2024

Water Supply

Asset Management Plan

Christchurch City Council

Asset Management Plan Summary

Water supply

Asset management plans

Together, our 14 asset management plans (AMP) present a detailed description of all the things – roads, cycleways, footpaths, pipes, buildings, vehicles, parks and so on – that the Christchurch City Council owns, across all areas of work, and how these 'assets' are planned, managed, operated and funded.

All our assets belong to and are managed and operated on behalf of ratepayers.

Ensuring our assets are appropriate for the city's needs enables us to deliver the services that make Christchurch and Banks Peninsula a great place to live, work and visit.

What we do

We provide potable water for drinking and other uses to around 160,000 homes, businesses and industries. We own, plan, manage and operate three urban and four rural water supply schemes supplying water to Christchurch City and Lyttelton Harbour Basin, Akaroa and Takamatua, Duvauchelle, Wainui, Birdlings Flat, Little River and Pigeon Bay.

Why we do it

Providing a high quality, clean, safe and sustainable drinking water supply is an essential service.

High quality drinking water ensures the community is protected from water-borne diseases and that public drinking water supplies meet safety and health risk standards.

We aim for our water supply assets and activities to contribute to safe and healthy communities, to supply high quality drinking water, to use resources in a sustainable way and for our infrastructure and facilities to be modern and robust.

Our assets

Our water supply schemes consist of water treatment plants, pump stations, reservoirs and reticulation networks with a total replacement value of $2.87 billion.

Where we've come from

Christchurch's public water supply began in Sydenham in 1903 expanding into five individual schemes operated by the five borough councils. The five local bodies merged into the new Christchurch City Council in 1989. Banks Penninusla water supplies began in Akaroa in 1890 and came into Council stewardship in 2006 following amalgamation.

Christchurch City and the Lyttelton Harbour Basin has a decentralised system of multiple wells that provide high quality deep aquifer groundwater straight into the reticulation system for consumption. Banks Peninsula schemes collect water from streams, springs and wells and treat this water to make it safe to drink.

The Canterbury earthquakes of 2010 and 2011 Canterbury disrupted the water supply. Repairs and temporary solutions were completed rapidly to restore water supply provision, followed by a programme of assessment and rebuilding. This event increased awareness of the need for water supply resilience.

The 2016 Havelock North water contamination event put a national spotlight on the risk of water supply contamination. Expert security assessments of our well heads in late 2017 found that none were secure. This cost Christchurch its secure bore status, which is needed if water is not treated. Since then much of the city and Brooklands/Kainga water supples have been temporarily dosed with chlorine while infrastructure upgrades are completed. A priority programme of work is now under way to minimise contamination risks and ensure water supply security.

Our issues and risks

Our network is vulnerable to a wide range of risks, from issues such as climate change through to inherent operational risks, such as not complying with a resource consent. These are outlined in the asset management plan, along with the planned mitigation activities.

What it costs

Our proposed budget in Year 1 of the 2024 LTP is $177.27 million, with the operating expenditure projected at $102.75 million and the capital expenditure at $74.52 million. Tables for each area of spending are included in our asset management plan (Appendix 5.7).

How we're funded

Our expenditure is determined under the Council's Revenue and Funding Policy, based on who benefits.

This policy is being reviewed for the Long Term Plan 2021-31.

- Operational expenditure (including maintenance) is funded by rates (targeted, general, separate and differential) and through fees and charges.
- Capital expenditure is funded by borrowing and repaying over several years.
- Private developer vesting – water supply assets are created during the subdivision process and vested with the Council.

How it's delivered

The Three Waters and Waste Unit is responsible for water supply. Several teams across this unit are involved in delivery, along with other staff and private contractors.

- **Staff deliver**
    - Network and water supply operations, water services, asset planning and management, project management, quality control and compliance.
    - Reactive and planned renewals and improvements
    - Major maintenance
    - SCADA system
    - Financial and legal advice
    - Supervision and liaison with external contractors
- **Contractors deliver**
    - Maintenance and construction
- **Key delivery partners**
    - Technical Services Unit (Council)
    - Transport Unit (Council)
    - City Care Ltd
    - Consultants Panel
    - Land developers
    - Environment Canterbury
    - Ministry of Health/Government Regulator

Our functions and services

Residents want reliable, safe, high quality drinking water. They want us to operate and maintain the service in a responsive manner that also demonstrates environmental stewardship. Ratepayers also want value for money.

We apply engineering, financial and management practices to achieve the agreed levels of service, for the most cost-effective expenditure. This means optimising investment and outcomes within the constraints of finance, service levels and resources.

Managing our assets involves considerable spending, so it is vital that we do the right thing, at the right time and for the right price.

Maturity assessment

The 2023 maturity assessment for all of our 3-Waters assets, not just the wastewater activity, shows we are performing at a core/intermediate level. This is a reduction in level from the 2020 assessment that had this activity at an intermediate or advanced level.

Planned Improvement items over the next three years would focus on enhancing key data management, forecasting, master planning and a focus on levels of service and customer engagement.

Little progress was made on business improvement items identified in the 2018 or 2021 Asset Management Plans so these items are again proposed in this LTP. However, as there has not been any additional funding provided through this Long Term Planning (LTP) process to support the Asset Management team to carry out any improvement items it is unclear how any planned improvements will be realised.

Looking ahead

In the long term, water supply asset management is expected to align with Te Wai o Tane – Integrated Water Strategy, which sets out the Council's vision, goals, objectives and suggested implementation for work in the water supply area.

Shorter term as we move into the 10 years of the Long Term Plan 2024-34 there are a number of specific challenges. These include aging infrastructure, new regulations, service delivery reform, climate change, risk, resilience, demand management, data-rich smart solutions and increased inflation rates affecting capital projects. The capital programme has been constrained for the first 10 years of the LTP, meaning a reduction in asset renewals.

Our immediate priorities will be to focus on renewing assets with the highest criticalities to ensure the level of service drops do not affect essential services.

Ageing infrastructure

Different pipe materials used at different times in history have different lives. These different lives mean pipes from different growth periods in Christchurch's history are all arriving at their "use-by" dates at the same time, so we now have a sizeable proportion of pipelines in poor condition and frequent pipe breaks interrupting the service.

New regulations and reform

The drinking water regulatory environment in New Zealand is changing.

The previous Government's Three Waters Reform proposed a changes in regulation, funding and organisational arrangements. However with the change in Government, the form of any sort of reform is unknown.

We will need to comply with the new drinking water standards, and this will require a focus on reservoir and suction tank condition, leakage rates and backflow prevention.

Climate change

In addition to overcoming the problem of aging infrastructure, we need to focus on mitigating the expected effects of climate change.

Christchurch is a coastal city and climate change will have a significant impact, especially in the coastal areas. We are likely to see changing rain patterns, sea level rise, higher levels of groundwater and groundwater salinity, drought, increased demand and water shortages. These changes will affect our operations, maintenance and planning.

Continuous improvement

While we have a strong commitment to continuous improvement within the business unit, our efforts are constrained by resourcing and funding.

This means planning to ensure the highest priority improvement items are delivered first, and that future needs and delivery costs are well understood given the constrained funding in the Long Term Plan 2024-34.

Document Control

Version Control

Version numbering changes when a document is approved. Draft document numbering starts at 0.01. Released or approved numbering starts at 1.01.

Version	Date	Description
1.01	31/01/2024	Draft for approval for consultation
1.02	03/07/2024	Final following adoption of LTP

Document Acceptance and Release Notice

This is a managed document. For identification of amendments each page contains a release number and a page number. Changes will only be issued as a complete replacement document. Recipients should remove superseded versions from circulation. This document is authorised for release once all signatures have been obtained.

Name	Role	Status	Signed	Date
Brent Smith	Head of Three Waters	Final	B Smith	8/3/2024
Tony Richardson	Finance Business Partner	Final	T Richardson	11/3/2024
Jane Parfitt	General Manager Infrastructure, Planning & Regulatory Services	Final	J Parfitt	11/3/2024

Long Term Plan documentation

Christchurch City Council's Long Term Plan (LTP) consists of a group of integrated documents intended to be read in conjunction with each other.

Activity Plans include community outcomes, levels of service KPIs, future impacts and demands (such as growth) and finances. Asset Management Plans specifically cover asset lifecycles and asset risks.

This enables Council to meet the detailed requirements of the Local Government Act 2002, which applies to all councils in New Zealand.

Other approaches to asset management (for example the International Infrastructure Management Manual or ISO 55000) should consider both plans together, rather than Asset Management Plans in isolation.

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1 Introduction to our Asset Portfolio

1.1 Background

Christchurch's water supply has evolved from the various community schemes that began joining up with central reticulation in the 1890s and early 1900s. Standardisation of water supply provision increased from 1989 when five local bodies merged into the new Christchurch City Council. Stand-alone Banks Peninsula water supplies came into Council stewardship in 2006 following further amalgamation.

Christchurch City has benefitted from a decentralised system of multiple wells that provide high quality deep aquifer groundwater straight into the reticulation system for customer consumption.

The 2010/2011 Canterbury earthquakes disrupted the water supply but because of the decentralized supply system, repairs and temporary solutions were completed rapidly after the earthquakes to restore water supply provision, followed by a programme of assessment and rebuilding. This event increased awareness of how the water supply activity can be made more resilient and the need to manage any legacy impacts of the earthquakes on the water supply infrastructure.

In 2016 a water contamination event in Havelock North has triggered numerous legislative changes that affect the water supply activities across New Zealand under the broad programme of Central Government 3 Waters Reform. The new legislation include Taumata Arowai – the Water Services Regulator Act 2020, the Water Services Act 2021, the Water Services Entities Act 2022, the Water Services Legislation Bill, the Water Services Economic Efficiency and Consumer Protection Bill, and the Health (Drinking Water) Amendment Act 2007. New Drinking Water Standards, Drinking Water Quality Assurance Rules and Aesthetic Values came into effect on 14 November 2022 and triggered additional requirements relating to the drinking water supply system including source water, treatment and distribution systems. Council's forward programme of work includes capital programmes to meet the regulatory requirements that will have to include protozoal treatment of all groundwater(UV treatment) as well as permanent chlorination facilities to maintain residual disinfection. Provision is also made for fluoridation as required in terms of the Health (Drinking Water) Amendment Act, even though Christchurch has not yet received a Directive to commence fluoridation of drinking water.

New Zealand's wastewater services are going through a period of regulation change by the Central Government, although it is still uncertain what changes the new Government may bring, particularly with regard to any sort of water reform. This AMP has been prepared on the basis of prudent management of the assets and activity, irrespective of when and how any future changes to water regulation and managment takes place.

The Council supplies water to approximately 160,000 residential and business customer connections, through seven water supply schemes in Christchurch City, Lyttelton, Governors Bay, Diamond Harbour, Akaroa, Ducauchelle Bay, Birdlings Falt, Little River, Pigeon Bay and Wainui. Christchurch City, Lyttelton, Governors Bay, Diamond Harbour, Akaroa and parts of Duvauchelle are urban on-demand water supplies also provide fire fighting water while the remainder of Duvauchelle, Birdlings Flat, Little River, Pigeon Bay and Wainui are rural restricted water supply schemes supplying a set quantity per day to fill private water tanks.

Each scheme has headworks assets consisting of water treatment plants (only in Banks Peninsula), pump stations, wells, stream intakes (only in Banks Peninsula) and reservoirs and reticulation assets consisting of pipes, valves, fire hydrants and other fittings.

The key services that customers want delivered are:

- Water supplies are reliable
- Water supplies are operated and maintained in a responsive manner
- Water supplies are safe and wholesome to drink
- High quality water is provided
- Water supply networks and operations are sustainable.

These key services form the basis for water supply to the community through the sub-functions of:

- Water sources (groundwater and surface water)
- Water treatment (where required)
- Water storage and reticulation, including flow, pressure and reservoir level monitoring
- Water conservation program including leak detection and management.

1.2 Asset Lifecycle Approach

Council has established a lifecycle management framework, aligned to the *International Infrastructure Management Manual* as illustrated in Figure 1-1.

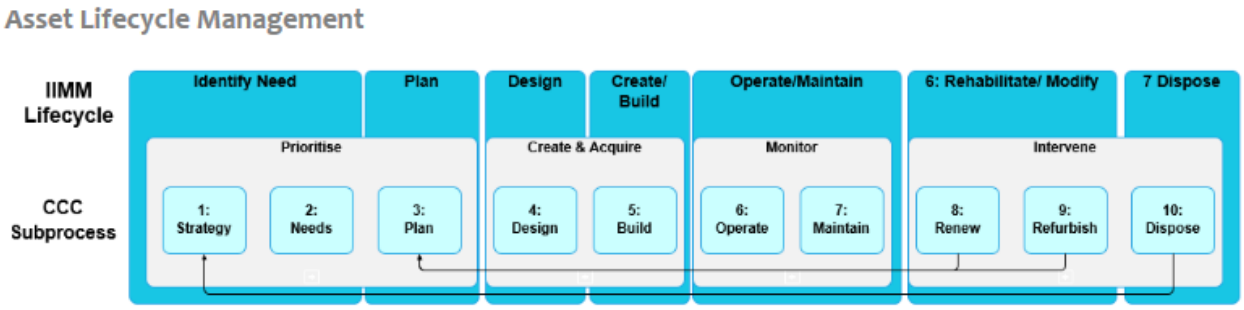


Figure 1-1: Asset Lifecycle Categories

1.3 Goals and objectives of Asset Management

Asset management is a business process which guides the lifecycle management of assets. Lifecycle management includes the planning, acquisition, operation, maintenance, renewal and disposal of assets.

Effective asset management enables the delivery of levels of service in the most cost-effective manner to present and future communities.

The Council's Asset Management Policy (approved by Council's Executive Leadership Team on 26 March 2018) provides the organisation's long-term vision, values and direction for asset management. The policy aligns with the organisation's strategic framework. The policy relates to Council's overarching intentions for asset management and the asset management system and not specifically assets or asset decisions.

The five principles underpinning the policy are:

- Asset management outcomes align with the strategic direction of Council.
- Asset management is an organisational wide practice.
- Decisions about assets are based on well-managed, quality information.
- Asset management maturity is appropriate to the assets, services and risks we manage.
- Asset management plans are living documents.

The Asset Management policy sets out the assets Council manages in accordance with its asset management principles, and therefore within the asset management system scope.

The Asset Management Policy demonstrates commitment to maintaining an Asset Management System that promotes responsible management of assets to deliver value to customers and support business objectives, in accordance with best practice and alignment across the organisation. This provides a framework for establishing detailed plans and targets that support these objectives; and are measured and monitored to ensure continual performance improvement for Asset Management.

