes and influenced by population growth and demand, Council faces the challenge of making decisions that prioritise resources to deliver the best mix of services at the

right level and in a sustainable way. The key challenges and opportunities that have been prioritised by Council are below in Table 1-1.

Table 1-1

Key Issue	Discussion
Earthquake and the Earthquake Rebuild	<p>A series of earthquakes including a magnitude 7.1 on 4 September 2010, a magnitude 6.3 on 22 February 2011 and over 10,000 aftershocks, 2 of which were greater than 6.0 and 59 greater than 5.0. These seismic events caused a significant level of damage to the water supply network. The majority of Earthquake damage occurred in Lyttelton and the Eastern Suburbs of Christchurch City.</p> <p>The Infrastructure Rebuild Management Office (IRMO) and Stronger Christchurch Infrastructure Rebuild Team (SCIRT) were created for repair and rebuild of horizontal infrastructure. The Infrastructure Rebuild will not repair all damage in the water network.</p> <p>In addition, areas of residential land within Christchurch City were red-zoned by the Canterbury Earthquake Recovery Authority (CERA) and are being compulsorily acquired by the Crown. The future of this land and infrastructure passing through the land is uncertain; however for planning purposes it has been assumed that all water supply infrastructure in the residential red-zone will become redundant.</p> <p>Some pump stations, reservoirs and access to reservoirs are on land red-zoned due to rock-fall danger. The future of these assets is also yet to be determined. For planning purposes it is assumed these assets will remain as-is. Any changes will increase required funding.</p>
AC pipes are approaching the end of their effective lives.	<p>Population and building booms in the 1950s and 1960s resulted in the construction of many Christchurch suburbs. The majority of water supply infrastructure during this time period was constructed from asbestos cement (AC) pipes. These pipes are now approaching the end of their lives resulting in the need for significantly increased renewals expenditure over the next 30 years.</p>
Water supply to Lyttelton Harbour Basin.	<p>Water is supplied to Lyttelton, Governors Bay and Diamond Harbour through three pipes, two passing through the Port Hills in the rail tunnel and one in the road tunnel. The rail tunnel pipes are approaching the end of their lives and will require renewal in the near future. Permission to renew these pipes from the tunnel owners is uncertain and costs will increase significantly should Council need to find an alternate route.</p> <p>Development of a potable water source within the Lyttelton Harbour Basin could increase the resilience of Lyttelton Harbour Basin water supplies and defer or eliminate the rail tunnel pipeline renewal requirements.</p>
Christchurch CBD Trunk Mains	<p>The Eastern Terrace trunk main feeding the Christchurch CBD have been condition assessed with the results showing renewal is required by 2020. This is a large main with multimillion dollar renewals costs. Other significant mains in the area are also approaching the end of their lives.</p> <p>Water demand may have changed since the construction of these trunk mains and an investigation into future requirements is recommended to ensure renewals are not financing unneeded infrastructure. The investigation should be completed in the 2015-16 period to leave sufficient time for Eastern Terrace trunk main renewal should it be deemed necessary.</p>
Concurrent growth areas	<p>Land for potential subdivision has been made available in multiple directions at the same time under the LURP. Meeting the needs of multiple growth areas concurrently is adding to the quantity of growth driven projects the Council must deliver.</p>

2 Proposed changes to activity

Table 2-1 summarises the proposed changes for the management of the Water Supply activity since the Three Year Plan 2013-16 Activity Management Plan.

Table 2-1 Proposed changes to activity

Key Change	Reason	Level of significance? What investigations are needed?	Options for consultation and engagement
Pressure management project – reduction of high pressure areas of the City.	Improved asset life. Reduced power consumption. Reduced leakage. Reduced service interruptions. Improvements to disaster recovery processes.	Computer modelling has been completed. A pilot trial in one zone has been implemented. Results from this trial will be used to inform the decision regarding roll-out over the whole city.	Consultation and engagement is being provided for through Community Board information sessions, discussions with Property Council and other stakeholders.
Waterwise campaign discontinued	We have not seen a good correlation between the campaign and conservation. Other mechanisms – such as direct billing for excess consumption is far more effective in reducing demand	Low level of significance. Funding better applied to leak repairs in post earthquake environment	Water education through school programs.
In FY 15/16 conduct investigation into universal water billing.	Study to look at the pros and cons of universal billing for water and wastewater services.	Reasonably significant as could potential move from targeted rate to capacity and consumption charging basis. Could have significant benefits in reducing water consumption and thereby deferring future capital investment to meet peak summer day demand.	Plenty of opportunities to consult with the community both during and after the study is completed.

3 Activity description

3.1 Focusing on what we want to achieve

Council undertakes activities in order to deliver on the community outcomes for Christchurch. The outcomes that relate most directly to the management of the city's water supply network are that:

- The Council's water supplies meet the public's reasonable needs;
- Christchurch has clean, safe drinking water;
- Injuries and risks to public health are minimised;
- Statutory obligations are met by the Council;
- Stream and river flows are maintained (applies to Banks Peninsula surface water intakes);
- Water is used efficiently and sustainably;
- City assets, financial resources and infrastructure are well managed, now and in the future; and
- Energy is used more efficiently.

In addition to these community outcomes the Council also aims to ensure the quality and quantity of aquifer supplied water takes is protected.

3.2 How we will know we are achieving the outcomes

We will know we are achieving the above outcomes when we see the following results:

- **Statutory requirements** and reasonable **customer expectations regarding water quality are met** and ensure clean, safe water is supplied to acceptable taste, clarity and odour levels while health risks are managed;
- **Statutory requirements** and reasonable **customer expectations regarding water quantity and continuity of supply are met** by applying best practice maintenance, renewal, upgrade and acquisition practices that are sustainable and efficient;
- Water supply schemes are operated in a way that **minimises adverse social, cultural environmental and economic effects and meets statutory requirements** in these areas.

The activities that follow in section 4 and the levels of service within them are all linked to the above results to ensure Councils stays focused on moving towards the community outcomes. This link aims to confirm why we are doing the activities – that they will realistically move us closer to our goals – and that service delivery remains relevant to strategic direction.

3.3 What services we provide

This activity includes the following services:

- Supplying potable water to properties, through the provision of infrastructure to take, treat (where appropriate), store, deliver, maintain, manage and monitor the supply.

Ongoing strategies to deliver this service include a balanced mix of maintenance and renewal to preserve levels of service plus a capital response where appropriate to respond to increasing demands. Assets installed during historical growth periods are now at or nearing the end of their lives, combined with ongoing renewal of earthquake damaged assets a significant increase in renewals is required over the next 30 years.

Much of the infrastructure to serve growth is delivered by private developers then vested in Council. Council standards including the Infrastructure Design Standard (IDS), Construction Standard Specification (CSS) Approved Water Supply Installer program and Approved Materials List are maintained and updated on a regular basis to ensure these new assets meet Council requirements. Recent updates have focussed on resilience of assets with the aim of improving the restoration of service in future disasters.

In addition investigations are underway to review options available that may change the network configuration allowing improved system management, cost reductions and enabling the network to recover more quickly from future earthquake events. This work was planned under the water strategy but has been accelerated due to the major infrastructure rebuild (water pressure zoning project).

The water supply activity includes 7 water treatment plants, 114 pump stations, 32 reservoirs, 7 stream intakes, 156 water wells, 1,730km of water mains and 1,630km of sub-mains supplying water to

approximately 160,000 customers in Christchurch, Lyttelton, Diamond Harbour, Governors Bay, Akaroa, Takamatua, Duvauchelle Bay, Pigeon Bay, Little River, Birdlings Flat and Wainui.

3.4 Benefits and Funding Sources

3.4.1 Who Benefits?

Who benefits?	
Individual	
Identifiable part of the community	
Whole community	Full

Key:
Full
Majority
Some

Explanatory Comments:

The entire community benefits from this activity.

There are health and environmental benefits from an organised collection processing system for the whole community.

3.4.2 Who pays?

Funding - Fees / User Charges	Other revenue Grants & Subsidies	General rate	Targeted rate
10%	4%	0%	86%
Some			Majority

Note, Funding Split % is derived from the 'Summary of Cost for Activity' (section 13).

Key:		Typically
Full	All or almost all the cost is funded from that source. If the comment is made in the general or targeted rate columns it does not preclude making minor charges for the service but indicates that the charges are a negligible part of the fund.	95%+
Majority	The majority of the activity is funded from this source.	50%+
Some	Some revenue is derived from this source.	<50%

Does this Activity generate surplus funds that can be applied to other areas? **No**

Explanatory Comments:

The majority of the cost of this service is covered by Targeted Rate.

3.5 Key legislation and Council strategies

Key legislation relating to the Council water supplies includes: Local Government Act 1974 and 2002, Health Act 1956, Health (Drinking Water) Amendment Act 2007; Resource Management Act 1991, Drinking-Water Standard for New Zealand (as revised), and Water Related Services Bylaw 2008.