The Asset Management objectives (see Appendix 5-1) enable the management of assets in a manner consistent with the principles of the policy, and the organisation's objectives.

2 Lifecycle Management Plans

2.1 Asset Overview (what assets we have)

The following assets are covered in this AMP.

Table 2-1: Scope of Assets and Services Covered in this Plan

In Scope	Out of Scope
Reticulation assets	Private laterals
Pump stations	
Water treatment plants	Operator (City Care) - owned equipment

2.2 Location and Value

In the Te Pūrongo-ā-tau Annual Report 2022, Fixed Assets under direct Council Control carried a book value of $14.2 billion. A detailed summary of the assets covered by this AMP is included in Table 2-2 and for the purposes of this AMP, the assets are considered to fall in to 3 groups as follows;

1. Reticulation
2. Pump stations
3. Treatment and storage facilities

The 2023 Valuation found the total value (optimised replacement cost) of the assets covered by this AMP to be **$3.7 billion.** Almost 90% of this value is associated with the pipes and associated nodes (inlets, outlets, manholes etc.) that make up the reticulation network. The rest of the asset base is for pump stations, storage and treatment facilities.

Table 2-2: Detailed summary of assets covered in this AMP

Asset Class	Asset Type	Replacement Value	Book Value	Annual Depreciation
Reticulation	Main	1,756,110,915	899,854,132	20,332,605
	Trunk Main	116,395,616	57,328,955	1,194,543
	Submain	807,523,383	532,140,661	9,312,230
	Crossover	79,224,060	51,013,832	936,587
	Laterals	112,974,856	75,982,723	1,253,555
	Pipe protection	2,904,154	2,434,353	29,041
	Valves	148,929,200	70,540,465	2,824,986
	Structures	3,591,868	2,993,944	32,653
	Meters	117,082,945	80,197,336	2,008,591
	Connections	78,394,894	27,006,353	2,827,769
	Hydrants	111,463,189	57,838,472	1,378,289
	Reticulation Total	**$ 3,334,595,079**	**$ 1,857,331,229**	**$ 42,130,853**
Pump Stations, Treatment	Buildings and Structures	88,672,048	36,520,231	1,030,040
	Electrics	23,246,955	13,011,705	565,451
	Instrumentation and Control	12,254,561	4,069,419	637,467

	Pipework	21,444,498	7,269,344	387,652
	Plant and Equipment	2,536,321	875,568	63,886
	Pumpset	15,385,594	6,469,481	317,773
	Reservoirs and Tanks	113,034,463	44,589,034	1,369,406
	Standby Plant	10,294,379	4,172,519	238,488
	Valves	9,125,638	5,501,040	113,839
	Wells and Wellheads	78,390,858	40,661,484	1,278,395
	Pump Station, Treatment and Storage (Combined) Total	**$ 374,385,314**	**$ 163,139,825**	**$ 6,002,396**
Grand Total		**$ 3,708,980,393**	**$ 2,020,471,055**	**$ 48,133,249**

Source: Financial Valuation of 3 Waters Assets – WSP May 2023

Figure 2-1 and **Figure 2-2** show an overview of where the water supply reticulation, station and treatment assets are located in Christchurch city and in Banks Peninsula.

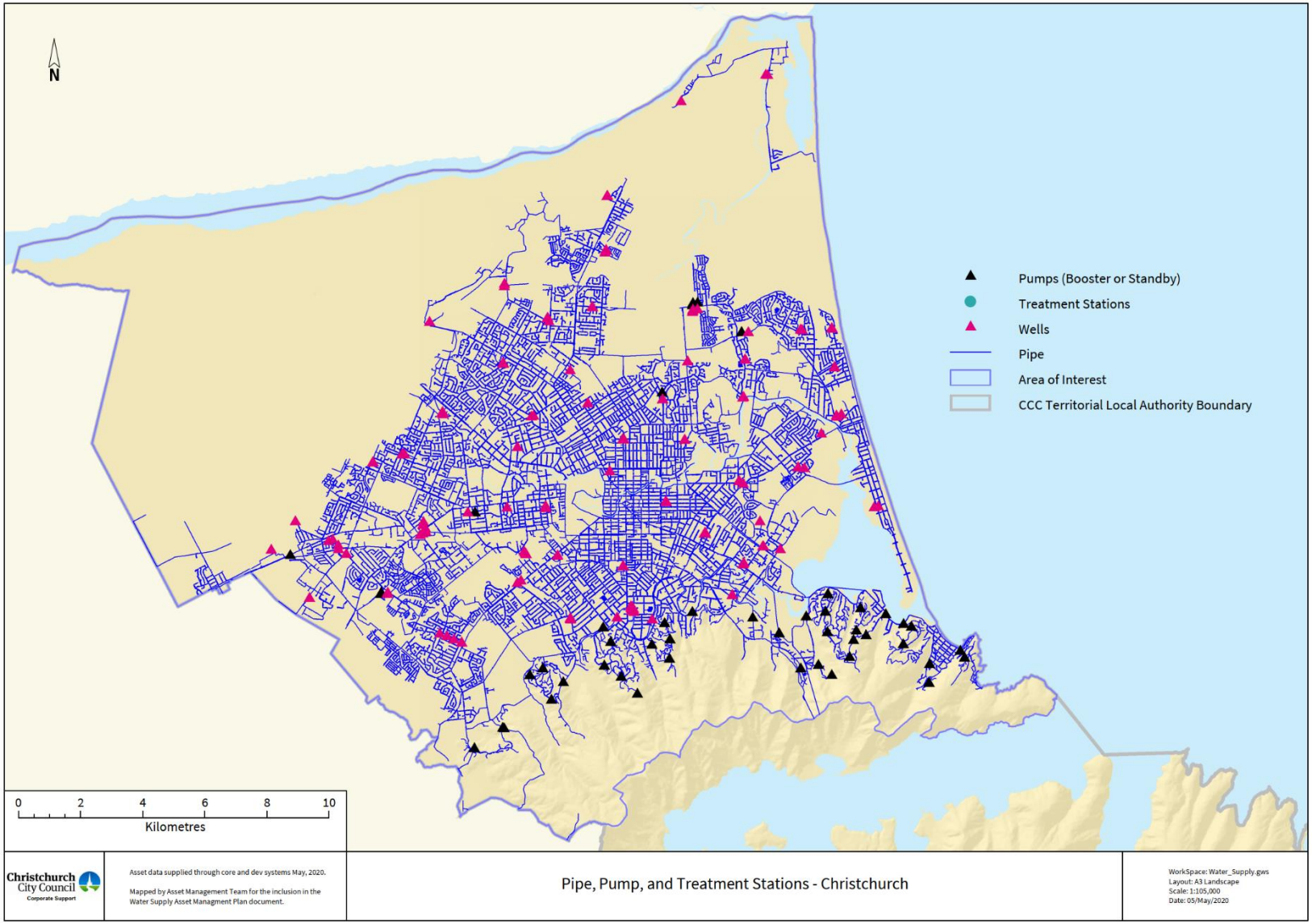


Figure 2-1: Christchurch City Water Supply Asset Locations

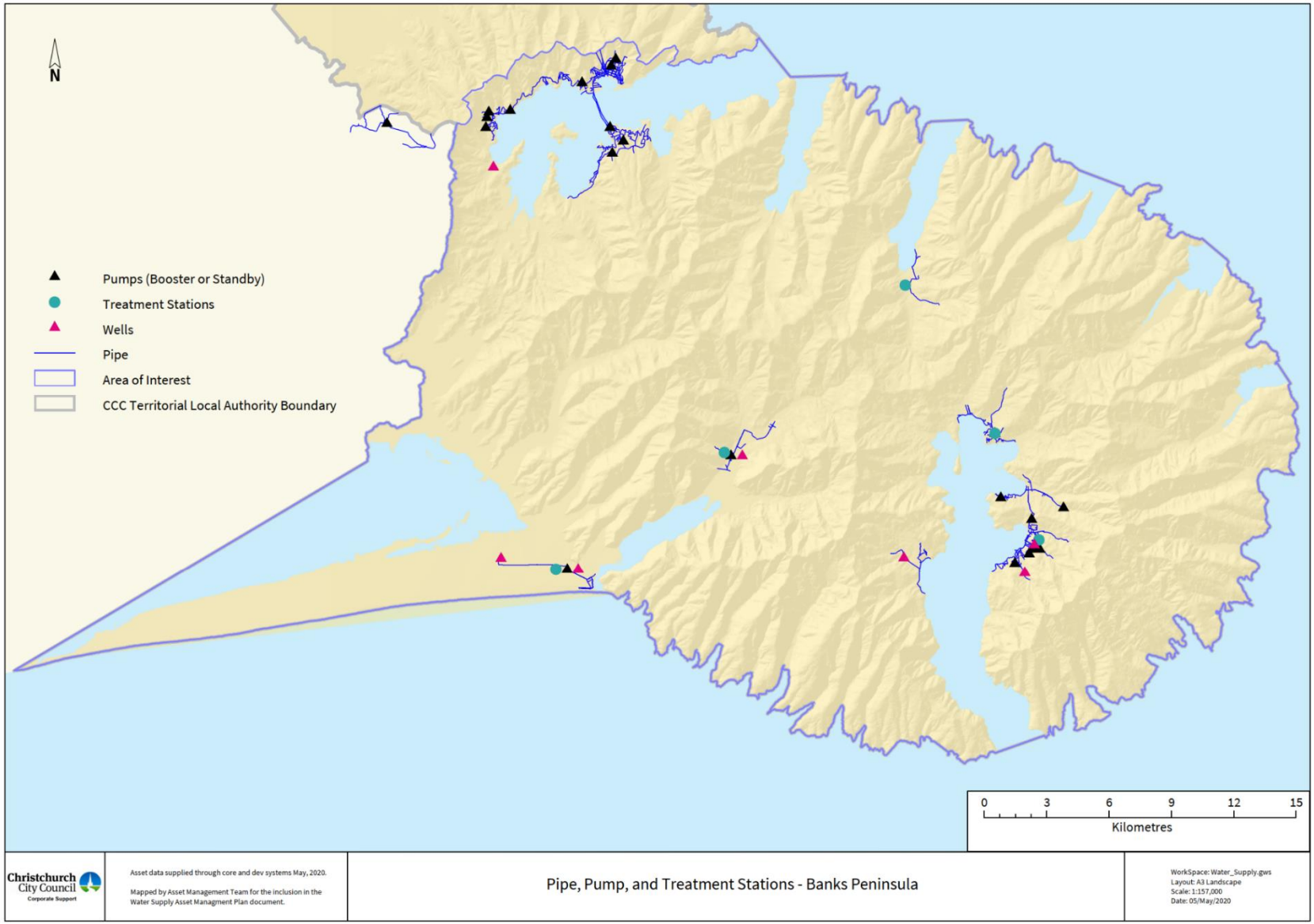


Figure 2-2: Banks Peninsula Water Supply Asset Locations

2.3 Asset Data Confidence

Table 2-3 summarises the confidence of asset data for water supply assets both in terms of completeness (% of assets for which that data type is stored) and reliability (using the A-E grading below). Table 2-4 describes the confidence assessment system. Asset data is held in SAP, GIS and InfoAsset systems.

Although the numbers of most assets and asset types are available, detailed data is commonly lacking.

Table 2-3: Asset Data Confidence

Asset Group	Data Confidence				
	Quantity	Age	Condition	Performance	RMO*
Buildings	Highly Reliable	Reliable	Uncertain	Uncertain	Unknown
Electrical and electronic equipment	Highly Reliable	Reliable	Uncertain	Uncertain	Unknown
Mechanical equipment & plant	Reliable	Reliable	Uncertain	Uncertain	Unknown
Land	Very uncertain	N/A	Very uncertain	Unknown	Unknown
Station Pipework	Very uncertain	Highly Reliable	Uncertain	Uncertain	Unknown
Structures	Very uncertain	Reliable	Uncertain	Uncertain	Unknown
Water wells	Very uncertain	Highly Reliable	Uncertain	Uncertain	Unknown
Reticulation	Highly Reliable	Highly Reliable	Uncertain	Uncertain	Reliable
Water meters	Highly Reliable	Highly Reliable	Uncertain	Uncertain	Unknown
Spares	Uncertain	Very uncertain	Very uncertain	Very uncertain	Unknown

*RMO – Repair, Maintenance Operation records – this selection of information is used as part of the Asset Assessment Intervention Framework (AAIF) process for renewal forecasting. With the AAIF process only used for gravity pipe assets, this is the only asset group with a Data Confidence record.

Table 2-4: Asset Data Confidence Descriptions

Confidence Grade	Description
Highly reliable	Data based on sound records, procedures, investigations and analysis, documented properly and recognised as the best method of assessment. Dataset is complete and estimated to be accurate ± 2%
Reliable	Data based on sound records, procedures, investigations and analysis, documented properly but has minor shortcomings, for example some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation. Dataset is complete and estimated to be accurate ± 10%
Uncertain	Data based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data are available. Dataset is substantially complete but up to 50% is extrapolated data and accuracy estimated ± 25%
Very Uncertain	Data is based on unconfirmed verbal reports and/or cursory inspections and analysis. Dataset may not be fully complete and most data is estimated or extrapolated. Accuracy ± 40%
Unknown	None or very little data held.

The Data Confidence rating and descriptions are based on Table 3.5.3 of the "International Infrastructure Management Manual – 2011" which is the grading system used by the consultant who carried out the valuation process.

2.4 Network Age and Lifecycle Stage

2.4.1 Reticulation Age and Condition

Water supply reticulation condition grades use the 1 to 5 scale. Lack of consistent results from visual and chemical tests means sample collection followed by a laboratory condition assessment is currently the sole method for condition grading. At present approximately 70 lengths of mains of the same size, material and construction age have a measured condition grade; other mains have an estimated condition grade based on the installation year and a theoretical useful life.

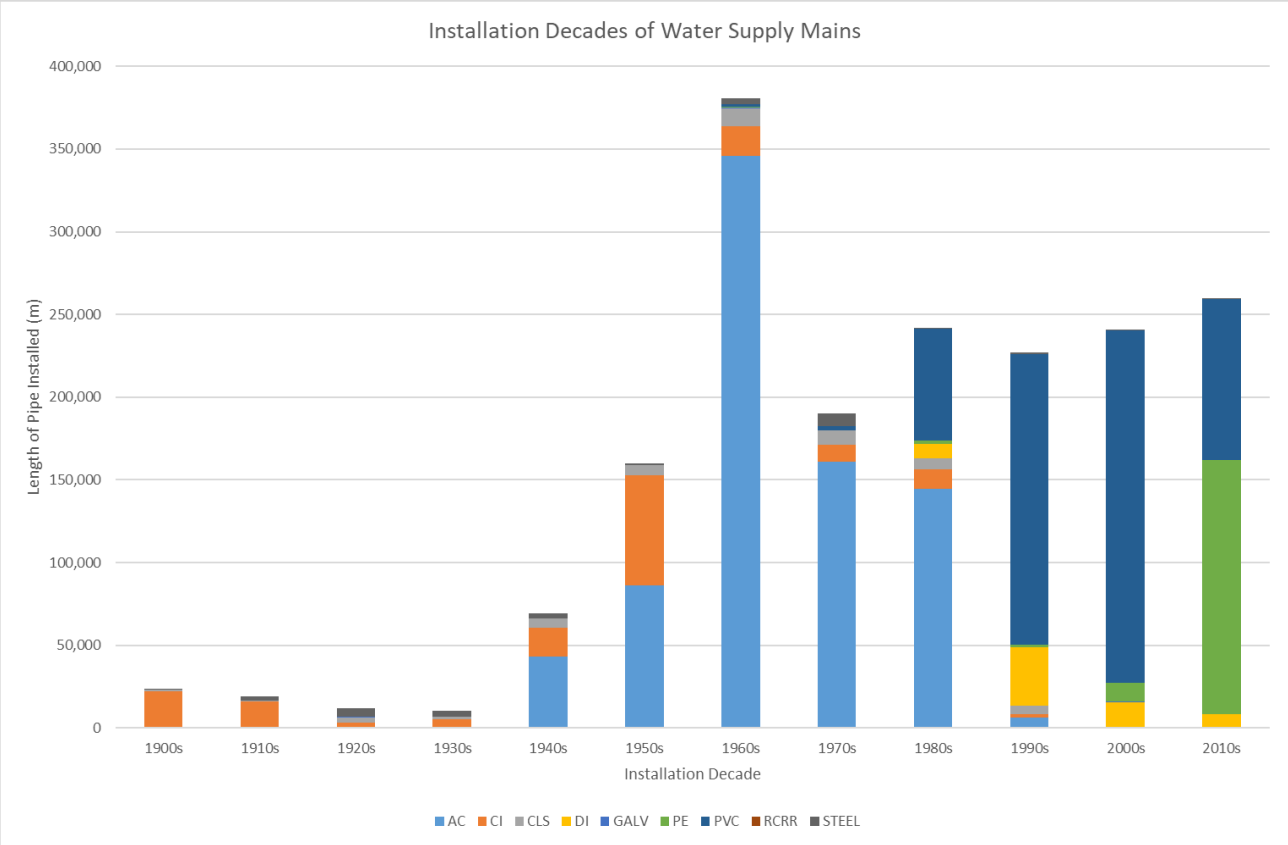


Figure 2-3: Pipe Installation Decades

Figure 2-3 shows the length of pipe of each material installed in each decade; this only shows pipes currently in service and ignores historic or abandoned pipes. Although public water supplies may date back to 1890s or 1900s, networks did not become widespread until the 1950 and 1960 building booms and have expanded relatively consistently since then.

Pipe materials have also changed over time with cast iron (CI) the predominant pipe material up until the 1940s, followed by asbestos cement (AC) from 1950 to mid-1980s and plastic from the mid-1980s to now. Theoretical useful lives of CI, AC and early generation PVC are 120, 60 and 40 years respectively, meaning that much of the initial network, network from the 1950s and network from the 1980s are all approaching end of life with estimated poor conditions.

Council has experienced issues with high breakage rates for early generation HDPE submains and crossover pipes that were installed in the 1990's. We have 861.1km of 'In Service" HDPE pipe throughout the network which has a calculated failure rate of 5.4 breaks per kilometre which is extremely high for an asset of this age. To enable these assets to be

renewed in a timely manner, we have reduced the effective asset life of crossovers to 40 years while submains is 70 years – despite the pipe not lasting this long.

Figure 2-4, Figure 2-5, and Figure 2-6 shows the current condition profile of reticulation assets for water supply mains, water supply sub-mains, and the overall water supply reticulation network respectively.

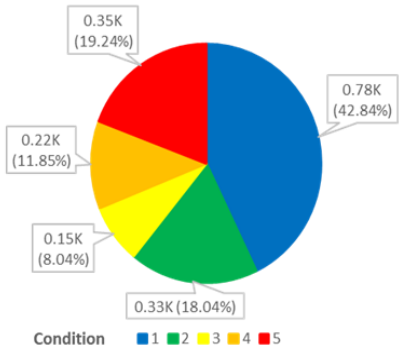


Figure 2-4: Water Supply Main Condition

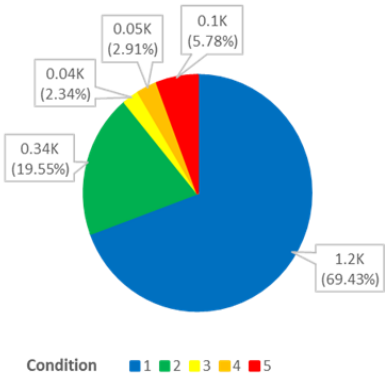


Figure 2-5: Water Supply Sub-main Condition

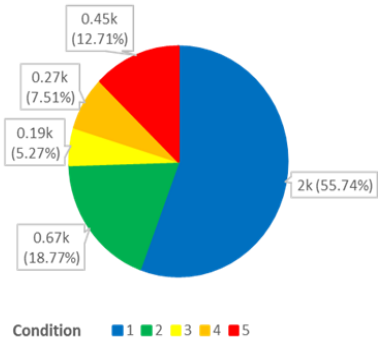


Figure 2-6: Overall Water Supply Network Condition

2.4.2 Stations Age and Condition

At a portfolio level, the condition data held in the database for station assets is poor compared to reticulation assets. The high-level condition assessments rely on asset age as a proxy for condition and a large number of start-up dates are missing for assets.

Asset condition is measured on a 1-5 scale.

Figure 2-7 shows the condition grading profile of the station assets by replacement value.

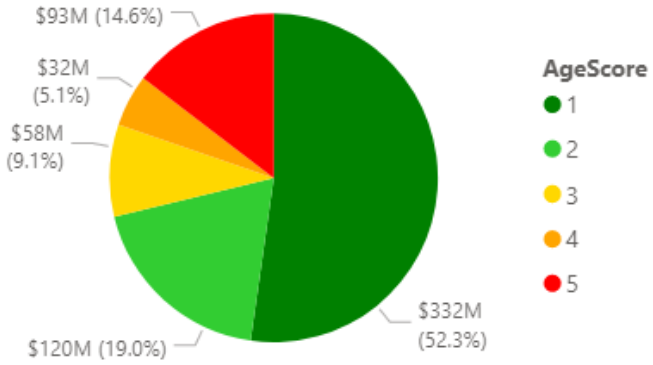


Figure 2-7: Station asset condition by value

There is a high proportion of assets in very poor condition; 29% of the total station asset value have a condition grade of 5. Figure 2-8 show which types of assets are in poor or very poor condition (grade 4 and 5). This is taken from the 2021 LTP.

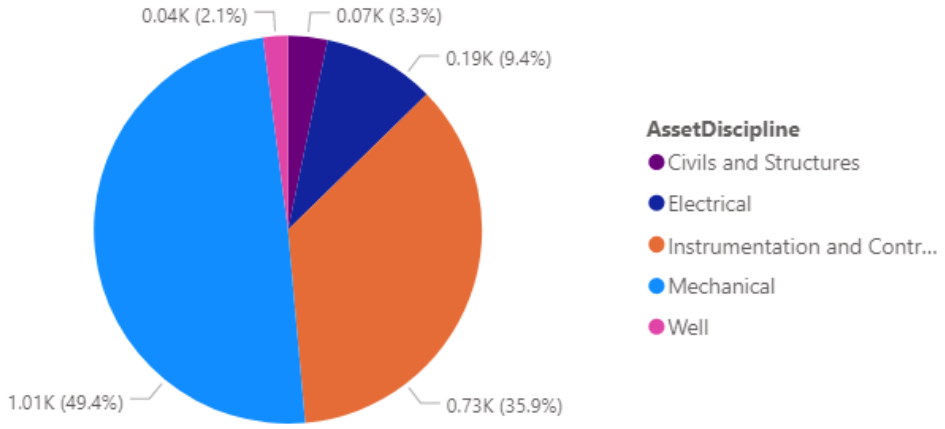


Figure 2-8: Types of assets in poor or very poor condition (by number)

To increase confidence in this age-based condition profiling, future condition assessment effort is focussed on civil and structures assets, then mechanical, electrical and IAC in that order.

2.5 Critical Assets

Consequences of failure, often also referred to as criticality, grades the importance of individual assets to the delivery of the service.

Critical assets are those whose failure would likely result in a significant disruption in service and financial, environment and/or social cost, and therefore warrant a higher level of asset management.

Within three waters we do not call this criticality as national data standards limit criticality only to the consequences of failure on service delivery to customers while with consequences of failure we are looking at including financial, environmental, cultural, heritage, damage to other infrastructure, health and safety and reputational outcomes as well. In general assets with high consequences of failure receive a higher level of asset management and more proactive interventions compared to other assets.

The criteria used for assessing consequences of failure for water supply assets are defined in the Three Waters Lifecycle Management Manual. Consequence of failure assessments are complete for reticulation assets but criteria are still being developed for station and treatment assets. In the interim a basic concept has been applied for station assets where all assets at the station location are given the same criticality score based on the total flow provided by that station.

Consequences of failure are not a criteria that is used explicitly for treatment assets, however the Water Safety Plans use risk-based assessments that considers such factors as the numbers of customers supplied by the treatment facility. Critical assets are those whose failure would likely result in a significant disruption in service and financial, environment and/or social cost, and therefore warrant a higher level of asset management.

2.5.1 Reticulation Assets Consequence of Failure

The overall consequence of failure is a weighted average of the score from each of the eight consequence of failure categories. Weightings for the water supply activity prioritise the consequences on service delivery to customers (how many properties and the importance of facilities) and service disruption (number of failures affecting the same customers) with a lower weighting on damage to other infrastructure.

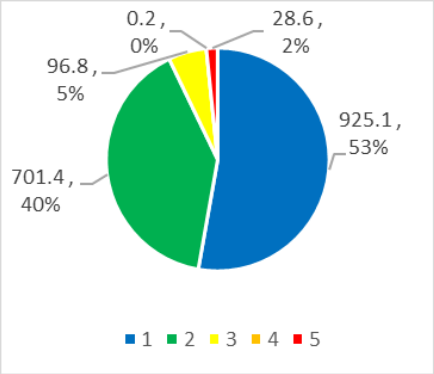


Figure 2-9: Water Supply Main Consequences of Failure

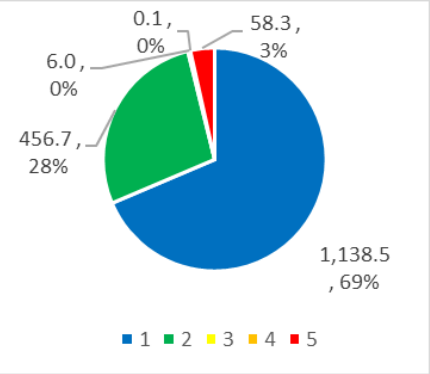


Figure 2-10: Water Supply Submain Consequences of Failure

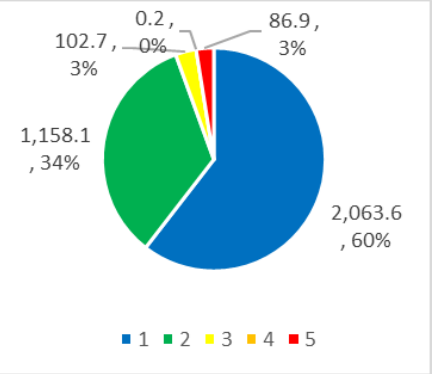


Figure 2-11: Overall Water Supply Network Consequences of Failure

The decentralised nature of the Christchurch City water supply network i.e. there are multiple pump stations feeding into each zone for redundancy, this means that there are few pipelines with “very high” or “extreme” overall consequences of failure. Figure 2-9, Figure 2-10, and Figure 2-11 show the consequence of failure profiles for mains, submains and the overall network, while **Figure 2-12** on the next page shows locations. This is taken from the 2021 LTP.