Relevant Council strategies include the Christchurch City Council Water Supply Strategy 2009-39 and the Christchurch City Council Surface Water Strategy 2009-39.

4 Levels of service and performance measures

Table 4-1 summarises the levels of service and performance measures for the Water Supply activity. Shaded rows are the levels of service and performance measures to be included in the Long Term Plan. Non-shaded rows are non-LTP management level measures, agreed with and reported to Council but not included as part of the community consulted document.

Table 4-1

Performance Standards Levels of Service (we provide)	Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
					Year 1	Year 2	Year 3	
					2015/16	2016/17	2017/18	
Supplying potable water to properties, through the provision of infrastructure to take, treat (where appropriate), store, deliver, maintain, manage and monitor the supply.								

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.1	Supply continuous potable water to all customers.	Statutory requirements and reasonable customer expectations regarding water quantity and continuity of supply are met		2013/14: 17.2 2012/13: 16.4 2012/11: 17.6 2009/10: 11.8 2013/14: 1.64 2012/13: 1.42 2009/10: 0.74 2013/14: 96.9% 2012/13: 86.0% 2011/12: 44% 2009/10: 98.6%	National Performance Review (30 TLAs) – 12/13: av 20 (range 2-100) WaterCare Auckland 96.7% repaired within 5 hours	12.0.1.1: Number of unplanned interruptions per 1,000 properties per year: ≤18 12.0.1.2: Number of unplanned interruptions greater than 4 hours duration per week each year: ≤1.7 12.0.1.3: Percentage of urgent urban leaks responded to within 1 hour of the leak being reported: ≥90%	12.0.1.1: Number of unplanned interruptions per 1,000 properties per year: ≤19 12.0.1.2: Number of unplanned interruptions greater than 4 hours duration per week each year: ≤1.7 12.0.1.3: Percentage of urgent urban leaks responded to within 1 hour of the leak being reported: ≥90%	12.0.1.1: Number of unplanned interruptions per 1,000 properties per year: ≤20 12.0.1.2: Number of unplanned interruptions greater than 4 hours duration per week each year: ≤1.75 12.0.1.3: Percentage of urgent urban leaks responded to within 1 hour of the leak being reported: ≥95%	12.0.1.1: Number of unplanned interruptions per 1,000 properties per year: ≤50 12.0.1.2: Number of unplanned interruptions greater than 4 hours duration per week each year: ≤2.0 12.0.1.3: Percentage of urgent urban leaks responded to within 1 hour of the leak being reported: ≥95%

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.1 (cont'd)	Supply continuous potable water to all customers.	Statutory requirements and reasonable customer expectations regarding water quantity and continuity of supply are met		2013/14: 97.5% 2012/13: 97.0% 2011/12: 75.5% 2009/10: 96.5% 2013/14: 83.9% 2012/13: 71.3% 2011/12: 54.7% 2009/10: 98.3% 2013/14: 83.2% 2012/13: 79.9% 2011/12: 56.0% 2009/10: 97.2%		12.0.1.4: Percentage of urgent rural leaks responded to within 2 hours of the leak being reported: $\geq 90\%$ 12.0.1.5: Percentage of medium leaks repaired within 1 working day of being reported $\geq 90\%$ 12.0.1.6: Percentage of minor leaks repaired within 3 working day of being reported. $\geq 90\%$	12.0.1.4: Percentage of urgent rural leaks responded to within 2 hours of the leak being reported: $\geq 90\%$ 12.0.1.5: Percentage of medium leaks repaired within 1 working day of being reported $\geq 90\%$ 12.0.1.6: Percentage of minor leaks repaired within 3 working day of being reported. $\geq 90\%$	12.0.1.4: Percentage of urgent rural leaks responded to within 2 hours of the leak being reported: $\geq 95\%$ 12.0.1.5: Percentage of medium leaks repaired within 1 working day of being reported $\geq 90\%$ 12.0.1.6: Percentage of minor leaks repaired within 3 working day of being reported. $\geq 90\%$	12.0.1.4: Percentage of urgent rural leaks responded to within 2 hours of the leak being reported: $\geq 95\%$ 12.0.1.5: Percentage of medium leaks repaired within 1 working day of being reported $\geq 90\%$ 12.0.1.6: Percentage of minor leaks repaired within 3 working day of being reported. $\geq 90\%$

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.1 (cont'd)	Supply continuous potable water to all customers.	Statutory requirements and reasonable customer expectations regarding water quantity and continuity of supply are met	<p><i>From the time that the local authority receives notification to the time the service personnel reach the site. Measured as the median response time. Water Supply mandatory performance measure 3a.</i></p> <p><i>From the time that the local authority receives notification to the time that the service personnel confirm resolution of the fault or interruption. Measured as the median response time. Water Supply mandatory performance measure 3b.</i></p> <p><i>From the time that the local authority receives notification to the time the service personnel reach the site. Measured as the median response time. Water Supply mandatory performance measure 3c.</i></p>	New LoS – No past performance.		12.0.1.7: Median response time for attendance for urgent call-outs following notification: ≤ 1 hour	12.0.1.7: Median response time for attendance for urgent call-outs following notification: ≤ 1 hour	12.0.1.7: Median response time for attendance for urgent call-outs following notification: ≤ 1 hour	12.0.1.7: Median response time for attendance for urgent call-outs following notification: ≤ 1 hour
						12.0.1.8: Median time to resolve urgent call-outs following notification: ≤ 5 hours	12.0.1.8: Median time to resolve urgent call-outs following notification: ≤ 5 hours	12.0.1.8: Median time to resolve urgent call-outs following notification: ≤ 5 hours	12.0.1.8: Median time to resolve urgent call-outs following notification: ≤ 5 hours
						12.0.1.9: Median response time for attendance for non-urgent call-outs following notification: ≤ 3 days	12.0.1.9: Median response time for attendance for non-urgent call-outs following notification: ≤ 3 days	12.0.1.9: Median response time for attendance for non-urgent call-outs following notification: ≤ 3 days	12.0.1.9: Median response time for attendance for non-urgent call-outs following notification: ≤ 3 days

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.1 (cont'd)	Supply continuous potable water to all customers.	Statutory requirements and reasonable customer expectations regarding water quantity and continuity of supply are met	<i>From the time that the local authority receives notification to the time that the service personnel confirm resolution of the fault or interruption. Measured as the median response time. Water Supply mandatory performance measure 3d.</i>	New LoS – No past performance.		12.0.1.10: Median time to resolve non-urgent call-outs following notification: ≤ 4 days	12.0.1.10: Median time to resolve non-urgent call-outs following notification: ≤ 4 days	12.0.1.10: Median time to resolve non-urgent call-outs following notification: ≤ 4 days	12.0.1.10: Median time to resolve non-urgent call-outs following notification: ≤ 4 days
				New LoS – No past performance.		12.0.1.11: Number of continuity of supply complaints per 1,000 customers per year: ≤ 2.5	12.0.1.11: Number of continuity of supply complaints per 1,000 customers per year: ≤ 2.5	12.0.1.11: Number of continuity of supply complaints per 1,000 customers per year: ≤ 3	12.0.1.11: Number of continuity of supply complaints per 1,000 customers per year: ≤ 4
				New LoS – No past performance.		12.0.1.12: Number of pressure or flow complaints per 1000 connections per year: ≤ 2	12.0.1.12: Number of pressure or flow complaints per 1000 connections per year: ≤ 2	12.0.1.12: Number of pressure or flow complaints per 1000 connections per year: ≤ 3	12.0.1.12: Number of pressure or flow complaints per 1000 connections per year: ≤ 4

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.2	Ensure potable water is supplied in accordance with the Drinking Water Standards for New Zealand	Statutory requirements and reasonable customer expectations regarding water quality are met		2009-14: Ba	Lower Hutt: Bb Hastings City: Uu Pegasus: Bb (secure gw)	12.0.2.1: MoH risk grading of the urban water supplies (excluding NW zone): Ba	12.0.2.1: MoH risk grading of the urban water supplies (excluding NW zone): Ba	12.0.2.1: MoH risk grading of the urban water supplies (excluding NW zone): Ba	12.0.2.1: MoH risk grading of the urban water supplies (excluding NW zone): Ba
				2009-14: Da	Prebbleton: De Kaiapoi: Uc (non-secure gw)	12.0.2.2: MoH risk grading of the NW water supply zone: Da	12.0.2.2: MoH risk grading of the NW water supply zone: Da	12.0.2.2: MoH risk grading of the NW water supply zone: Ba	12.0.2.2: MoH risk grading of the NW water supply zone: Ba
				2009-14: Uu	Methven: Ud Waipara town: Ee	12.0.2.3: MoH grading of rural water supplies: Uu	12.0.2.3: MoH grading of rural water supplies: Uu	12.0.2.3: MoH grading of rural water supplies: Cc	12.0.2.3: MoH grading of rural water supplies: Cc
				2013/14: 300 2012/13: 400 2011/12: 112 2010/11: 90 2009/10: 268	Only 4 TLAs known to have an active backflow programme	Non-LTP 12.0.2.4: Number of highest risk properties assessed and required to install backflow prevention devices ≥100	Non-LTP 12.0.2.4: Number of highest risk properties assessed and required to install backflow prevention devices ≥100	Non-LTP 12.0.2.4: Number of highest risk properties assessed and required to install backflow prevention devices ≥100	Non-LTP 12.0.2.4: Number of highest risk properties assessed and required to install backflow prevention devices ≥50