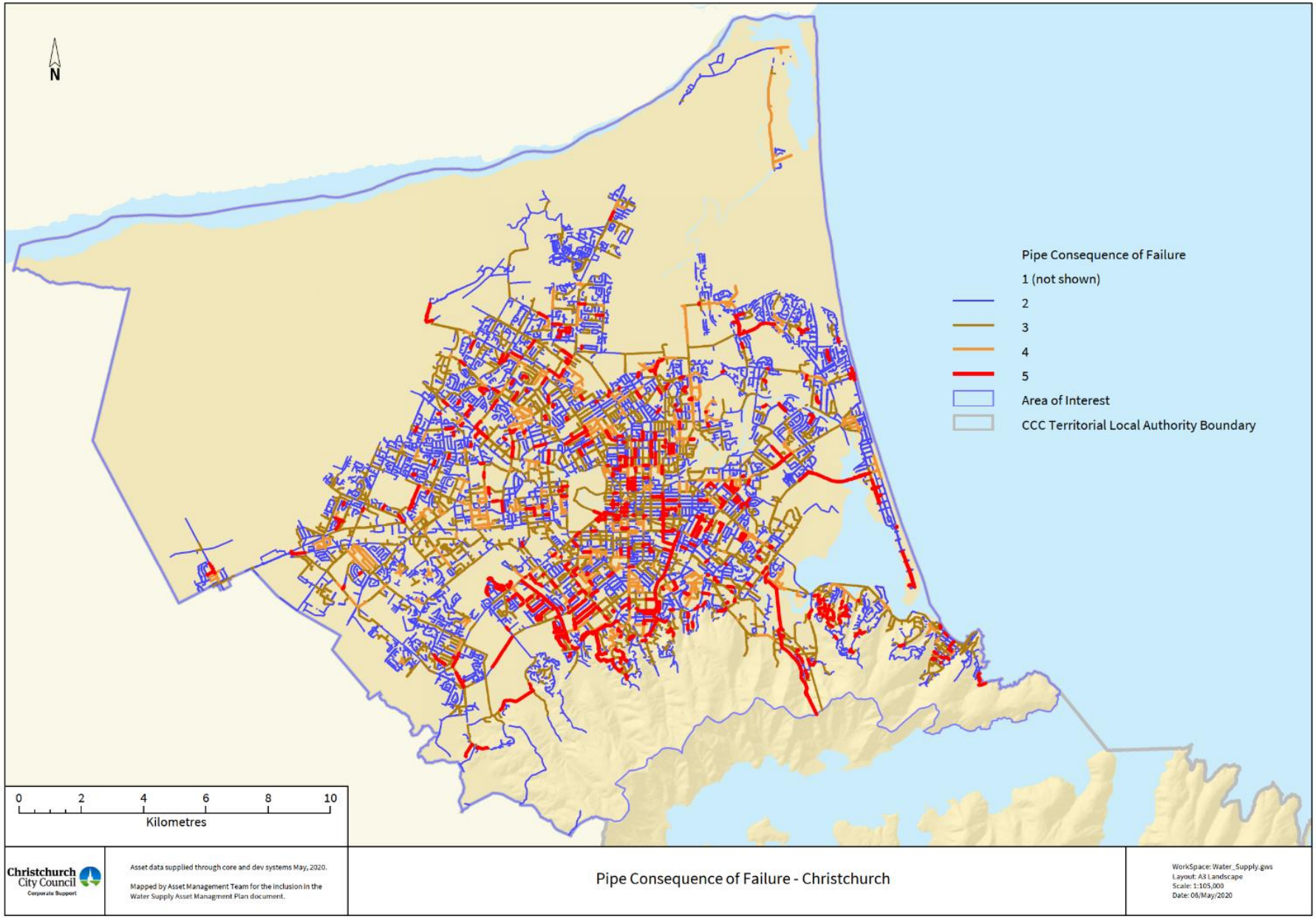


Figure 2-12: Water Supply Reticulation Consequences of Failure

2.5.2 Stations Criticality

Criticality criteria is still being developed for stations assets. Current criticality criteria is based on the sum of electric motor power for direct pumping stations or the total reservoir capacity as shown in Table 2-5 below.

Table 2-5: Station criticality criteria

Criticality Score	Station Size	Reservoir Storage (m^3)
1	Up to 5kW	Up to 25
2	5kW to 22kW	20 to 100
3	22kW to 100kW	100 to 250
4	100kW to 200kW	250 to 500
5	Over 200kW	Over 500

Additionally, stations with generators are criticality 5 as these are needed to meet minimum flows or public health protection barriers during outages.

By their nature as points of supply, water supply station assets typically have a high criticality. This profile is shown in Figure 2-13, the consequence of failure profile by number of station assets.

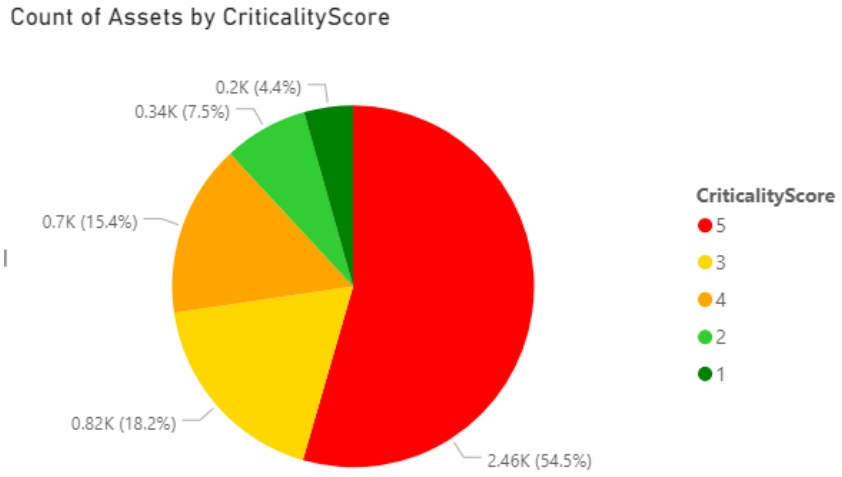


Figure 2-13: Station asset criticality (by number)

2.6 Asset Data Improvements

The following improvements to data quality are included in the AM Improvement Plan in Section 4.

Improvement programme	Asset inventory, condition assessment and failure data improvement programme
Scope	Targeted data capture strategy for vertical assets to improve completeness and confidence of asset inventory, with a specific focus on treatment assets. Condition assessment of critical or high value assets for stations and treatment plants to inform renewal programmes. Condition assessment of pipes where evidence will help refine AAIF criteria for applying condition scores (AC and CI). Asset failure and disposed asset post-mortem to understand failure mechanisms and verify condition grading.

	Improve failure data capture and handling to strengthen the connection between historical failure performance and proactive renewal/maintenance strategy.
Issues addressed	Incomplete asset register, particularly for vertical assets with many treatment assets missing from the register or without installation dates. Poor information on the condition of vertical assets, which presents a risk particularly for critical or high value assets. Better valuation information for large vertical assets such as reservoirs and treatment plants. Condition assessment of pipes is primarily based on age and material and requires ongoing validation. Failure data is not always captured in a manner where it can be analysed across the portfolio to aid decision-making.
Benefits	Increased confidence in decision making around risk management, maintenance strategy, condition management, renewal intervention and financial management.

3 Managing Risk

3.1 Managing Risks

Council's approach to managing risk is detailed in its Risk Management Policy.

3.1.1 Risk Management plan (risk framework)

Risk management is inherent in all of Council's asset management processes. Significant risk management strategies for this activity include:

Asset Design
Council requires all new assets to be designed to accord with the following standards:

- Infrastructure Design Standards
- CCC Construction Standard Specification
- Building Code
- City Water & Waste Specification for Control Equipment (Pump stations)
- Water Pumping Station Design Standard
- General Electrical and Automation Specification
- Manufacturer's specifications and maintenance manuals (Mechanical & Electrical equipment)
- Operation and Maintenance Manuals

It is anticipated that if all Water Supply assets are designed, constructed and maintained to accord with the above list, then they will include suitable resilience and redundancy to meet Councils Levels of Service and mitigate risk. The difficulty will be when these design standards are applied to older assets, built before these standards were adopted, but are still expected to conform to the same risk profile.

Insurance
Insurance is a risk transfer strategy to mitigate financial risks associated with disruptors. Council's approach is to attract and consolidate a balanced insurer panel and secure the maximum amount of insurance possible for the best possible price.

Business Continuity and Emergency Response Planning
There is a comprehensive Business Continuity Plan (BCP) that covers the roles, responsibilities and procedures to allow Council to recover its essential services following a natural disaster. A number of individual Continuity Procedures have been assigned to Water Supply in the 3 Waters and Waste BCP, and they are:

- CWW-WS-021: Aquifer Contamination
- CWW-WS-022: Medium to Long Term Degradation of Aquifers
- CWW-WS-023: Salination of Coastal Wells
- CWW-WS-024: Contamination of Surface Water Sources (Banks Peninsula)
- CWW-WS-025: Physical Terrorist Attack on Assets (3 Waters)
- CWW-WS-026: Cyber Attack on 3 Waters PLC, SCADA and IT Systems
- CWW-WS-027: Tsunami (3 Waters)
- CWW-WS-028: Earthquake (3 Waters)
- CWW-WS-029: Water Demand exceeds Consent Water Take
- CWW-WS-030: Water Supply Treatment Plant Process Failure
- CWW-WW-57: Death or Major Harm Incident in the Operations Area
- CWW-WW-60: Contractor is Terminated for Insolvency or Poor Performance

Water Safety Plans
The Water Services Act 2021 requires Council to have and implement a water safety plan. A water safety plan documents a public health risk-based assessment and management process that aims to ensure a safe and secure supply of drinking water for consumers, protecting public health. Unlike the previous regulatory regime, Taumata Arowai does not "approve" water safety plans but review plans and provide feedback.

Council is currently updating the Water Safety Plans (Christchurch in Particular) and will resubmit when complete. The water safety plans now include new sections, one to cover elements common to all supplies, and one to cover off the source water.

Table 3-1 lists Council's eight water safety plans and their current status.

Table 3-1: Christchurch City Council Water Safety Plans

Water Supply Scheme	Current Water Safety Plan Status
Akaroa and Takamatua	Submitted 10 November 2022
Brooklands Kainga	To be submitted February 2024
Christchurch City and Lyttelton Harbour Basin	Submitted 15 December 2023
Birdlings Flat	Submitted 16 June 2023
Duvauchelle	Submitted 8 November 2022
Little River	Submitted 19 December 2023
Pigeon Bay	Submitted 14 November 2022
Wainui	Submitted 10 November 2022

3.2 Critical Risk Identification and Management

3.2.1 Climate Change Impacts

Climate change is expected to have significant impacts on the water supply activity and infrastructure, particularly in relation to sea-level rise, rainfall, flooding, heat, drought, fire, and other factors.

Sea-Level Rise

The intrusion of saltwater into coastal infrastructure can lead to corrosion and reduced asset lifespan. More frequent and extensive coastal inundation can limit services and pose potential health consequences. Retreat from coastal areas may increase the need for pumping and associated energy costs. Saltwater intrusion into water sources could lead to additional treatment processes or requirements.

Rainfall and Flooding

Higher groundwater levels resulting from increased rainfall can make repairs challenging and require additional dewatering effort. Flooding and intense rainfall events can introduce more sediment, organic carbon, and nutrients into water sources. Storm events can cause flooding, leading to damage at treatment plants, impacting accessibility, and limiting chemical supply. Changes in rainfall patterns may reduce water availability, especially in specific areas around Banks Peninsula. There is a risk that contamination of water supplies during and after flooding events impacts public health.

Heat, Drought, Fire

Higher temperatures can lead to increased water losses from vegetation absorption and evaporation. Reduced surface runoff and snowmelt may affect the recharge of groundwater supplies. Higher temperatures can contribute to greater microbiological activity, leading to additional treatment and posing human health risks. More frequent droughts can impact water source availability and lead to increased peak water demand. Increased temperatures can also result in higher concentrations of contaminants and pathogens in source water. The heightened risk of fire may increase firefighting demands and water usage.

Other Impacts

Social inequalities may arise due to divided ownership rights to water supplies. Water scarcity may prompt the consideration of alternative technologies like wastewater reuse. The inability for individual properties to self-source their water supply may lead to increased requests for connection to Council's network. There may be population growth from climate-related displacement that requires additional infrastructure and source water to service. Climate

change poses human health risks such as waterborne diseases that may impact the activity. Increased building intensification and land-use changes (residential and non-residential) resulting from climate change impacts or new policy may increase water demand.

Climate Change Risk Mitigation

Options being considering to reduce the risks to the water supply activity and the community posed by the climate impacts above include:

- Promote sustainable use of drinking water through water conservation measures and education to ensure long-term sustainability objectives
- Implementation of "smart" metering which helps to improve understanding of current customer use patterns, avoid wastage, and manage future use
- Create a dynamic link between "smart" water metering and energy consumption to allow for proactive management of electricity usage
- Continue to implement and manage excess water use charges – initial data has demonstrated a reduction in peak water demand which contributes to the ability to minimise energy usage and increase efficiency
- Improve knowledge of network performance by continuing to use and maintain hydraulic models which consider current and future scenarios
- Proactively monitor and record usage information with the assistance of intelligent technology to enable informed decision making
- Automation of mechanical systems to more efficiently respond to future pressures – for example variable speed drives can help to reduce overall energy consumption
- Protection of groundwater sources and their vulnerability to contamination through targeted investigations, further implementation of source protection works, and restrictions on excavation below groundwater level
- Establish a collaborative working group with Regional Public Health, Environment Canterbury, and Christchurch region territorial authorities (Christchurch City Council, Waimakariri District Council, Selwyn District Council) to further promote and manage source water protection initiatives
- Work collaboratively with Environment Canterbury to further promote and manage source water protection initiatives
- Manage assets collectively to ensure future works maximise collaborative benefits across Council activities. This includes reviewing climate change risks, such as sea level rise extents, and incorporating the results into current and future planning and design works, noting management of climate related risks and reduction in vulnerability will likely include collaboration in multiple Council activity areas.

Unfortunately, there hasn't been any additional OPEX funding provided to further any initiatives required to meet Councils climate targets, meaning any improvements can only be done at the expense of tasks that staff are currently doing.

3.2.2 Regulation Impacts

In 2016 a water contamination event in Havelock North has triggered numerous legislative changes that affect the water supply activities across New Zealand under the broad programme of Central Government 3 Waters Reform.

The new legislation include Taumata Arowai – the Water Services Regulator Act 2020, the Water Services Act 2021, the Water Services Entities Act 2022, the Water Services Legislation Bill, the Water Services Economic Efficiency and Consumer Protection Bill, and the Health (Drinking Water) Amendment Act 2007.

New Drinking Water Standards, Drinking Water Quality Assurance Rules and Aesthetic Values came into effect on 14 November 2022 and triggered additional requirements relating to the drinking water supply system including source water, treatment and distribution systems.

Council's forward programme of work includes capital programmes to meet the regulatory requirements that will have to include protozoal treatment of all groundwater (UV treatment) as well as permanent chlorination facilities to maintain residual disinfection. Provision is also made for fluoridation as required in terms of the Health (Drinking Water) Amendment Act, even though Christchurch has not yet received a Directive to commence fluoridation of drinking water.

The previous Government's Three Waters Reform proposed a changes in regulation, funding and organisational arrangements. However with the change to a National led coalition government, the form of any sort of reform is unknown. This AMP has been prepared on the basis of prudent management of the assets and activity, irrespective of when and how any future transfer takes place.

3.2.3 Asset Risks

The Three Waters unit also identifies and records risks at a more detailed level, as shown in appendix 5.2.

High-risk issues from Promapp fall into the following strategic themes for water supply.

- Drinking water supply is contaminated
- Major/critical infrastructure fails
- Customers are dissatisfied with chlorine levels
- We are unable to supply sufficient water
- The water supply operation harms staff, public or the environment
- The assets are managed poorly, resulting in high costs or poor service outcomes
- Our staff are not able to deliver our project, operational, and improvement commitments

4 Continuous Improvement

4.1 Overview of the Improvement Programme

Council has made a strong commitment to improvement of asset management practices and seeks to further improve the approach. Council acknowledges the need to focus efforts to further asset management practices over the next 2-3 years to an appropriate level of capability.

4.2 Current Asset Management Maturity

Historical Assessments

Historically, Council has carried out full independent Asset Management Maturity Assessments (AMMA) usually once every 3 years, most recently being October 2020, with an abridged assessment undertaken in September 2023. Additionally, 3 Waters carried out benchmarking against the Water Services Association Australia (WSAA) using the Asset Management Customer Value (AMCV) project in both 2008 and 2016.

Historically, baseline maturity assessment was predominantly achieved through onsite interviews, with a good cross-section of participants. Future maturity level was also set based on best appropriate practice and considering the agreed business drivers. Strength and opportunities for improvement area summarised alongside the results to acknowledge the baseline achievements.

The findings of the 2016 WSAA review closely paralleled the AMMA review with both acknowledging that:

- Council improved in the general "asset management" practices involved with Policy, Strategy, Risk, Asset Management Plan preparation, Service Delivery and Quality Management.
- There were on-going deficiencies with the storage and updating of asset data, and the use of the data for forecast planning for both operational and capital works spends and a lack of models to allow appropriate demand forecasting.

An independent assessment of current asset management practice was undertaken in October 2020. Asset Management Maturity Assessments (AMMA) are carried out once every 3 years.

The baseline maturity assessment was predominantly achieved through onsite interviews, with a good cross-section of participants. Future maturity level was also set based on best appropriate practice and considering the agreed business drivers. Strength and opportunities for improvement area summarised alongside the results to acknowledge the baseline achievements.

The October 2020 maturity assessment determined that the activity was defined as '**Intermediate or advanced level for most functions**'.

A summary of the 2020 assessment results for this activity is attached as Appendix 5.3. The maturity assessment shows that Council scored highest and lowest in the following areas:

Table 4-1: 2020 Asset Management Maturity highest and lowest scores

Scores 85 - 90	Scores 65 - 80
AM Policy and Strategy	Asset Performance/Condition
Levels of Service	Management Systems
Forecasting Demand	Service Delivery Mechanisms
Managing Risk	Asset Register Data
Operational Planning	Decision Making
Capital Works Planning	Financial Planning
AM Leadership and Teams	Audit and Improvement
AM Plans	
AM Information Systems	

Figure 4-1 below shows Council's asset management maturity mapped against historical and target scores for water supply.

Figure 4-1: Asset Management Maturity Assessment for Water Supply

The 3-waters Head of Department determined that the WSAA benchmarking exercise that was scheduled to be carried out in 2020 was not required to be done.

Current Assessment

As stated above, a review of current asset management practices are usually carried out once every 3 years, however an abridged assessment was undertaken in September 2023. This assessment focussed on a core selection of the topics normally covered by a AMMA review. These topics included:

1. Asset Condition and Performance
2. Asset Financial Planning & Management
3. Asset Data & Information
4. Asset Management Information & Systems
5. Asset Management Process Management
6. Outsourcing and Procurement
7. Continuous Improvement

The latest review found the 3 Waters Asset Management Maturity was rated at a Core/Intermediate level for the essential asset management functions. This is lower than the previous assessment and confirms that the deficiencies found in the previous assessments are still present. Following the findings of the 2023 review and some negative media coverage, the Elected Leadership Team has stated that there shall be an emphasis on increasing asset management maturity within Council.

4.3 Review of Progress against Previous Plan

The last improvement plan was developed as part of the 2021 AMP update. The indicative term of the improvement programme was three years. No OPEX funding requested by the 3 Waters Asset Management team for carrying out the land drainage improvement items within the 2021 AMP were approved. Therefore, all of the items have been carried through into Table 4-1 within Section 4.5 – Improvement Plan 2024 below.

4.4 Improvement Plan 2024

The independent asset management maturity assessment process provides a sound basis for prioritising and monitoring improvements to current asset management practices. This will put in place the programme for 2024 through to 2026.

Improvement items identified in the 2018 AMP and the 2020 maturity assessment were rationalised into the 2021 Improvement Plan presented in the last AMP. The 2024 Improvement Plan is an updated version of the 2021 Improvement Plan, taking into account improvement progress and current priority areas of focus.

Table 4-1 details those tasks that have been proposed that could be undertaken over the next three years to improve the level of Asset Management maturity as a response to the latest AMMA report that reconfirms the findings of the previous AMMA reviews. These tasks have focus specifically on those areas where the risk is most critical and are explained in greater detail in Appendix 5.4. To facilitate the practical implementation of the improvement programme tasks have been designed to address several issues concurrently and be programmed to ensure a logical progression towards an improved asset management maturity 3–year target.

The Improvement programme assumes that suitable funding and resourcing will be provided by the organisation to enable the improvements items to be carried out. Once the level of funding for three waters is confirmed, a programme road map document can be produced which outlines tasks, timelines, hold points, interdependencies between tasks, resource constraints (either inter or intra unit) and completion dates.

Table 4-1: Asset Management Improvement Tasks

Task ID	Project / Task	AM Maturity Gaps	Priority (H, M, L)	Responsibility	Resources (teams, $)	Timeframe
WS-01	Asset inventory, condition assessment and failure data improvement programme	Data, lifecycle asset management	H	Asset management	Up to $1M/year	Intensive 2 years, then ongoing
WS-02	Financial tracking, forecast and relationships improvement programme	Data, lifecycle asset management, financial	H	Asset management	$200k/year	12 months
WS-03	Demand management improvement programme	Demand, data	M	Planning	$100k/year	4 years
WS-04	Integrated master planning improvement programme	Demand, lifecycle asset management	M	Planning	$100k/year	12 - 24 months
WS-05	Climate change response improvement programme	Risk and resilience	M	Planning	$100k/year	12 months
WS-06	Level of service and customer engagement improvement programme	Levels of service, financial	L	Service delivery	$100k/year	Ongoing
WS-07	Water safety plan improvement programme	Regulation, risk, levels of service	H	Asset management team support	Staff time	Ongoing
WS-08	“Smart” technology improvement programme	Demand, data	M	Asset management team support	Staff time	Ongoing

4.5 Monitoring and Review

The Asset Management Improvement Programme (AMIP) will be reported to the Strategic Asset Management Team (SAM). All improvement items and the improvement programme will be monitored by the SAM team and reported to the Executive Leadership Team as required. At this time, it is difficult to understand how the AMIP will be able to be carried out by the business given the lack of additional investment over the current amounts that have been insufficient to previously carry out any improvement items.

5 Appendices (Supporting information)

5.1 Asset Management Objectives

Table 5-1: Asset Management Objectives

Principle	Objective
1. Asset management outcomes align with the strategic direction of Council	1. Linkages between Council's strategic direction and asset management outcomes are clear and understood
	2. All asset based services are linked to the attainment of Community outcomes
	3. A whole of life approach is taken for all asset management initiatives
	4. Asset management planning outputs provide the options and financial forecasts for the first draft of the Long-Term Plan (LTP)
	5. Investment in Infrastructure is optimised across all asset types
	6. Opportunities to increase resilience are considered in all asset management planning
2. Asset management is an organisational wide practice	1. The Strategic Asset Management Team (SAM) provides leadership of asset management practice at Council
	2. Asset management is co-ordinated across the organisation
	3. Core asset management processes are consistent across Council
	4. Asset management practice is compliant and appropriate
	5. Asset Management Teams across all lines of the business are motivated and driven by customer needs
	6. There is an organisational culture of continuous improvement in asset management
3. Decisions about assets are based on well managed, quality information	1. Asset data is available in corporate system for use in all decision making related to Council assets
	2. The performance and condition of assets is monitored and reported
	3. Decision making by asset owners and managers is outcome based and based on reliable asset information
	4. Supporting asset information is readily accessible
	5. Asset data is up to date
	6. Asset management decisions by asset owners and managers are based on evaluation of all viable options to deliver levels of service outcomes
4. Asset management maturity levels are appropriate to the assets, services and risks we manage	1. Identified asset management maturity gaps close over time
	2. The asset management capability of staff resources matches the needs of the organisation
	3. The organisation recognises the importance of AM and adequately resources the AM system
	4. Appropriate levels of asset management maturity are defined and reviewed as business needs change
	5. The level of AM practice is matched to the criticality of the assets
	6. Christchurch City Council gains recognition for its evolving AM practice
5. Asset management plans (AMPs) are living documents	1. AMPs are easy to follow
	2. AMPs are complete and at the agreed level of maturity
	3. AMPs reflect the current level of asset management practice for the asset type
	4. The asset management improvement programme in the plan, contains all actions necessary to close the existing maturity gaps
	5. AMPs contain the 30-year financial forecasts; suitable to develop the first draft of the Long Term Plan and the Infrastructure Strategy
	6. Life cycle strategies are articulated within the asset management plan

5.2 Risk Register

Table 5-2: Water Supply Risk Register

Risk Register (only the High and Very High rated risks are included here, refer to ProMapp for full register of risks)			
ID	**Risk Description**	**Residual Rating**	**Control Descriptions**
R00001	There is a risk that the groundwater that we use to supply Christchurch/Lyttelton, Wainui, Birdlings Flat, Little River and Akaroa/Takamatua becomes microbially or chemically contaminated. Caused by: • Wastewater seeping into the aquifer from broken or leaking pipes, septic tanks or wastewater overflows • Water abstracted from a well is less than 1 year old, so microbial contamination may still be present • Chemical or diesel spill seeps into aquifer, leaching from contaminated sites • Intensive farming in the groundwater source area contaminates the groundwater with nitrate • Wells are not maintained and/or degrade affecting the security of the groundwater source, due to insufficient maintenance and renewals budget, lack of staff/contractor capability and capacity, or negligence • Abandoned or improperly decommissioned wells provide a direct route for contamination to enter the aquifer This may result in: • Illness and possibly deaths from drinking water contaminated water • Non-compliance with the Drinking-water Standards for New Zealand, which may lead to intervention by the drinking water regulator (e.g. requirement to chlorinate) • Inability to supply sufficient water to meet demand • Additional costs to treat contaminated water • Reputational damage to the Council.	Very High	Water Safety Plans (WSPs) signed off, used and kept up to date covering specific risks to the water supply zones. Follow the Response to Water Contamination procedure when contamination is found or suspected. Test water supply catchments and wells regularly and have system in place to report any results over set limits for response. Aquifers monitored for changes. Water outlook used for monitoring and record keeping, including water abstraction rates. Maintenance contractor has priority access to emergency water tankers. Water conservation programme in place to prevent over abstraction. Well drilling programme milestones met, Northwest shallow wells removed from service. Wells that have transgressions taken off line. Wellhead inspection and repair programme implemented to reduce risk of contaminated water entering well head Chlorination or disinfection of well water and covering of all reservoir roofs is needed to reduce the residual risk any further than what it is at present. Temporary chlorination will not be enough to reduce the risk as it is only short term Manage Turbidity: Christchurch Urban Water Supply 1. 20-25 wells/year get annual turbidity sample results 2. Some pump stations have sand filters or suction tanks which allow a limited ability to remediate turbidity. 3. If a well is identified as producing turbid water it can be isolated from the reticulation and redevelopment could be considered if the problem persists. 4. In all circumstances flushing would occur prior to reconnection to the reticulation. Banks Peninsula Water Supplies 1. Most raw water sources from either surface or ground are on occasion providing turbid water. 2. Turbidity monitoring on the raw water takes is in place so the take can be shut down when the turbidity goes above the limits of the treatment plant. 3. All Banks Peninsula treatment plants have systems in place to manage turbidity. 4. If high turbidity in raw causes reservoirs to drop CCC may tanker water from CHCH to the Banks Peninsula reservoirs. CCC may also undertake community awareness to reduce demand. 5. If prolonged high turbidity in raw water or failure of the treatment plant to produce DWNZ quality potable water occurs, it may ultimately be necessary to issue 'Boil Water Notices" to affected communities.

			Council rules of "chain of cleanliness" in CSS and Approved Water Supply installer specs to be adhered to by all contractors and authorised water supply installers. Reactive and Planned Maintenance to be undertaken in accordance with the Contractors Plan and Contract clauses. Auditing of chain of cleanliness by the contracts engineers in the Technical Services and Design team and Reticulation and Maintenance team. Follow the Response to Water Contamination procedure when contamination is found or suspected. Only Approved Water Supply installers allowed to work on CCC water supply. Reservoirs inspected internally through maintenance contract and leaking roofs identified and planned to be sealed. Regular planned external reservoir inspections to identify any source of possible transgression. Audits by Reticulation and Maintenance team of reservoirs. Backflow register kept up to date and new connections on commercial buildings not installed until backflow protection in place. Backflow requirements picked up through Building Consent process.
			Chlorine levels at treatment plants monitored by trained competent contractor's staff. Levels monitored on SCADA and Low and High alarms responded to.
R00737	Insufficient treated water inventory storage at Akaroa to meet the peak day demands during summer, at existing treatment capacity.	Very High	Collaborate with Project Management to expedite the delivery of additional water storage at L'aube Hill (Akaroa). Deliverable is progress report to management every two months.
R00739	Because of continued high customer consumption during summer, Christchurch water supply systems are being consistently operated close to their capacity, increasing need for capital projects and maintenance activities, while also having less redundancy when undertaking these activities	Very High	Water charging is underway to reduce peak water demand. Support by reporting monthly water demand and highlight peak events when appropriate to inform further actions on network capacity discussions, Summer peak demands are reducing as a result of excess water use charges
R00741	Network Operations are experiencing significantly increased outages for repair / replacement of faulty assets. Previous experience for turnaround was days to weeks, is now months to quarterly. As documented in Network Operations database for asset status.	Very High	Review critical spares inventory, including electrical critical spares.
			Support and encourage, by continuing to report of assess availability on a monthly basis, a transition from reactive maintenance to a proactive approach from both capital delivery and planning, (mix of proactive and predictive maintenance).
R00736	Chlorination of Christchurch's Drinking Water Supply is still being implemented with temporary equipment, lacking the robust design, implementation, operational funding and personnel resourcing that would be inherent in a permanent solution.	Very High	Support Council decision making with information and professional advice as required.
			Prepare a business case to illustrate the current situation and options available, for consideration by Council, whilst the situation with chlorination remains in limbo between the Council and the regulator.