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.2 (cont'd)	Ensure potable water is supplied in accordance with the Drinking Water Standards for New Zealand	Statutory requirements and reasonable customer expectations regarding water quality are met	<p><i>Mandatory performance measures encompassing complaints received about the networked reticulation systems for any of the following reasons:</i></p> <p>(a) drinking water clarity</p> <p>(b) drinking water taste</p> <p>(c) Drinking water odour</p> <p>(d) drinking water pressure or flow</p> <p>(e) continuity of supply</p> <p><i>Water Supply mandatory performance measures 4a-f.</i></p>	<p>2013/14: 84%</p> <p>2012/13: 88%</p> <p>2011/12: 85%</p> <p>2009/10: 92%</p> <p>New LoS – 2013/14: 0.95</p> <p>New LoS – 2013/14: 0.75</p> <p>New LoS – No past performance.</p>	<p>WaterCare Auck target ≤ 5 complaints / 1000 Achieved 4.6 / 1000</p> <p>National Performance Review of water suppliers in New Zealand 12/13yr across clarity and taste Av = 3.2 (range 0.5 – 14.5)</p>	<p>Non-LTP 12.0.2.5: Proportion of customers satisfied with the water supply service: ≥85%</p> <p>12.0.2.6: Number of water clarity complaints per 1,000 customers per year: ≤ 1.5</p> <p>12.0.2.7: Number of water taste complaints per 1,000 customers per year: ≤ 1</p> <p>12.0.2.8: Number of water odour complaints per 1,000 customers per year: ≤ 0.5</p>	<p>Non-LTP 12.0.2.5: Proportion of customers satisfied with the water supply service: ≥87%</p> <p>12.0.2.6: Number of water clarity complaints per 1,000 customers per year: ≤ 1.5</p> <p>12.0.2.7: Number of water taste complaints per 1,000 customers per year: ≤ 1</p> <p>12.0.2.8: Number of water odour complaints per 1,000 customers per year: ≤ 0.5</p>	<p>Non-LTP 12.0.2.5: Proportion of customers satisfied with the water supply service: ≥90%</p> <p>12.0.2.6: Number of water clarity complaints per 1,000 customers per year: ≤ 1</p> <p>12.0.2.7: Number of water taste complaints per 1,000 customers per year: ≤ 1</p> <p>12.0.2.8: Number of water odour complaints per 1,000 customers per year: ≤ 0.5</p>	<p>Non-LTP 12.0.2.5: Proportion of customers satisfied with the water supply service: ≥90%</p> <p>12.0.2.6: Number of water clarity complaints per 1,000 customers per year: ≤ 1</p> <p>12.0.2.7: Number of water taste complaints per 1,000 customers per year: ≤ 1</p> <p>12.0.2.8: Number of water odour complaints per 1,000 customers per year: ≤ 0.5</p>

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25	
						Year 1	Year 2	Year 3		
						2015/16	2016/17	2017/18		
12.0.2 (cont'd)	Ensure potable water is supplied in accordance with the Drinking Water Standards for New Zealand	Statutory requirements and reasonable customer expectations regarding water quality are met	<p><i>Mandatory performance measures encompassing complaints received about the networked reticulation systems for any of the following reasons:</i></p> <p><i>(f) the local authority's response to any of these issues.</i></p> <p><i>Water Supply mandatory performance measures 4a-f.</i></p>	New LoS – No past performance.	ditto	12.0.2.9: Number of drinking water pressure or flow complaints per 1,000 customers per year: ≤ 2	12.0.2.9: Number of drinking water pressure or flow complaints per 1,000 customers per year: ≤ 2	12.0.2.9: Number of drinking water pressure or flow complaints per 1,000 customers per year: ≤ 3	12.0.2.9: Number of drinking water pressure or flow complaints per 1,000 customers per year: ≤ 4	
				New LoS – No past performance.		National Performance Review 13/14 will provide NZ wide data from 2015 on	12.0.2.10: Number of continuity of supply complaints per 1,000 customers per year: ≤ 2.5	12.0.2.10: Number of continuity of supply complaints per 1,000 customers per year: ≤ 2.5	12.0.2.10: Number of continuity of supply complaints per 1,000 customers per year: ≤ 3	12.0.2.10: Number of continuity of supply complaints per 1,000 customers per year: ≤ 4
				New LoS – No past performance.			12.0.2.11: Proportion of complaints remediated to the customers' satisfaction: ≥95%	12.0.2.11: Proportion of complaints remediated to the customers' satisfaction: ≥95%	12.0.2.11: Proportion of complaints remediated to the customers' satisfaction: ≥95%	12.0.2.11: Proportion of complaints remediated to the customers' satisfaction: ≥95%

Performance Standards Levels of Service (we provide)	Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
					Year 1	Year 2	Year 3	
					2015/16	2016/17	2017/18	
		<i>Water Supply mandatory performance measures 1a & 1b.</i>	2013/14: 99.5% 2012/13: 100% 2011/12: 100% 2010/11: * 2009/10: 99.8% (* excluded from annual compliance survey due to earthquakes)		12.0.2.12: Proportion of urban residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.8%	12.0.2.12: Proportion of urban residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.8%	12.0.2.12: Proportion of urban residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.8%	12.0.2.12: Proportion of urban residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.8%
		<i>Water Supply mandatory performance measures 1a & 1b.</i>	2013/14: 100% 2012/13: 92% 2011/12: 82% 2010/11: 81% 2009/10: 67%		12.0.2.13: Proportion of rural residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.5%	12.0.2.13: Proportion of rural residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.8%	12.0.2.13: Proportion of rural residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.8%	12.0.2.13: Proportion of rural residents supplied water compliant with the DWSNZ bacterial compliance criteria: ≥ 99.8%

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.2 (cont'd)	Ensure potable water is supplied in accordance with the Drinking Water Standards for New Zealand	Statutory requirements and reasonable customer expectations regarding water quality are met	<p><i>Water Supply mandatory performance measures 1a & 1b.</i></p> <p>2013/14: 79% 2012/13: 79% 2011/12: 79% 2010/11: * 2009/10: 79%</p> <p>(* excluded from annual compliance survey due to earthquakes)</p> <p><i>Water Supply mandatory performance measures 1a & 1b.</i></p> <p>2013/14: 11% 2012/13: 11% 2011/12: 11% 2010/11: 11% 2009/10: 11%</p>	<p>National Performance Review 13/14 will provide NZ wide data from 2015 on</p> <p>ditto</p>	<p>12.0.2.14: Proportion of urban residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 79%</p> <p>12.0.2.15: Proportion of rural residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 80% <i>(subject to Akaroa treatment plant successfully completed on time)</i></p>	<p>12.0.2.14: Proportion of urban residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 79%</p> <p>12.0.2.15: Proportion of rural residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 99.8%</p>	<p>12.0.2.14: Proportion of urban residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 99.8%</p> <p>12.0.2.15: Proportion of rural residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 99.8%</p>	<p>12.0.2.14: Proportion of urban residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 99.8%</p> <p>12.0.2.15: Proportion of rural residents supplied water compliant with the DWSNZ protozoal compliance criteria: ≥ 99.8%</p>	

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
				New LoS – No past performance.	Ditto – non-LTP level	----- Non-LTP 12.0.2.16: Proportion of water supplies with a MoH approved Water Safety Plan: 100% (risk management)	----- Non-LTP 12.0.2.16: Proportion of water supplies with a MoH approved Water Safety Plan: 100% (risk management)	----- Non-LTP 12.0.2.16: Proportion of water supplies with a MoH approved Water Safety Plan: 100% (risk management)	----- Non-LTP 12.0.2.16: Proportion of water supplies with a MoH approved Water Safety Plan: 100% (risk management)
12.0.3	Monitor the condition of the water supply network.	Statutory requirements and reasonable customer expectations regarding water quantity and continuity of supply are met		2013/14: 26.2 2012/13: 23.1 2011/12: 17.5 2009/10: 16.5 2013/14: 126.6 2012/13: 130.1 2011/12: 83 2009/10: 81.5		12.0.3.1: Number of breaks per 100km of water main each year. (excluding 3 rd party damage): ≤ 28 12.0.3.2: Number of breaks per 100km of sub-main each year. (excluding 3 rd party damage): ≤ 130	12.0.3.1: Number of breaks per 100km of water main each year. (excluding 3 rd party damage): ≤ 29 12.0.3.2: Number of breaks per 100km of sub-main each year. (excluding 3 rd party damage): ≤ 130	12.0.3.1: Number of breaks per 100km of water main each year. (excluding 3 rd party damage): ≤ 30 12.0.3.2: Number of breaks per 100km of sub-main each year. (excluding 3 rd party damage): ≤ 135	12.0.3.1: Number of breaks per 100km of water main each year. (excluding 3 rd party damage): ≤ 50 12.0.3.2: Number of breaks per 100km of sub-main each year. (excluding 3 rd party damage): ≤ 175