R00102	Context: The Council has an objective that it will provide Freshwater, Wastewater, Stormwater and Resource Recovery functions without environmental damage and ensuring Council service provision is in compliance with regulations (including the RMA). There is a risk that: Whilst managing Council utilities, pollution of the environment occurs from such events as: 1. Raw sewage escapes network. (People exposed to bacteria risk) 2. Wastewater treatment process failure. (People exposed to bacteria risk) 3. Water abstraction over consent limits. (Reduction in water availability) 4. Excessively contaminated stormwater. (Low water quality resulting in poor ecological and cultural health of waterways). 5. Excess noise. (Health and amenity impact on people). 6. Offensive or objectionable odour. (Health and amenity impact on people). Caused by: 1. Network capacity exceeded, or maintenance fails to maintain network capacity. 2. Operations and/or Maintenance failures in the wastewater treatment processes. 3. Water allocation not in line with operational requirements and/or water supply not operated in line with abstraction limits. 4. Insufficient/inadequate stormwater treatment facilities. 5. Excess contaminate loading on stormwater treatment facilities. 6. Constrained maintenance budgets, requiring prioritisation of response. 7. Inadequate or poorly operated odour control. Resulting in: 1. Loss of reputation. 2. Breach of consent and prosecution by regulator. 3. Reduction in ecosystem health. 4. Loss of amenity value. 5. Costly clean-up and/or legal issues. 6. High cost of maintenance.	Very High	

R00570	There is a risk that the Council, as a water supplier, does not comply with the Drinking-water Standards for New Zealand or the Health Act. Caused by: • Loss of secure bore water status (Christchurch/Lyttelton and Wainui) • Not having an approved Water Safety Plan for each water supply that serves more than 500 customers (Christchurch/Lyttelton and Akaroa/Takamatua) • Not implementing the preventive measures and improvements in the Water Safety Plans • Not operating, maintaining, renewing and upgrading water supply infrastructure (including treatment plants) to meet the required standards • A failure to adequately respond to transgressions and escalate breaches of the standards or Act • Insufficient trained and experienced staff (Council and Citycare) • Inadequate funding of water supply renewals and upgrades and/or operations and maintenance This may result in: • Illness and possibly deaths from drinking water contaminated water • Regulator intervention, including issuing a compliance order, prosecution, fines, declaration of a drinking water emergency with a designated officer of the Ministry of Health taking control of the water supply • Increased capital, operational and maintenance costs • Reputational damage	High	Water Safety Plans (WSPs) signed off, used and kept up to date covering specific risks to the water supply zones. Follow the Response to Water Contamination procedure when contamination is found or suspected. Test water supply catchments and wells regularly and have system in place to report any results over set limits for response. Aquifers monitored for changes. Water outlook used for monitoring and record keeping, including water abstraction rates. Maintenance contractor has priority access to emergency water tankers. Water conservation programme in place to prevent over abstraction. Well drilling programme milestones met, Northwest shallow wells removed from service. Wells that have transgressions taken off line. Wellhead inspection and repair programme implemented to reduce risk of contaminated water entering well head Chlorination or disinfection of well water and covering of all reservoir roofs is needed to reduce the residual risk any further than what it is at present. Temporary chlorination will not be enough to reduce the risk as it is only short term
			Chlorine levels at treatment plants monitored by trained competent contractor's staff. Levels monitored on SCADA and Low and High alarms responded to. Contractor carries out daily verification tests at plant and in reticulation zones. Lab take samples and notify any low or high readings to reticulation team and contractor immediately. Contractor follows Chlorine dosing procedure and SOPS for reservoir dosing, FACs taken after dosing. Regular Contractor competency training carried out for staff carrying out dosing. Handheld dosing instruments kept calibrated. The Response to water contamination procedure is followed. Project Manager used for rollout of temporary chlorine machines and regular meetings of PCG group and HAZOP conducted. SOPs and Emergency plans, filling plans, monitoring equipment to be installed etc. to be developed and installed. Chlorine strength verified by supplier.
			• Urban water supplies excluding Northwest zone: re-confirm 'secure groundwater' status using the requirements and processes outlined in the DWSNZ • Northwest zone: complete the Northwest DWSNZ Upgrade programme (drilling of deep wells) and gain 'secure groundwater' status • Rural water supplies: complete water treatment plant upgrades and operate new water treatment plants in accordance with DWSNZ requirements • All supplies: maintain and audit existing Water Safety Plans, undertake drinking water quality monitoring in line with DWSNZ, request grading session with drinking water assessor when upgrades and improvements are complete
			Contractors and staff in the field actively managing and monitoring operations of the network assets with Robust response plans in place for potential events, including remote and physical onsite control as required.
			Proactive monitoring of any failure in core services so that CCC can identify at risk assets and notify asset renewal team for potential inclusion into renewal programme. CCL to provide pipe samples and failure/condition codes from failures.
			BCP for water, wastewater, storm water and solid waste

			Council rules of "chain of cleanliness" in CSS and Approved Water Supply installer specs to be adhered to by all contractors and authorised water supply installers. Reactive and Planned Maintenance to be undertaken in accordance with the Contractors Plan and Contract clauses. Auditing of chain of cleanliness by the contracts engineers in the Technical Services and Design team and Reticulation and Maintenance team. Follow the Response to Water Contamination procedure when contamination is found or suspected. Only Approved Water Supply installers allowed to work on CCC water supply. Reservoirs inspected internally through maintenance contract and leaking roofs identified and planned to be sealed. Regular planned external reservoir inspections to identify any source of possible transgression. Audits by Reticulation and Maintenance team of reservoirs. Backflow register kept up to date and new connections on commercial buildings not installed until backflow protection in place. Backflow requirements picked up through Building Consent process.
			Capital works now underway to improve wellheads. Standard to be achieved so an expert assessor will sign them off.
			Ensure that Asset Management Plans are up to date and renewal programmes are based on the best available data and information so that work is prioritised to the most critical assets
R00730	The need to comply with increasing regulation and legislative reporting requirements over the past 5+ years, has necessitated a prioritisation of the Operation Team. This has resulted in a reallocation of staff resources from trades/vocational roles to professional / engineering roles, without increasing head-count or budget. This has significantly reduced the resilience and redundancy of operational delivery of service.	High	Periodic review of the Business Continuity Plan and collaboration with Head of Department, capturing in the quarterly Three Waters reporting
R00735	There is no available internal resourcing with the Operation Team to progress with the implementation and update existing documentation across the CWTP, Banks Peninsula Treatment Plants, Water Treatment and Network Control - without compromising routine operation and operational compliance reporting.	High	Consider the re-distribution of resources within Three Waters to support the delivery of operational and compliance documentation through a quarterly review process, driven from operations
R00742	There is reduced resilience and redundancy due to an inability to train and qualify vocational staff for core delivery roles.	High	Work with HR and senior management to evaluate options to build in succession planning and support vocational training and cross-skilling
R00574	There is a risk that: Operational budgets will be overspent with an adverse impact on rates. Caused by: - reactive maintenance activities exceeding budget, due to differed renewals - Business being unable to accurately predict maintenance spend requirements - Working to a budget cap due to adverse rates impact - No additional budget being released due to unplanned (for) events. This may result in: - adverse/negative Levels of Service (LoS) impacts - major health, safety and wellbeing events (risk to life eg. recent road-markings death event); - increased asset recovery costs (from deferred maintenance) - Increased asset failure rates.	High	Monthly review of all operational expenditure (OPEX). Ensure all expenditure is reviewed prior to commitment Review expenditure and revenue to date and ensure the best information available is submitted to CS business partner regularly to ensure appropriate changes are made for future AP/LTP bids

R00518	There is a risk of: Council relying too heavily on outside consultants. Caused by: Council's (perceived) lack of ability to attract and retain staff with the level of expertise and experience, in the numbers required, across the City Services portfolios, given (amongst other things) a highly competitive technical recruitment marketplace. Resulting in: A consequential loss in internal knowledge, expertise and specialist skills development, a lack of ownership of issues and an inability to progress key initiatives in core functions.	High	Managers to proactively ensure PD's reflect role and job evaluations along with remuneration scale reflects responsibilities and markets
			Staff structure regularly reviewed and reflects the needs of Council along with reflecting the changing environment
			Succession plans in place for all critical and specialist roles where scarcity in the market or in house knowledge dictates a need
R00555	Central Government may legislate to re-arrange the operations and management of either part or all of the 3 Waters into a larger independent organisation/s. There is a risk that the Christchurch City Council may not be suitably informed and prepared for any particular central government led change, including legislative change, and therefore is unable to best respond to the threats and opportunities this presents. This could be caused by: • The Havelock North inquiry recommendations; • Current research being undertaken by Central Government into overseas options; • Governments approach that one solution fits all; • Christchurch City Council being unaware of the preferred position of its community; and • Not understanding the potential change, impact, or opportunities that this may have on the organisation cost, structure, and access to expertise; This could result in: • Removing an element of self-governance; • Financial costs or benefits, due to the change in structure and spread of overheads; • Downsizing of the organisation; • Inability to fully integrate decisions on future infrastructure for Christchurch; • Organisational culture risks; • Reputational risk; • Increase or decrease in cost to CCC ratepayers; and • A misalignment between Council and its residents.	High	Appropriate involvement in the research and engagement being led by Crown, to stay current on process and ensure views are considered. This includes: • Proactively submit at all stages of the process • Keep fully informed by attending appropriate forums • Executive Sponsor role with framework established • Participate in regional water working groups • Studying overseas models to understand their strengths and weaknesses • Look for opportunities to discuss options/decision one on one with the decision makers and policy advisors

			Understanding the potential impact on CCC and wider Canterbury. This includes: • Undertake gap analysis of state of drinking water network compared with best practice; • Liaise with key partners including neighbouring authorities; • Coordinating an integrated approach across Council ensuring organisational alignment; and • Consult widely with the community in a proactive manner.
R00199	There is a risk that: Critical Infrastructure fails leading to network failure of core Council services. Caused by: - The current (poor) state of some areas of core infrastructure resulting from earthquake events - Earthquake damaged pipe not found previously, now surfaces - Earthquake repairs completed to a lower standard than desired/required - Renewal programme being further eroded - Renewal programme inadequate to meet identified/agreed need - Operations Budget constraints preventing repairs - Energy supply disruption, including major power outage or fuel supply - Mechanical failure of infrastructure, including wells, pipes, pumps. Resulting in: - Failure to deliver essential water and waste services - Increased risk to community safety - Water borne disease outbreak or unacceptable public health issues - Environmental and/or property damage - Significant costs of clean-up operations and restoration work - Negative economic impact - Reputational damage for Council - Increased Opex or litigation costs - Failure to provide waste water collection in a safe and efficient manner to meet ratepayer expectations and/or Levels of Service (LoS) - Unbudgeted reactive expenditure - Need for premature pipe replacement.	High	Incorporate in the future renewals programme significant known earthquake damage that has not been covered by the existing cost share agreement.
			Negotiating the transfer of the defects liability from SCIRT repairs to CCC at an agreed risk cost
			Contractors and staff in the field actively managing and monitoring operations of the network assets with Robust response plans in place for potential events, including remote and physical onsite control as required.
			Develop an Improvement Plan derived from our participation in the WSAA International Asset Management Benchmarking project to optimise renewals decisions across 3 waters. (End of June 2017)
			Reviewing renewals programme on an on-going basis. Delivering of the capital programme Utilizing bring backs from future LTP years if necessary to replenish reactive budgets that have been depleted.
			Proactive monitoring of any failure in core services so that CCC can identify at risk assets and notify asset renewal team for potential inclusion into renewal programme. CCL to provide pipe samples and failure/condition codes from failures.
			BCP for water, wastewater, storm water and solid waste
			Ensure that Asset Management Plans are up to date and renewal programmes are based on the best available data and information so that work is prioritised to the most critical assets
			Reservoirs and portable generators to address long term power outages

R00009	There is a risk that: Water demand exceeds supply. Tankered water is not fast enough to meet emergency needs. Additionally, not enough strategically placed PRVs at reservoirs to allow for feeding zones below. Water pump stations taken out of service for upgrades or well upgrades leaves remaining live plant vulnerable. Caused by: - Streams supplying water on the Banks Peninsula (BP) get too low for adequate abstraction. Wells on the BP don't recharge fast enough for adequate abstraction. Peak water days in BP and Christchurch put stress on available supply. - Ministry of Health approved potable water tankers not available, or are not engaged quickly enough. - Pressure Reducing Valves (PRVs) only installed at some reservoirs. - Rain/storms make stream water untreatable due to turbidity. - Treatment Plant not able to treat water due to malfunction or not able to treat very turbid water. - Wellhead renewal/repair programme is not managed closely enough or pressure is put on to expedite quicker than the available plant should allow hence no factor of safety built in and minor changes cause large problems Resulting in: - Potential periods of no water in BP supplies if storage tank levels drop, also effecting Fire Fighting capability. - Stream water abstraction exceeds consented takes bringing Regional Authority attention and potential prosecution. - Periods of low pressure in Christchurch during sustained maximum pumping periods and/or periods where well availability is severely diminished. - Water restrictions required to be enacted. - Tankering does not meet initial demand, and extended periods of costly tankering. - Difficulty in livening up water supply reservoir zones when reservoirs are out of action.	High	Storage has been increased at some BP Treatment plants. Close monitoring of stream levels during summer periods to enable timely restriction level setting and prevent consent condition breaches. Aylmer's well able to by-pass membrane treatment and direct into storage if needed. Media releases and publicity used to maximise customer understanding and minimise when water shortage is a possibility. Regular meetings to discuss levels of water restrictions. Strategy for summer of 2018/19 to be discussed and set in September/October 2018 with Tech Services Manager. Regular restrictor checks as per the contract and leak detection both planned and reactive. Small settlement development strategy controls areas and size of growth to ability to supply water year around. SCADA monitoring and alarming of high turbidity and storage tank levels on BP allow time to make decisions about water tankering. Some treatment plants have increased ability to treat turbid water due to upgrades. Well renewal programme underway, most wells in Christchurch are available at present. PRV and Emergency Valve placement needs re-examining and building into LTP. Contractor to keep water tankers available. Emergency water saw horses kept maintained and available. Council and contractor have GIS marked emergency water points. Draft Business Continuity Plan requires finalisation. Programmes for repair and renewal do not outstrip the ability to provide enough water. Network Operations Manager able to keep control of kit being taken out of service and keeping enough plant in service with a factor of safety to be able to prevent pressures dropping across city. Work closely with programmes of work like the wellhead repair/renewal programme and the project Manager and contractors doing the work
			- Identify IEA or contractors qualified to operate the network in the event of a staff strike. - Document processes and procedures to operate the network.
R00011	There is a risk that: A member of staff or contractor, or a member of the public or other individual/group, causes damage to the water or wastewater network through either accidental or deliberate action. Caused by: - A contractor causes damage by working on council assets without the appropriate authority, does not follow agreed plan, or incorrectly tags and locks out equipment, or does not identify council services when working around them - An individual or group damage or remove infrastructure by vandalism or theft - Security features are breached and specific assets or asset targeted in a planned action. Resulting in: - Disruption to service, small or large - Contaminated water supply causing illness or (potential) death	High	Permit to work and Permit to Enter systems in place and used for contractor work on council assets. CSS, Water Supply Installer and Authorised Drain layer specs followed by qualified contractors and planned shutoffs controlled by council. Registers of installers and drain layers kept up to date. Council retains the right to prosecute for unauthorised interference and this acts as a deterrent.
			Assets shown clearly on GIS and valves painted as per specs to show normal position, open or shut with critical valves tagged also. New houses to have water connection checks prior to sign off, and Rural Restricted supplies to be checked periodically.
			Facilities and hatches to be left locked at all times except when lawfully in use. Respond to reports of suspicious activity at facilities. Follow the Response to Water Supply Contamination and Overflow procedures.