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.4	Maintain pumping efficiency in city's reticulation (excluding rural townships)	Statutory requirements and reasonable customer expectations regarding water quantity and continuity of supply are met		2013/14: 0.30 2012/13: 0.34 2011/12: 0.41 2010/11: 0.38		Annual average kWh of electricity used per m ³ of water pumped: ≤ 0.37	Annual average kWh of electricity used per m ³ of water pumped: ≤ 0.37	Annual average kWh of electricity used per m ³ of water pumped: ≤ 0.37	Annual average kWh of electricity used per m ³ of water pumped: ≤ 0.35
12.0.5	Ensure consent compliance.	Minimises adverse social, cultural environmental and economic effects and meets statutory requirements		2013/14: 0 2012/13: 0 2011/12: 0 2010/11: 0		Number of infringement notices for major or persistent breaches of resource consents regarding water supply network operation as reported by ECan or CCC: Zero	Number of infringement notices for major or persistent breaches of resource consents regarding water supply network operation as reported by ECan or CCC: Zero	Number of infringement notices for major or persistent breaches of resource consents regarding water supply network operation as reported by ECan or CCC: Zero	Number of infringement notices for major or persistent breaches of resource consents regarding water supply network operation as reported by ECan or CCC: Zero

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if.....)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2024/25
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	
12.0.6	Maintenance of the reticulation network - Reduce the percentage of real water loss from the local authority's networked reticulation system	Statutory requirements and reasonable customer expectations regarding water quantity and continuity of supply are met	The percentage of real water loss from the local authority's networked reticulation system – <i>including a description of the methodology used to calculate this –</i> <i>Water Supply mandatory performance measure 2.</i>	New LoS – No past performance. Current system total loss est 22.4% (public and private) - 12.3% from public only)		≤ 15.0% water loss	≤ 15.2% water loss	≤ 15.4% water loss	≤ 20% water loss
12.0.7	Demand Management -Manage the average consumption of drinking water per day, per residents		<i>Water Supply mandatory performance measure 5.</i>		<i>Benchmarks to be sourced</i>	Average 298 litres per day, per resident	Average 298 litres per day, per resident	Average 298 litres per day, per resident	Average 298 litres per day, per resident

5 Review of cost effectiveness - regulatory functions and service delivery

Service: Water Supply

Current Arrangements			
Governance	Funding	Delivery	Estimated Cost
CCC	CCC	CCC and CCO (City Care Ltd)	\$32.0 million

Arrangements that cannot reasonably be changed in next two years			
Governed by Legislation	Contract or binding agreement	Not cost effective to review	Option
	Christchurch City Council Maintenance of City Water and Wastewater Network Contract.	This contract has been in place for less than 6 years and has greater than 2 years remaining.	No review necessary at this time

Network operation and communication systems maintenance are completed in-house by CCC.

General network maintenance is carried out by City Care Limited under the Christchurch City Council Maintenance of City Water and Wastewater Network Contract. The contract commenced 1 July 2010 with an initial 5 year duration and extensions for high performance. Including extensions the contract will expire in at least 2017 with further extensions moving this out to 2019. Award of the contract was on a non-competitive basis, however an external, independent review of contract rates was conducted to ensure Council obtained market value.

6 Long Term Infrastructure Strategy

6.1 Issues, principles and implications

6.1.1 Residential Red Zone

SCIRT supplied information indicates 10.16km of water supply reticulation infrastructure is within the residential red zone areas. It is unclear if this includes the areas red zoned due to rock fall risk so this number may increase. For planning purposes it has been assumed all water supply infrastructure in the Avon River residential red zone will be decommissioned due to redundancy.

A number of water supply pump stations, reservoirs and associated access tracks are on land red-zoned due to rock-fall danger. Current plans are to retain these assets as-is since the time staff are on-site is very low. Should health and safety or resiliency issues require changes to these plans a funding increase will be required.

6.1.2 Earthquake Legacy

Long term effects on the water supply network resulting from the earthquake are not well understood. SCIRT has completed works to return service to all customers and renewed a number of water mains. Approximately 50% of the water mains that meet the renewals criteria will not be renewed by SCIRT and remain for Council to renew.

Ground settlement is continuing following the earthquakes. Further water supply failures are possible from this settlement.

Movement during the earthquakes potentially caused microscopic cracks in water mains. Microscopic cracks in asbestos cement (AC) water mains decrease the pipe life leading to premature failure. The extent of this issue and potential outcome to the water supply network are not currently known.

Earthquake damaged wastewater and storm water networks pose a hazard to the water supply network, especially on hillsides. During storm events wastewater or storm water escaping their respective damaged networks can scour material surrounding water pipes leading to a failure. This occurred in two occasions in 2014.

6.1.3 Aging Network

The first public water supplies serving the Christchurch Area were Akaroa and Lyttelton in 1890, Sydenham in 1903 and then Christchurch CBD and Southern Christchurch in 1908. Technology advances lead to different pipe materials depending on installation dates. Initially cast iron pipes with an expected life of 120 years were used. Post WW2 through to the mid 1980's asbestos cement (AC, 60 year life) became the material of choice until health concerns led to a move to plastic pipes. The post-war "baby boom" period was a significant time of expansion for Christchurch with approximately 50% of the water supply reticulation network consisting of AC pipes installed at this time.

Both the AC and early cast iron pipes are approaching the end of their effective lives and require renewal. Renewals requirements are predicted to rise significantly over the next 15 years followed by 30 years of elevated renewals rates.

6.1.4 Pressure Management Project

A proposed pressure management project will see the Christchurch City water supply network split from the seven existing pressure zones into approximately fifteen new zones. The pressure in the majority of new zones will be reduced from current levels. Positive effects of this project include reduced pumping costs, reduced water leakage, increased pipe life and increased resiliency with earlier return to service following natural disasters.

Although an extended service life can be expected for pipes in pressure reduced zones this only applies to pipes in good condition. Pipe assets that are already in poor condition or at the end of their lives will not be granted life extensions.

6.1.5 Network Optimisation

Since network installation population demographics, land use, customer habits and technologies have all changed resulting in changing local water demand. Local demand changes are also anticipated as a result of growth and the pressure management project.

Renewal provides an opportunity to review the demand in an area and install the correctly sized infrastructure to meet demand. Installation of correctly sized infrastructure optimises the network and avoids additional costs from undersized assets or overinvestment. Demand models and the network model should be fully developed, updated and calibrated to provide tools for correct sizing on infrastructure.

6.1.6 Climate Change

Climate change has the potential to affect both supply of, and demand for water.

Warmer drier conditions are likely to result in increased water demand for irrigation and recreational use; however as an increase in land use intensity is expected to occur at the same time there will be a decrease in irrigated land and therefore the overall impact is unclear.

Christchurch City, Lyttelton, Governors Bay and Diamond Harbour are fed from groundwater sources. An increase in rainfall in the aquifer recharge areas means the Christchurch City and Lyttelton Harbour Basin water supplies should not experience adverse changes to water quantity or quality. Local water quality issues may arise should sea level changes however move the fresh water/salt water interface inland. This could be remedied through decommissioning of coastal pump stations and replacement with inland pump stations with trunk mains to the coastal pressure zones.

Wainui water supply scheme is also groundwater fed. Rainfall reductions are predicted for the Wainui aquifer recharge zone; however due to the low flows extracted for the water supply scheme the climate change rainfall decrease is not anticipated to affect availability of water.

Due to salt-water contamination of the existing bore a new water source for the Birdlings Flat water supply scheme is currently under investigation. As the water source is not yet established it is not possible to determine how it could be affected by climate change.

Akaroa, Takamatua, Duvauchelle Bay, Pigeon Harbour and Little River water supply schemes are fed from surface water sources. The climate change predictions of decreased rainfall will result in reduced river flows and are likely to directly impact the quantity of water available to be taken for water supplies. High flow periods of turbid water are expected as a result of the increased rainfall intensity. This turbid water is not suitable for treatment in the existing water treatment plants and therefore treatment plant upgrades and significantly increased storage may be required to maintain water supplies to these areas in the future.

6.1.7 System Losses

SCIRT leak detection work following the earthquakes returned the average water supply network leakage rate to 129L per connection per day or 14.9%. These numbers are based on night-flow field testing of the Christchurch City and Lyttelton Harbour Basin water supplies and do not include rural Banks Peninsula supplies. No recent testing has been carried out on Banks Peninsula supplies but some testing is proposed for the current year.

The figure of 129L/connection/day was achieved following significant expenditure by SCIRT. It is unlikely this expenditure can be maintained by Council and therefore the leakage rate will increase. Council is aiming to maintain leakage below the pre-quake rate of 165L/connection/day.

Due to water conservation efforts the percentage water loss will increase even if actual leakage rates remain constant.

6.1.8 Reliability of Supply

A decreased reliability of supply is anticipated, primarily due to increased failures in the aging reticulation network. Reticulation failures cause short term (approximately 5 hour) outages to groups of individual properties but are typically limited to one block or less.

Larger scale supply limitations commonly occur in Lyttelton, Akaroa and Takamatua. Lyttelton large scale outages are caused by high demand from the Port Company to refill cruise ship water tanks resulting in Exeter reservoir being drained. Possible remedies for this are to increase the supply to the reservoir or limit maximum flows to the port.

Summer water restrictions are often imposed on Akaroa and Takamatua. A project to construct a new water treatment plant, increased storage volume and merge the existing three schemes into a single scheme is underway. On completion this is expected to avoid the need for future restrictions.

Salt water contamination has occurred at the Birdlings Flat water supply bore rendering it unusable. In the short term water tankers from Christchurch are providing water to Birdlings Flat while a new water source is developed.

The decentralised nature of Christchurch City water sources provides a resilient network unlikely to be affected by failures at individual bores or pump stations.

Christchurch City hillside pressure zones are each fed from a single reservoir and Banks peninsula water supplies are each fed from a single treatment plant. Lack of redundancy means reservoir or treatment plant failures could cause supply interruptions; however water storage means short-term faults will not result in supply interruptions.

Lyttelton Harbour Basin water supplies have a number of areas where resiliency is an issue, these include:

- Supply pipes to Lyttelton through the Port Hills;
- Supply pipes on the seabed from Lyttelton to Diamond Harbour; and
- The supply pipe from Lyttelton to Governors Bay.

Access to the Port Hills and seabed pipes is limited and requires specialised equipment and expertise. Catastrophic failure of any of these pipes or the Port Hills tunnels has the potential to cut water supply to individual settlements of the Lyttelton Harbour Basin as a whole. Actual interruptions will depend on the duration of outages as water is stored in reservoirs in the Lyttelton Harbour Basin. Rail tunnel pipes are approaching the end of their lives and a project to renew them is in the LTP, resiliency will be considered as part of this project. The Governors Bay pipeline is constructed of a known poor quality material and may fail prematurely, a project to replace this pipeline will be submitted in the near future.

7 Review of cost-effectiveness - infrastructure delivery

Water supply creations, renewals and replacements

Current Arrangements			
Governance	Funding	Delivery	Estimated Cost
CCC	CCC	Capital renewals only. CCC and various contractors	\$11.6 million
CCC	CCC and Private Developers	Growth capital projects only. Various contractors and private developers.	\$0.006 million

Estimated costs in the table are average annual costs over the LTP period.

Arrangements that cannot reasonably be changed in next two years			
Governed by Legislation	Contract or binding agreement	Not cost effective to review	Option
Local Government Act	Council Procurement Policy	Design work is tendered or completed in-house dependant on cost, resources and specific skills requirements. All construction work is tendered.	No review necessary

8 Significant Effects

The significant negative and significant positive effects are listed below in Tables 8-1 and 8-2 respectively.

Table 8-1 Significant Negative Effects

Effect	Council's Mitigation Measure
Cost to Council/Ratepayers of operating a potable water supply.	Documented processes and maintenance systems control cost. Asset renewal used to continuously improve network efficiency.
Effects of water abstraction on the environment.	Network maintenance and water conservation measures to minimise wastage. Annual leak detection programme to monitor water loss. Maintain resource consent compliance and avoid over abstraction
Land use compromises aquifer security and/or quality.	Ensure land use documents at City and Regional level recognise virtue of water supply. Work with Canterbury Water Forum to improve risk understanding in land use.
Over extraction limits water available for growth of the City.	Maintain network in good condition to reduce leaks. Operate within consents.
Salt-water intrusion in coastal regions compromises water quality.	Monitor well takes in coastal areas for salinity (conductivity) and investigate any changes. Long term strategy to move wells away from coast if possible.
Legislation requires chlorination or fluoridation of the water supply.	React to Central Government legislation as required. No current plans to chlorinate or fluoridate water supply.
Natural disasters cause widespread damage to the water supply network.	Earthquake design guidelines incorporated in rebuild. Well, pump station, reservoir and pipeline designs more resilient than old assets. Continue to invest in renewal programme to remove weaker assets from network (AC pipe).
Earthquake legacy of reduced asset lives and red zone infrastructure.	SCIRT will not return all earthquake damaged assets to pre-earthquake condition. This will leave a legacy of deferred replacement for CCC to manage.

Table 8-2 Significant Positive Effects

Effect	Description
Economic development.	Provision of an efficient water supply network allows premises to operate, therefore allowing economic growth and prosperity. Christchurch water supply is untreated, highly valued and relatively cheap. This provides a significant point of difference for the City.
Public health.	Provision of clean, safe water reduces risk of waterborne diseases and infections. Provision of water for cleaning and washing promotes hygiene reducing public health risks.
Image	Provision of water for irrigation promotes plant growth therefore assisting to maintain the "Garden City" image.
High quality, untreated potable urban water supply.	Untreated water supply promotes green nature of City.
Low cost of water.	Untreated, distributed well field means no expensive treatment processes.
Water conservation defers capital investment in infrastructure.	Active, economic leak detection and repair as well as education help defer capital investment to meet 'peak summer day' demand which is driven by irrigation of gardens.
A distributed water supply and lack of a need for treatment provides resiliency.	154 wells and pump stations provide resilient system. No one central point of failure other than contamination of all aquifers.
Current water take consents give security of supply until 2050.	City currently well within current consented take. Provides security for growth of City.

8.1 Assumptions

Council has made a number of assumptions in preparing the Activity Management Plan. Table 8-3 lists the most significant assumptions and uncertainties that underline the approach taken for this activity.

Table 8-3 Major Assumptions

Assumption Type	Assumption	Discussion
Financial assumptions.	That all expenditure has been stated in 1 July 2015 dollar values and no allowance has been made for inflation.	The LTP will incorporate inflation factors. This could have a significant impact on the affordability of the plans if inflation is higher than allowed for, but Council is using the best information practically available from Business and Economic Research Limited (BERL).
Asset data knowledge.	That Council has adequate knowledge of the assets and their condition so that the planned renewal works will allow Council to meet the proposed levels of service.	There are several areas where Council needs to improve its knowledge and assessments. Significant uncertainty exists about the works that will be completed by SCIRT and there is a risk that a change to the level of expenditure will be required. Although the uncertainty exists this assumption had to be made as the data used was the best available. The subterranean nature of the majority of water supply assets makes condition assessment difficult and expensive.

Assumption Type	Assumption	Discussion
Growth forecasts.	That the district will grow as forecast in the LURP and Growth Demand and Supply Model.	If the growth is very different it will have a moderate impact. If higher, Council may need to advance capital projects. If it is lower, Council may have to defer planned works.
Network capacity.	That Council's knowledge of network capacity is sufficient enough to accurately programme capital works.	If the network capacity is higher than assumed, Council may be able to defer works. The risk of this occurring is low and will have little significance. If the network capacity is lower than assumed, Council may be required to advance capital works projects to address congestion. The risk of this occurring is low; however the impact on expenditure would be significant.
Emergency funding.	That the level of funding in these budgets and held in Council's disaster fund reserves will be adequate to cover reinstatement following emergency events.	Funding levels are based on historic requirements. The risk of requiring additional funding is moderate and may have a moderate effect on planned works due to reprioritisation of funds. Note, this assumption may need to be revised once the costs of the December 2011 heavy rain event are known.
Timing of capital projects.	That capital projects will be undertaken when planned.	The risk of the timing of projects changing is high due to factors like resource consents, funding and land purchase. Council tries to mitigate these issues by undertaking the consultation, investigation and design phases sufficiently in advance of the construction phase. If delays are to occur, it could have significant effects on the level of service.
Accuracy of capital project cost estimates	That the capital project cost estimates are sufficiently accurate enough to determine the required funding level.	The risk of large under estimation is low; however the importance is moderate as Council may not be able to afford the true cost of the projects. Council tries to reduce the risk by including a standard contingency based on the projects lifecycle.
Changes in legislation and policy, and financial assistance.	That there will be no major changes in legislation or policy.	The risk of major change is high due to the changing nature of the government and politics. If major changes occur it is likely to have an impact on the required expenditure. Council has not mitigated the effect of this.

9 Risk Management

Council's risk management approach is described in detail elsewhere

High risk items are listed in Table 9-1 below.