	- Repairs, replacement or cleaning of infrastructure being required - Rivers or aquifers being polluted.		
R00671	There is a risk that our water treatment plants at Duvauchelle, Little River, Akaroa, Birdlings Flat, Pigeon Bay and Main Pumps do not adequately remove contaminants from the source water. Caused by: • Contaminant load is greater than the treatment plant was designed for • Treatment plant not properly maintained and/or operated due to insufficient maintenance and renewals budget, lack of staff/contractor capability and/or capacity, or negligence • Break-down of treatment plant This may result in: • Illness and possibly deaths from drinking water which has received insufficient treatment to remove contaminants • Non-compliance with the Drinking-water Standards for New Zealand, which may lead to intervention by the drinking water regulator • Increased operational and maintenance costs • Inability to supply sufficient water to meet demand • Reputational damage	High	
R00556	Context: The Council are temporarily chlorinating Christchurch's drinking water supply. NB: the summary residual risk rating is shown with the highest likelihood and the highest impact assessment. Associated with this are the following (interconnected) risks and their residual ratings: - Failure to adequately disinfect with chlorine (High) - Contamination of the water supply with excessive chlorine (Medium) - Formation of disinfection by-products due to chlorination (Medium) Caused by: - Equipment set up or failure, supplied hypochlorite or operator error leads to under-dosing of contaminated source water - Equipment failure, supplied hypochlorite or operator error leads to over-dosing, exceeding the maximum acceptable value in the Drinking-water Standards for New Zealand (5 mg/L). - Chlorine dose reacting with constituents of source water, existing biofilm and mineral deposits - Concerns about chlorination including taste and odour issues This may result in: - Illness and possibly deaths from drinking water with microbial contamination - Skin reactions to high chlorine concentrations - Premature failure of pipes, tanks and plumbing fittings due to high chlorine concentrations	High	Communication, including: • Proactively disseminating information in all media forms • being open and transparent at every step including minimising the amount of business transacted in public excluded sessions • providing up-to-date information to the public on all matters • Liaise with key partners to ensure messaging is consistent and aligned • keeping the residents fully aware of all progress being made in a timely manner • Implementation and ongoing review of Water Safety Plan for Christchurch supply • Well Head Security Improvement Programme (WHSIP) to upgrade well heads so that they are secure from contamination • Drilling deep wells to replace shallow wells that are more vulnerable to contamination • Maintain microbial contamination monitoring, risk assessment and reactive processes • Confined aquifer system prevents microbial contaminants from entering the aquifers used for our water supply • Maintenance programme to check and maintain well heads • Maintenance of temporary chlorine treatment equipment • Audits of all contractors' maintenance protocols and activities, and staff training • Providing unchlorinated water to general public from secure wells

	- Taste and odour issues from chlorine and disinfection by-products - Increased risk of cancer due to disinfection by-products - Increased costs of temporary chlorine treatment		

5.3 Asset Management Maturity Assessment 2020: Summary

Table 5-3 Extract from 2020 Asset Management Maturity Assessment

Section	Current/ Target		Reason for scores 2020	Improvement actions planned or underway
Audit and Improvement	80	90	A business improvement programme was developed following the first maturity assessment in 2016 and a water industry benchmarking process. An updated improvement plan was developed in 2018 but only limited funding was provided. Three major projects (risk, Quality Management Framework, maintenance contract review) are monitored through the corporate AM improvement programme led by AMU. Reporting on this programme is via AMGB. Other improvements are a lower priority and progress as BAU as time permits.	Establish KPIs to monitor AM improvement - AMMA results are appropriate but consider more detailed targets such as data quality and completeness, % reviews of AM processes.

Section	Current/ Target		Reason for scores 2020	Improvement actions planned or underway
AM Policy and Strategy	85	95	Corporate AM Policy and Strategic AM Plan in place, provides key principles, objectives, corporate AM improvement path, framework for AM planning. Strategic context analysis is thorough and documented in Water Strategy, IS, AMP and Activity Plan. Strategic priorities are well embedded with good alignment through to AMP and Activity Plans.	Advancing asset management programme. Continue to build strategic alignment into AMP programmes. Update AM Policy and Objectives.
Levels of Service	85	90	The levels of service and performance framework is aligned to strategic objectives and customer expectations and well measured, reported and benchmarked. There is a general understanding of customer and stakeholder needs, and there is engagement with Council over level of service and cost trade-offs. However, there is still a reliance on the community satisfaction survey and LTP /IS consultation as the means of customer engagement. It has been many years since there was wider community engagement	Re-engage with community around level of service options (beyond 'document submissions' processes). Further enhancements to network models and AAIF will support ongoing improvements in level of service and cost discussions.

Section	Current/ Target		Reason for scores 2020	Improvement actions planned or underway
			over levels of service and willingness to pay. The ability to link key levels of service and cost is strengthening as modelling (both capacity and condition) progresses. There are some improvements needed to operational performance measures, but that aspect is covered under 'operational planning'.	
Forecasting Demand	**85**	**95**	Water demand is planned at a city wide, supply zone and asset level. Demand is monitored and future demand is mapped for each water supply zone. Water supply zones are being rezoned and pressure management implemented to maximise value from supply, increase resilience and better manage demand. Various demand scenarios have been modelled (demand report 2020). Growth related projects have been identified.	Demand management initiatives. Operational demand management and control.
Asset Register Data	**80**	**95**	There is a robust core dataset for reticulation assets and wells, with data quality improvements for reticulation recently being driven by AAIF. Data quality dashboards are being established to be able to monitor data quality and easily identify remaining gaps. Work is required to establish an up-to-date dataset for stream intakes and water treatment plants. Data management processes are developed, but more work needs to be done to manage and enforce data quality coming into the organisation. Assignment of data owner/steward responsibilities has been a good step. Quality and timeliness of data for vested assets has improved.	Asset data validation - stream intakes and treatment assets. Bring wells data into the corporate system. Continue development of data quality monitoring/data improvements through data quality dashboards. Review and audit processes for incoming data sources and implement improvements.
Asset Performance/ Condition	**75**	**90**	Condition is estimated based on material type, pipe breakages and age and data is being validated with sampling following breaks. Performance data is collected via monitoring (SCADA) and modelling. Condition and performance deterioration models are part of AAIF for reticulation assets. A detailed assessment of reservoirs has recently been completed. There is a well-established history of reactive maintenance performance and cost and an improved process for transferring performance, works and cost data from contractor data Council systems. Dashboards have been developed to support performance monitoring, including contract KPIs.	Ongoing management and update of network models. Implementation of updated communication and control technology.
Decision Making	**80**	**90**	Formal decision-making processes are applied to major projects and programmes - business cases are used to justify the financial and non-financial benefits of projects. Options are evaluated using a Council framework. CAPEX projects are captured and prioritised against decision criteria (aligned to Council priorities) in the CPMS. See also CAPEX planning re: AAIF/ renewal decisions.	See capital planning.
Managing Risk	**85**	**95**	The Council risk policy and framework is well established and regularly updated. Regular risk reporting on 'management-level risks' in Promapp, reported to the Audit and Risk Committee and work has been done to align these with more	Complete assessment of 'resilience' against disasters for earthquake, tsunami, coastal, storm (risk analysis, mitigation programmes).

Section	Current/ Target		Reason for scores 2020	Improvement actions planned or underway
			detailed risk assessments done for water safety plans. Resilience section of AMP is new with stronger coverage of 'shocks/disruptors' risks and GIS hazard mapping is being used to improve understanding of hazard-related risks. The AMP Risk section summarises high risks and mitigation measures. Criticality/risk ratings have been applied to reticulation assets and used to prioritise renewals (AAIF).	Application of critical framework to assign asset criticality rating. Noted that Risk team are also progressing other recommendations from Deloitte risk review 2019.
Operational Planning	**85**	**95**	The networks are remotely monitored, intervention levels are defined, and corrective actions implemented. A significant review of operations and maintenance practices has been part of the water safety planning process with a much higher level of monitoring required. AAIF identifies risk-based inspection frequencies for pipes. There has been a focus on getting better monitoring and control of contractor operational activities and costs. Emergency management plans, and procedures for specific operations events (e.g. contamination) are in place but the emergency plan needs ongoing review and exercising.	Develop, implement 'Smart Network' strategy to support optimisation of network operations. Continue pump station maintenance review. Continue AAIF programme to inform 'optimised' inspections and maintenance programmes. Emergency management plan review/exercise programme.
Capital Works Planning	**90**	**95**	See decision making, plus. Capital projects and programmes managed in accordance with CPDF and projects tracked in CPMS. A 10-year (AMP/LTP) and 30-year (IS) CAPEX programme is in place. Renewal programmes for reticulation are based on age/condition/life/performance/cost (AAIF). Water network models are the basis for growth and level of service CAPEX programmes.	AAIF enhancements and expansion to non-retic assets.
Financial Planning	**80**	**90**	10- and 30-year financial forecasts are developed with supporting data confidence information to inform reliability of forecasts. A good financial overview is provided in the AMP, supported by detailed programmes in the lifecycle section covering how the finances were developed and the key assumptions and risks. Revaluations occur regularly - the most recent one seeing a significant increase in value (partly arising from application of actual rather than contracted rates). Funding/level of service scenarios are being presented to Council as part of LTP process. There has been more focus given to unit rates-based development of OPEX forecasts and calculation of 'consequential OPEX', however these still get 'disconnected' from CAPEX discussions for LTP budgeting. A 3-waters financial data framework project aims to better align financial and asset data structures to provide better lifecycle cost analysis and asset financial reporting.	Continue three-waters financial data framework to support asset lifecycle cost analysis and financial reporting.
AM Leadership and Teams	**85**	**90**	The organisational structure for asset management has embedded. AMU lead the consistent approach to AM across Council. There are council wide AM communications on AM through SharePoint and forums and this has been an area of improvement. AMU has developed an AM competence framework,	Continue to use opportunities to grow understanding and improve 'AM System' - i.e. how various Council teams work together to deliver good AM outcomes.

Section	Current/ Target		Reason for scores 2020	Improvement actions planned or underway
			but this has not been applied to individual roles or job descriptions. Generally, AM practice is becoming more standard Council language and culture.	Contine AM working group/s to support shared learnings and knowledge. Review staff/team capabilities against AM competence framework to identify capability development needs (training, mentoring, etc).
AM Plans	**85**	**95**	The AMP is a significant improvement on the one presented for the last review (which was incomplete). It is supported by strong data and analysis noted in other elements of this maturity framework. It contains all the required elements of an AM Plan, is well written and supported by good information. The process for AMP was collaborative with involvement from key support areas such as risk/resilience and strategic planning. There could be some streamlining between Activity and AMP content considered before the next LTP.	Review relative content, timing, scope of AMP and Activity Plan prior to next LTP. Robustness will improve as the AM improvement plan is further implemented.
Management Systems	**65**	**85**	A Quality Management Framework has been developed and a QMS role has been recruited to progress development of this. Processes are well established and documented for many corporate processes such as capital delivery and risk. Since the last review, AMU has reviewed/improved some critical AM processes including asset handover and disposals. AMU is supporting a more formal process to assist activities prioritising 'critical AM Processes' and reviewing/improving the highest priority ones, this is being progressed as part of the QMS.	Continue QMS implementation and prioritised development, documentation and monitoring of critical AM processes.
AM Information Systems	**85**	**95**	Several systems are in place to support the business needs for asset information - SAP, Infoasset, GIS, AAIF, hydraulic models. Data warehousing shares information between corporate systems. GIS Smartmap and Power BI tools (dashboards) are changing the way that staff interact with the information systems making it much easier to consume data and information. AMU has established a number of standardised asset and data quality reporting tools across the business, Waters have supplemented this with some to meet their own specific needs. Better financial analysis and reporting tools are still required.	Continue implementation of B2B and BI tools to support integrated, easy access to information. Asset Information Strategy.
Service Delivery Mechanisms	**75**	**90**	New Council procurement rules have been developed and are being implemented as contracts come up for renewal. Core operations functions have been defined and external contracts developed and procured following Council's procurement policy. A big focus has been better oversight, control and visibility of contractor activity. Hybrid delivery model for capital - (consultant panel). New AMP section provides a documented basis for service delivery/procurement approach.	Continued focus on improving oversight and control of contract operational activities. Ensure AM requirements are built into new contract/s.

5.4 2023 Asset Management Maturity Assessments

Table 5-4: 2023 AMMA Three Waters | What works well

Category	#	Theme	Observations	Evidence/examples
People: The team has strong capability	13	Asset management practices	• Key personnel are making reasonable qualitative or judgement-based decisions in the absence of data • Team members (Three Waters BI team) are taking ownership to address issues related to the asset management framework (organisation-level)	• Example: for stormwater assets, CCTV footage is reviewed prior to make maintenance or renewal decisions in the absence of reliability, maintainability and availability data *(applicable to Water Supply and Wastewater teams)*
Systems: Initiatives to improve data quality are either in-flight or being planned	14	Improvement initiatives	Initiatives are either in-flight or being planned to improve: • Introducing data standards **(4.2)** • Creating a consistent link between data sources **(4.2, 4.3)** • Using tools (e.g., AAIF) to determine the remaining useful life of an asset **(4.2)**	• The BI team are actively working on a data standard • The BI team are also working on creating a link between GIS and SAP platforms • For reticulation assets, the Asset Assessment Intervention Framework (AAIF) is utilised to calculate the remaining useful life. Key data fields include condition, RMO, consequence of failure and degradation

Table 5-5: 2023 AMMA Three Waters | Oppurtunities for Improvement

Category	#	Theme	Issue	Evidence/examples
Systems: Technology is not fit-for-purpose and data quality is poor	10a	Asset data quality	• Asset data fields are not complete, including condition, age, capacity **(2.4, 3.5)** • Data accuracy is inconsistent across asset types **(4.2)**	• Data confidence is high for quantity of assets (90%), uncertain for condition data (50%) and performance (50%). Validity of the data is unknown. • Condition data is out of date, with condition assessments last completed for waterways in 2015 Asset data confidence is high for reticulation assets, but low for pumping stations and treatment plants (documented in the Water Supply, Stormwater and Wastewater AMP's).
	10b	Consistent storage of data in centralised (Enterprise) systems	• Not all asset data is saved in SAP. Excel spreadsheets, GIS and external compliance data are also used. **(4.3)** • Lack of certainty in the procedure to maintain data in SAP **(4.2)** • Lack of documentation for all asset types which defines the data structure **(4.2, 4.4)**	• External compliance data from NIWA & Metservice is used to inform hydraulic modelling *(applicable to Land Drainage team)* • This process is documented in Promapp, however it was not observed. There is un-certainty to whether the process is adhered to. • Documentation exists for the AAIF for reticulation assets, however was not observed for the remaining Three Waters asset types.