Table 9-1 Significant Risks and Control Measures

Risk	Impact	Priority	Risk Strategy	Risk Response / Mitigation
Long term power outage.	Unable to deliver water to areas of the city where direct well fed and not on standby generator. Unable to deliver water to reservoirs	Extreme	Mitigate	<ul style="list-style-type: none"> • Reservoirs contain sufficient storage for short term outages • Commonality of connections and specified size for emergency generators • Contractor plan to recommend priority of supply • Commonality of connections and specified size for emergency generators • Contractor to sample fuel tanks regularly and hook up generators as per priority of supply. Emergency connections to well fields to allow local manual distribution where well has sufficient pressure to flow at ground level.
Contractor acts contrary to Contractors Plan – pump station availability	Pump station availability does not comply with KPIs	Extreme	Mitigate	<ul style="list-style-type: none"> • CCL compliance to contract requirements • Regular contract meetings at all levels • Audit and performance reviews
Raw water too turbid to treat – for treated water supplies	Fail to deliver treated water in accordance with public expectations. Unbudgeted expenditure due to water cartage requirements	Extreme	Mitigate	<ul style="list-style-type: none"> • Scada monitoring of turbidity • Diversion valves • CCC plan supplementary supplies • Design plants for wide range of water conditions
Uncontrolled concentration of	Ineffective chlorine residual in water	Extreme	Mitigate	<ul style="list-style-type: none"> • Chlorine dosing procedure and SOPs for reservoir dosing

chlorine in bulk supply	supply. High chlorine content causing odour and taste issues			<ul style="list-style-type: none"> Proper training of staff and contractors Audit of technical staff competency
Drainage of surface flooding due to well repairs (well redevelopment)	Discharge of contaminated water (sand and silt) into the environment	Extreme	Mitigate	<ul style="list-style-type: none"> Dewatering code of practice Training of contractors All well head works to be controlled under permit to work.
Two designs for emergency generator connection plug means that a generator could arrive on site and not be connected	Inability to connect generator due to incorrect connection type. Slows down restoration of services in an emergency	Extreme	Mitigate	<ul style="list-style-type: none"> Standardisation of genset plug connectors Leads may be left on site and electrician connects Generator connection procedure and training
Pipe materials do not achieve their design life	Higher interruption to water supply network. Unbudgeted expenditure on premature pipe replacement. Council KPI not achieved	Very High	Mitigate	<ul style="list-style-type: none"> CCC use asset renewal programme to identify at risk assets and replace on a priority basis. CCL to provide samples and failure / condition codes to increase understanding of pipe failure mechanisms. Maintain list of approved materials
Contamination of water supply through repairs – untreated water supply	Public illness reported. Excessive maintenance expenditure. Public loss of confidence in water supply.	Very High	Accept	<ul style="list-style-type: none"> CCC water contamination procedure to be implemented by all SCIRT contractors. Maintenance to be undertaken in accordance with Contractor's plan. Regular auditing of work activities by CCC and SCIRT.
Valves inoperable, covered or left in incorrect normal	Cannot maintain the network. Restricts flows from	Very High	Mitigate	<ul style="list-style-type: none"> Implement O&M procedures Implement appropriate training with contractors

operating position	major headworks. Risk to loss of supply. Impact customer satisfaction and therefore CCC KPIs			<ul style="list-style-type: none"> Regular datum of hydrants measures for pressure and flow.
Not meeting water quality grading as specified in the KPIs. Grading is a term no longer used – and the drinking water standards are now absolute measurements	Public health effects. Adverse media attention. Increased risk to public health. Potentially high expenditure to meet the new standards	Very High	Accept	<ul style="list-style-type: none"> Design and build plant upgrades to LTP programme that meet drinking water standards. Develop new secure wells. CCC sampling programme to be fully compliant Operate to Public Health Management Plans
Medium / long term degradation of aquifer supply due to land use (in particular nitrates)	City's water supply needs advanced treatment	High	Accept	<ul style="list-style-type: none"> Land use regulations including fertiliser loading and stock rates. Close and more frequent monitoring. Council obtain all Ecan data and map on our GIS system

10 Improvement Plan

City Water and Waste have developed a Contract Management Improvement Plan. Version 1.0 dated May 2014 is saved in TRIM – reference 14/995771.

Appendix A of the plan – Actions Table - sets out the actions, responsibilities, expected benefits and owner of the various actions identified. It is a snapshot as at May 2014. It is intended that the Improvement Plan is continually updated and monitored as a live document.

Contractors report their innovations, improved work practices and application of technology.

Asset management improvement plan is designed to achieve continuous improvements in the delivery of services through more efficient use of assets throughout their life cycle.

11 Operations, Maintenance and Renewals Strategy

11.1 Operations and Maintenance

Council has determined that the most effective way to achieve its objectives is a mixture of in-house operations and contracting out professional engineering services and physical maintenance works to commercial consultants and contractors. Contractors and Consultants will be employed following the Council Procurement Policy in order to execute work at market value.

Water supply operations are largely automated with monitoring and manual control of most sites conducted by Council staff using the SCADA system based at Christchurch WwTP. Communication to Banks Peninsula sites is currently limited; however planned upgrades to the Akaroa water treatment plant, Little River water treatment plant and radio repeaters are expected to remediate this and allow expansion of the SCADA system.

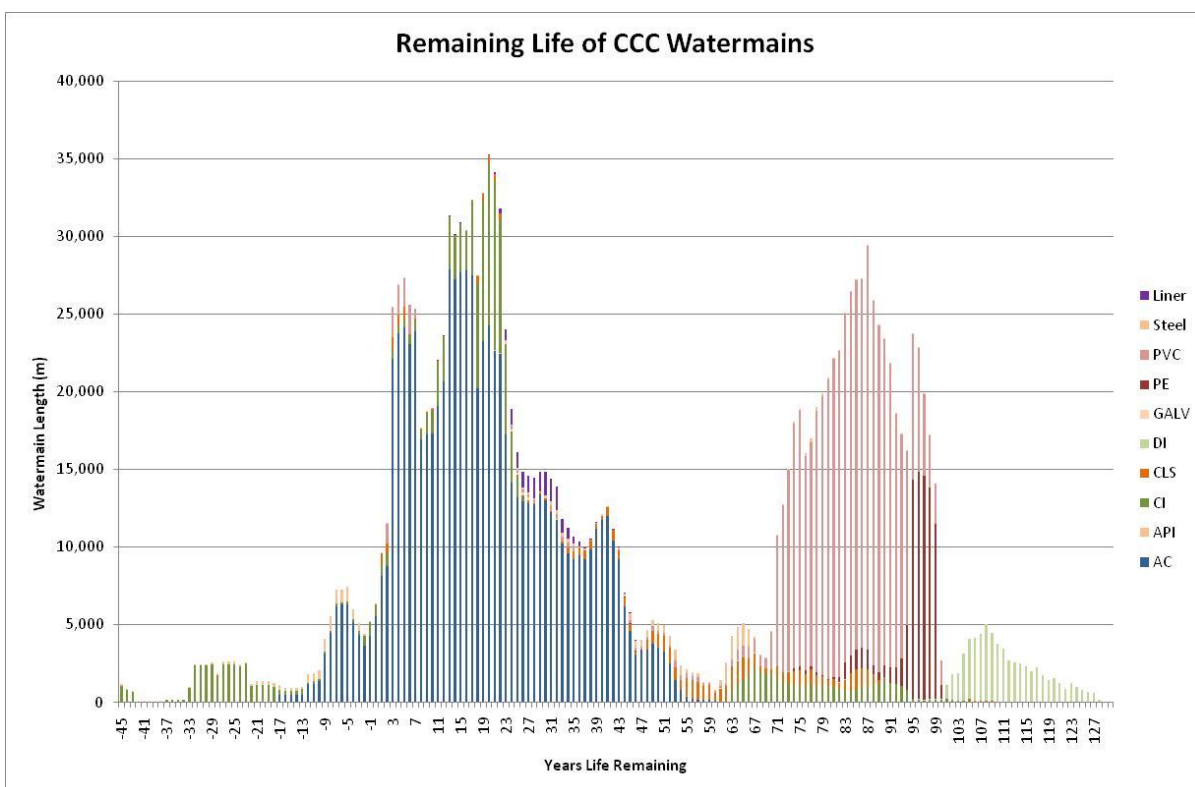
Most water assets are maintained by an external Contractor under the Christchurch City Council Maintenance of City Water and Wastewater Network Contract. This contract includes preventative maintenance, reactive maintenance, replenishment of consumables (except electricity and fuel), condition assessment and cleaning.

11.2 Renewals

Assets are considered for renewal based on condition assessment surveys, as they near the end of their effective working life, where the cost of maintenance becomes uneconomical or where required by the renewal of another asset. Criticality of assets is considered during renewals planning with higher levels of condition monitoring applied to assets where the risk of failure is high. Lower criticality assets are renewed on a reactive basis.

Figure 11-2 shows remaining lives of water supply mains. A large building boom occurred following WW2. Water supply infrastructure installed during the building boom is now approaching the end of its life and increased renewals expenditure will be required to maintain levels of service.

Figure 11-2 Water Main Remaining Life



Water treatment, storage and pumping assets are renewed on a planned basis based on condition and/or performance. Well pumps are the exception being renewed reactively as the cost of pump

removal for assessment exceeds the benefits. Small non-critical assets at stations such as sump pumps are renewed reactively.

The remainder of the water supply network is formed by the reticulation network. Critical mains in the reticulation network are condition assessed and renewals planned accordingly. Lower criticality mains become renewals candidates following 3 failures per intersection length with candidates prioritised by condition and renewed as budget allows. Individual small assets such as valves, hydrants and water meters are renewed reactively following failures.

12 Key Projects

Table 11-1 details the key capital and renewal work programmed for years 2015 to 2025.

Table 12-1

Project Name	Description	Year 1 (\$)	Year 2(\$)	Year 3 (\$)	Years 4-10 (\$)	Project Driver
	For details of the capital works relating to this activity refer to the draft Capital Programme, draft Long Term Plan, volume 1					

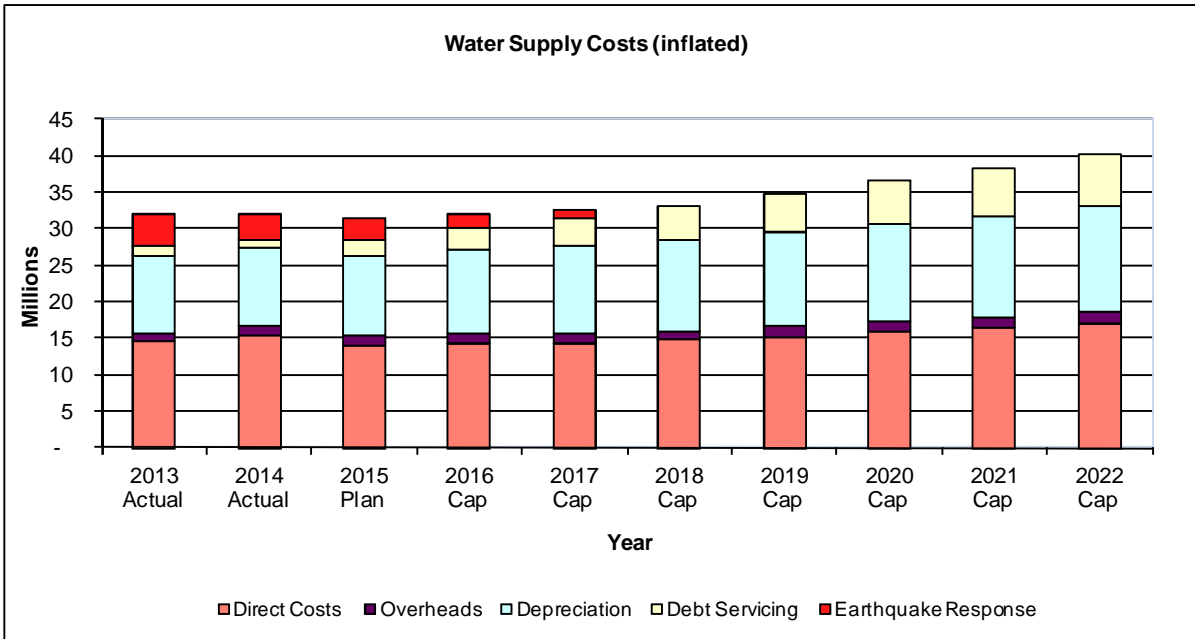
Note: G = Growth, LoS = Levels of Service, R = Renewal

13 Summary of Cost for Activity

Figure 13-1

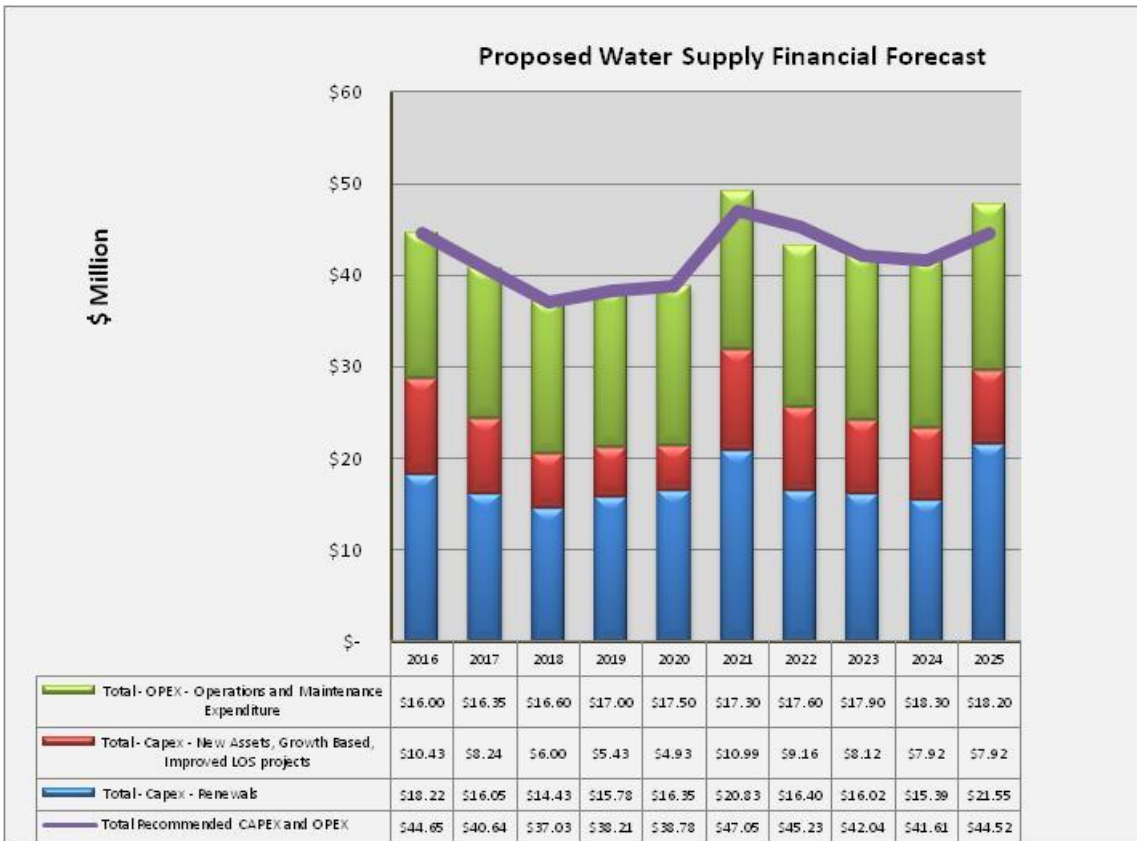
WATER SUPPLY	Funding Caps in 2015/16 Dollars				Funding splits exclude EQ Costs from all calculations				Period of Benefit (years)	Comments
	2014/15 Annual Plan	2015/16	2016/17	2017/18	Funding - User Charges	Other revenue	General rate	Targeted rate		
	000's									
Operational Budget										
Supply Continuous Potable Water	14,094	14,239	14,019	13,887						
Manage Risk to Potable Water Supply	-	-	-	-						
Monitor Effectiveness of Pipe Renewals	-	-	-	-						
Maintain Pumping Efficiency	-	-	-	-						
Ensure Consent Compliance	-	-	-	-						
Activity Costs before Overheads	14,094	14,239	14,019	13,887						
Earthquake Response Costs	3,046	1,905	1,036	-						
Corporate Overhead	1,332	1,326	1,312	1,245						
Depreciation	10,886	11,532	11,577	11,671						
Interest	2,082	2,959	3,788	4,479						
Total Activity Cost	31,439	31,961	31,732	31,282	10% Availability	0%	0%	90% Majority		
Funded By:										
Fees and Charges	2,989	3,075	3,075	3,075						
Grants and Subsidies	-	-	-	-						
Earthquake Recoveries	1,800	1,111	617	-						
Total Operational Revenue	4,789	4,186	3,692	3,075						
Net Cost of Service	26,650	27,775	28,040	28,207						
Funded by:										
Rates	25,404	26,980	27,621	28,207						
Earthquake Borrowing	1,246	794	419	-						
	26,650	27,775	28,040	28,207						
Capital Expenditure										
Earthquake Rebuild										
Renewals and Replacements										
Improved Levels of Service										
Additional Demand										

Figure 13-2



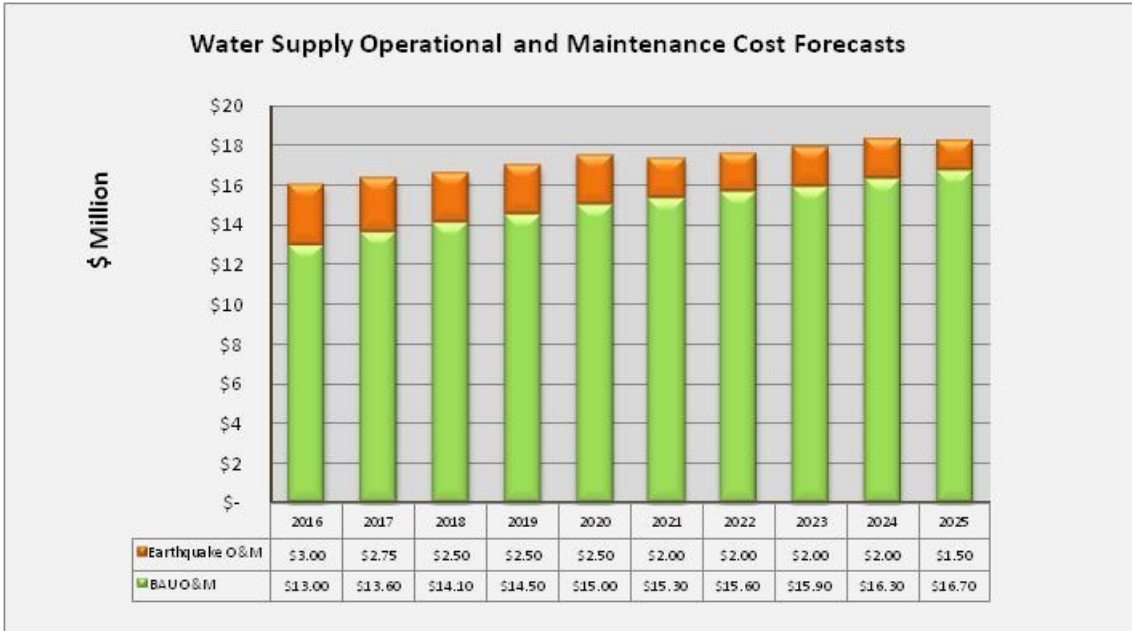
The following figures have been developed from forecasts of the operations, maintenance, renewal, creation and disposal cost requirements. Forecast preparation used all available information including modelling, the LURP and information from SCIRT. Inflation is excluded from the figures and all costs are presented in 2015 dollars.

Figure 13-3 Total Expenditure



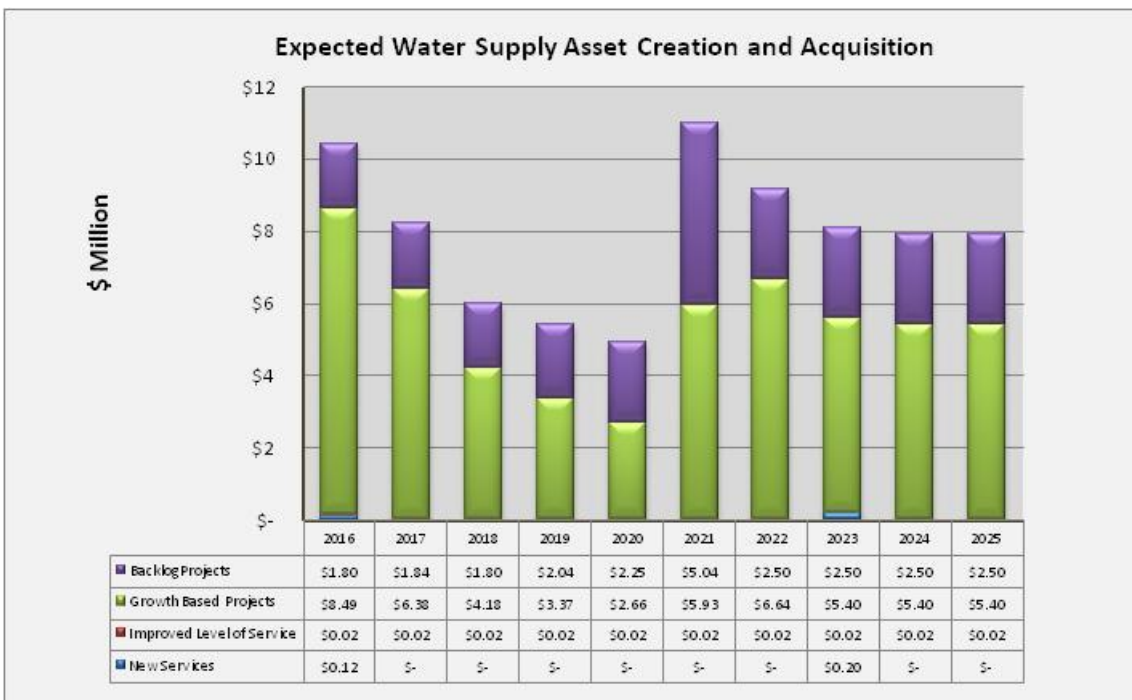
A gradual increase with individual peaks is the overall trend. Trends and peaks in each category will be explained further in each section below.

Figure 13-4 Operating Expenditure



Business as usual (BAU) operating and maintenance expenditure is expected to increase as the population increases and the network ages. Increases in BAU operational and maintenance costs are offset by a decrease in earthquake related operating and maintenance costs as the remaining damaged assets are replaced as part of the renewals programme.

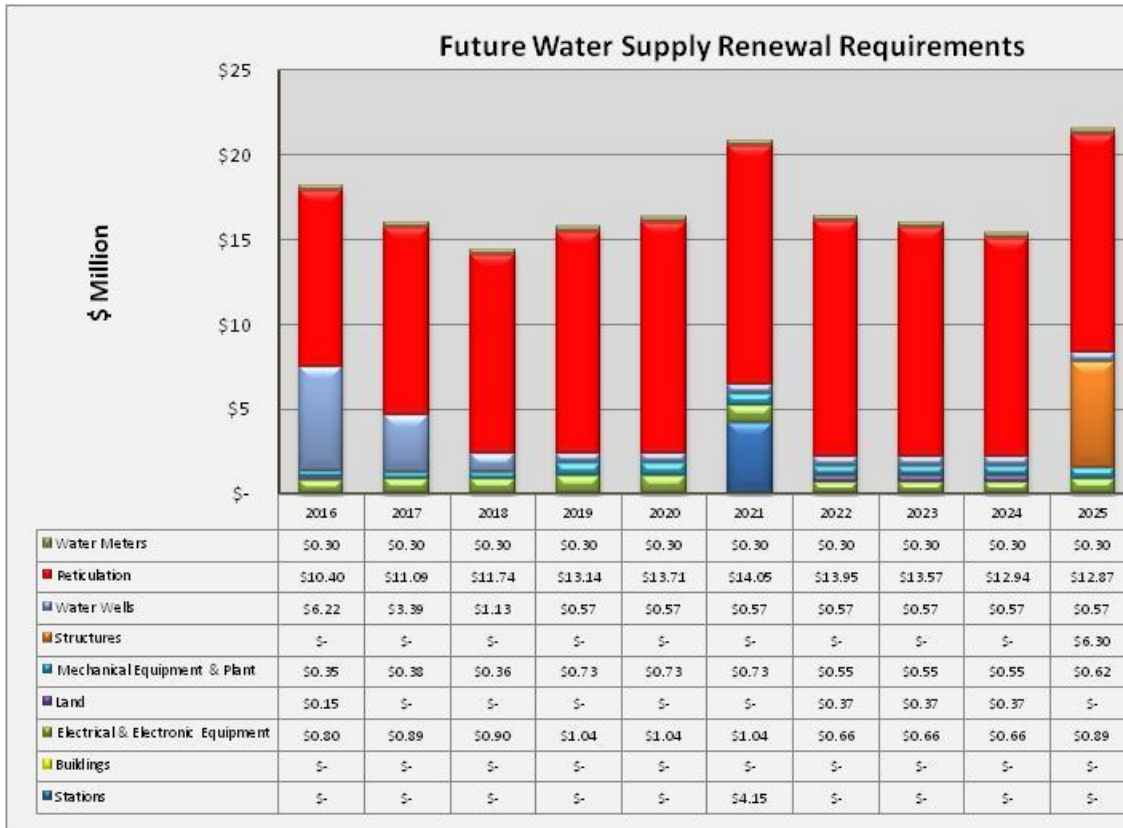
Figure 13-5 Capital Expenditure



CAPEX expenditure for the creation and acquisition of new assets is affected in the first five years due to the LURP making land available for subdivision in multiple areas at the same time. This sees high expenditure in the 2016-17 period with reduced expenditure in following years. From 2021-2025, growth related projects are anticipated to remain relatively constant.

Backlog projects are also relatively constant except for a peak in the 2021 financial year caused by an overlap between completing Christchurch City Optimisation and commencing the Akaroa Supplementary Supply projects.

Figure 13-6 Renewals Expenditure



Peaks occur in the renewals expenditure in 2016-17, 2021 and 2025 financial years, all due to specific large projects. The 2016-17 peak is a combination of renewing earthquake damaged wells and renewing wells in the Northwest Zone for water quality and risk avoidance. The 2021 peak is the construction of a new pump station building and suction tank at Kerrs pump station while the 2025 peak is renewal of the earthquake damaged Sydenham pump station suction tank. Excluding the large projects renewals expenditure is mainly dependant on reticulation renewals and remains relatively constant.