Category	#	Theme	Issue	Evidence/examples
Process: Processes are not fit-for-purpose	11a	Documentation and formalisation of business processes	• No documented process to define and identify critical assets **(4.4)** • No documented process to enable long-term planning of renewals (e.g., renewals are mostly reactive) **(3.5, 4.4)** • Engineering judgement is relied to make asset renewal decisions **(4.4)**	• Asset criticality is defined in the AMPs and is defined for reticulation, waterways and stations assets. However is it missing for all other asset types. • There is no long-term schedule of indicative renewals, based on criteria such as age (remaining useful life/similar). • There are no defined criteria to help on-site teams decide whether to repair, replace or dispose of assets (e.g., a pump on –site)
Process: Processes are not fit-for-purpose	11b	Clarity of accountabilities and responsibilities	• Responsibility is unclear on who is to maintain and update data **(4.2, 4.3, 4.6)** • There is no governance in place to control changes to data requirements or data itself **(4.3)** • Lack of clear requirements for external contractors to update data when undertaking work on-site has resulted in data gaps **(4.5)** • The asset handover process is not efficient, resulting in delays with data being uploaded to SAP **(4.5)**	• It is unclear on whether the responsibility to update and maintain the data sits with the AM or Operations team. There are communication gaps between the activity owners on where this responsibility lies. • Accountability for Asset Management sits with Managers, or Team Leaders, however, this does not appear to be formalised. • When contractors complete work on-site, information is not fed back to Council to update the asset record in SAP • After as-built information has been received, there have been instances where it has taken several months before being uploaded to SAP, which has prevented work orders from being raised against physical assets

Category	#	Theme	Issue	Evidence/examples
People: the team's ability to shift towards a more proactive asset management approach is being disadvantaged by resource constraints	12a	Internal and external resourcing capability	• External contractors don't have the required technical expertise (e.g., to carry out condition assessments and provide a reliable condition rating) **(4.5, 4.6)**	• External consultants engaged to complete condition assessments have been observed to not possess the specialist skills to provide a reliable condition rating (e.g., understanding of how waterways assets function, and what to look for to determine condition) *(applicable to Land Drainage team)*
	12b	Internal resourcing capacity	• The team does not have enough capacity to process its backlog for linear and non-linear assets	• There is minimal spare capacity within the unit to action non-BAU activities e.g., condition assessment programmes and update data

5.5 2021 AMP Improvement Programme

The 2021 asset management improvement focus areas were:

- Asset inventory, condition assessment and failure data improvement programme
- Financial tracking, forecast and relationships improvement programme
- Demand management improvement programme
- Integrated master planning improvement programme
- Climate change response improvement programme
- Level of service and customer engagement improvement programme

Asset management improvements can also support the following existing improvement programmes within the water supply activity:

- Water safety plan improvement programme
- "Smart" technology improvement programme

The 2021 AMP improvement programme is presented in the tables below.

Table 5-6: 2021 AMP Improvement Programme Tasks

Improvement programme	Asset inventory, condition assessment and failure data improvement programme
Scope	Targeted data capture strategy for vertical assets to improve completeness and confidence of asset inventory, with a specific focus on treatment assets. Condition assessment of critical or high value assets for stations and treatment plants to inform renewal programmes. Condition assessment of pipes where evidence will help refine AAIF criteria for applying condition scores (AC and CI). Asset failure and disposed asset post-mortem to understand failure mechanisms and verify condition grading. Improve failure data capture and handling to strengthen the connection between historical failure performance and proactive renewal/maintenance strategy.
Issues addressed	Incomplete asset register, particularly for vertical assets with many treatment assets missing from the register or without installation dates. Poor information on the condition of vertical assets, which presents a risk particularly for critical or high value assets. Condition assessment of pipes is primarily based on age and material and requires ongoing validation. Failure data is not always captured in a manner where it can be analysed across the portfolio to aid decision-making.
Benefits	Increased confidence in decision making around risk management, maintenance strategy, condition management and renewal intervention.
Resourcing	1 x FTE with skillset engineer/asset manager/analyst for system improvements Condition assessment experts for both vertical and horizontal assets to carry out the targeted inspection programme.
Budget	$100,000 (1xFTE) for system improvements and programme overview; $400,000 per year for reservoir and suction tank inspection, expand programme for pipe condition testing and failure post mortem, $150,000 data collection.
Timeline	Intensive 2 years, then ongoing

Table 5-7: 2021 AMP Improvement Programme Tasks Continued

Improvement programme	Financial tracking, forecast and relationships improvement programme
Scope	Require TOTEX (combined CAPEX and OPEX) estimation at all stages of a project. Provide templates for generating these TOTEX estimates

	Overhaul how OPEX costs are categorised to allow greater analysis of decision making impacts Develop a live and "BAU" method for the financial reporting that carried out as one-off as part of the AMP writing process. Create tools to make financial analysis more accessible and reliable for asset managers
Issues addressed	OPEX impacts are not always taken into account when projects are promoted and then put into service. Poor visibility on where OPEX is being directed and how effective it is over the long term to achieve desired outcomes. The financial analysis and reporting that is required as part of the AMP process is pulled together for a one-off process, is inefficient and lacks clarity.
Benefits	Measuring the combination of CAPEX and OPEX together to support effective financial decisions. Give decision-makers the visibility of clear financial data as evidence to support asset management strategy. Reduce the inefficiency and risk of error when pulling together financial data for AMPs.
Resourcing	Change programme champion (internal): staff time. Staff buy in from City Services, Finance, IT and PMO. Potential: (external) advisors, analyst, project manager
Budget	$200,000 (2xFTE)
Timeline	12 months

Table 5-8: 2021 AMP Improvement Programme Tasks Continued

Improvement programme	Demand management improvement programme
Scope	Proactive demand management, beginning with strategy and quantifying the most useful areas to target. Determine the off-set cost of infrastructure that is not needed if demand is reduced. Set milestones to reach the Level of Service targets for reduced average and peak demand. Determine options for leak detection and reduction and leverage these existing budgets. Determine options for managing demand via "Smart" networks and leverage these existing budgets. Identify new bulk metering sites required to support accurate demand calculation and management.
Issues addressed	Infrastructure is sized to deliver peak flows. Infrastructure costs can be avoided by reducing the peaks through demand management. There is no overarching demand management strategy that sets clear goals, and tactics. Effort is needed to determine where the most cost effective demand management techniques can be applied. Peak water supply demand surges in Summer as high as 552 litres per person per day[1] (l/p/d), compared to the average daily flow of 209 l/p/d. The estimated leakage rate for the water supply network is 23%. Quantitative demand forecasting currently does not include allowances for different demand scenarios and is done using only population growth prediction.
Benefits	A strategy for demand management provides a starting point and clear direction. Quantifying the need for demand management sets out the costs and benefits. Reducing demand can defer new infrastructure that would otherwise be needed to meet capacity Reducing demand can reduce running costs for pumping and treatment Reducing demand can reduce pressure on source water sources Reducing leakage demonstrates public health protection through a well contained reticulation network
Resourcing	1 x FTE with skillset engineer/asset manager/analyst
Budget	$100,000 per year for 4 years ($400,000 total)
Timeline	4 years

[1] February 2020 Newsline update : https://newsline.ccc.govt.nz/news/story/christchurch-facing-water-restrictions-as-demand-surges

Table 5-9: 2021 AMP Improvement Programme Tasks Continued

Improvement programme	Integrated master planning improvement programme
Scope	To create a high level infrastructure master plan that sets out strategy for main supply, conveyance, treatment and disposal zones. To make clear which long term infrastructure solutions are preferred. To integrate master plan priorities when projects are promoted for other reasons, such as renewals.
Issues addressed	Projects can be promoted in isolation which misses out on delivering co-benefits or helping address long term issues.
Benefits	Combine growth, level of service and renewal needs into one integrated master plan
Resourcing	Freeing up time and providing support labour to Team Leader Asset Planning WWW
Budget	$100,000 (1xFTE) to support planning team who is the owner of this programme
Timeline	12 - 24 months

Table 5-10: 2021 AMP Improvement Programme Tasks Continued

Improvement programme	Climate change response improvement programme
Scope	Develop and begin to implement a strategy to mitigate and adapt to climate change specifically for the water supply activity. Set clear goals, identify options and identify the costs and benefits. Develop a long term strategy for supplying water to land areas exposed to rising sea and groundwater level.
Issues addressed	Council has declared a climate change emergency however a clear strategy is needed to ensure that the most significant impacts to the water supply activity can be planned for. Decisions regarding climate change require financial support and have long term service impact so require a robust decision-making process. The strategy and planning needs to be done now so that the any specific responses that require CAPEX support can be promoted in the next LTP.
Benefits	Clear direction to meet Council's climate change commitments. Ensure quality decisions are made responding to climate change mitigation and adaption impacts to the water supply activity. Get the groundwork complete so that any specific responses can be promoted.
Resourcing	1 x FTE with skillset engineer/climate change impact
Budget	$100,000 (1xFTE) to support planning team and asset management team
Timeline	12 months

Table 5-11: 2021 AMP Improvement Programme Tasks Continued

Improvement programme	Level of service and customer engagement improvement programme
Scope	To engage with customers to ensure that levels of service expectations align with community values. To determine and then carry out various methods of engagement; e.g. customer stakeholder group, survey, workshop, level of service training, representation.
Issues addressed	The last detailed customer research that was carried out for water supply levels of service was over 20 years ago. Informed perspectives of water supply customers are essential for setting levels of service targets and long term programmes.
Benefits	To ensure alignment between the views of water supply customers and the decisions made regarding water supply costs and levels of service
Resourcing	1 x FTE with skillset in community engagement/customer relations. Internal support from asset management/planning
Budget	$100,000 (1xFTE), part time staff commitment from asset management/planning
Timeline	Ongoing

Table 5-12: 2021 AMP Improvement Programme Tasks Continued

Improvement programme	Water safety plan improvement programme
Scope	Section 3 identifies that $20M is needed to support the water safety plan improvements. Asset management team resources will be required to support these improvements.
Resourcing	Asset management team staff time
Timeline	Ongoing

Table 5-13: 2021 AMP Improvement Programme Tasks Continued

Improvement programme	"Smart" technology improvement programme
Scope	Section 3 identifies that $10M is needed to support the water safety plan improvements. Asset management team resources will be required to support these improvements.
Resourcing	Asset management team staff time
Timeline	Ongoing

5.6 Capital Investment Programme FY 2025-34

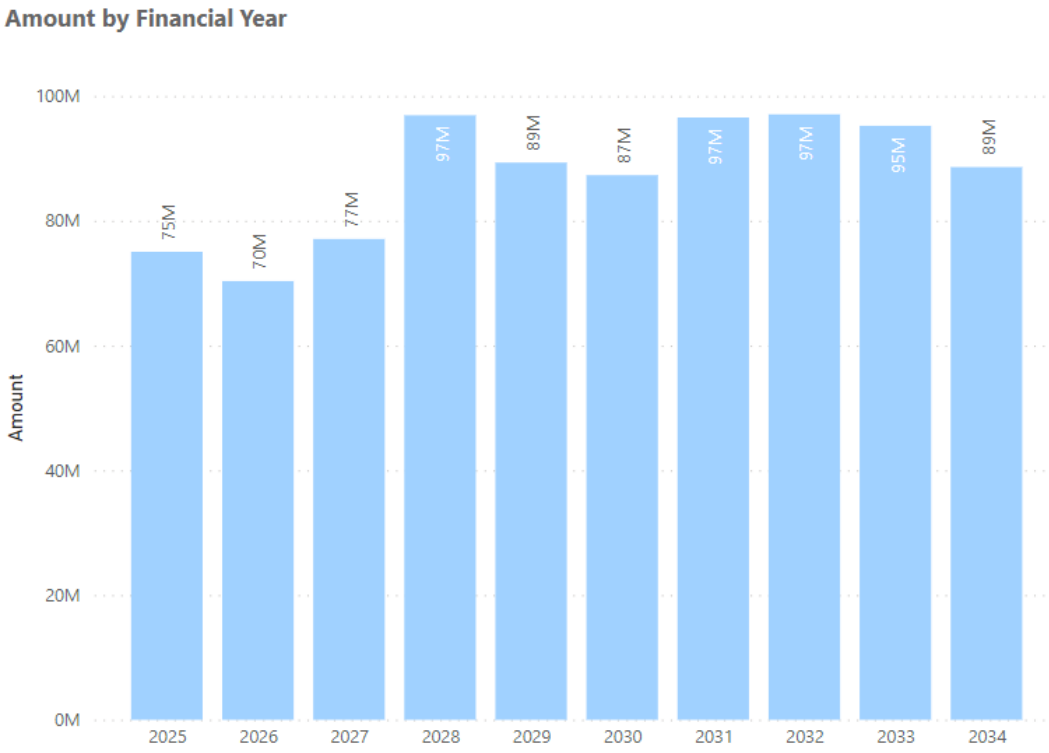


Figure 5-1: Total Water Supply Capital Programme FY 2025-34.

For Details of all Programmes and Projects refer to Budget Interactive Budget Tool and the accompanying Schedule.

Orbviz Budget Interactive Tool– multiple viewpoints and functionality.

Home | CCC Consultation for Long Term Plan and Annual Plan - Projects | Christchurch City Council (orbviz.com)

Schedule 1 – Water Supply by Primary Driver

LONG TERM PLAN 2024 - 2034

PLANNED CAPITAL PROGRAMME BY PRIMARY DRIVER (INFLATED)

(000s)

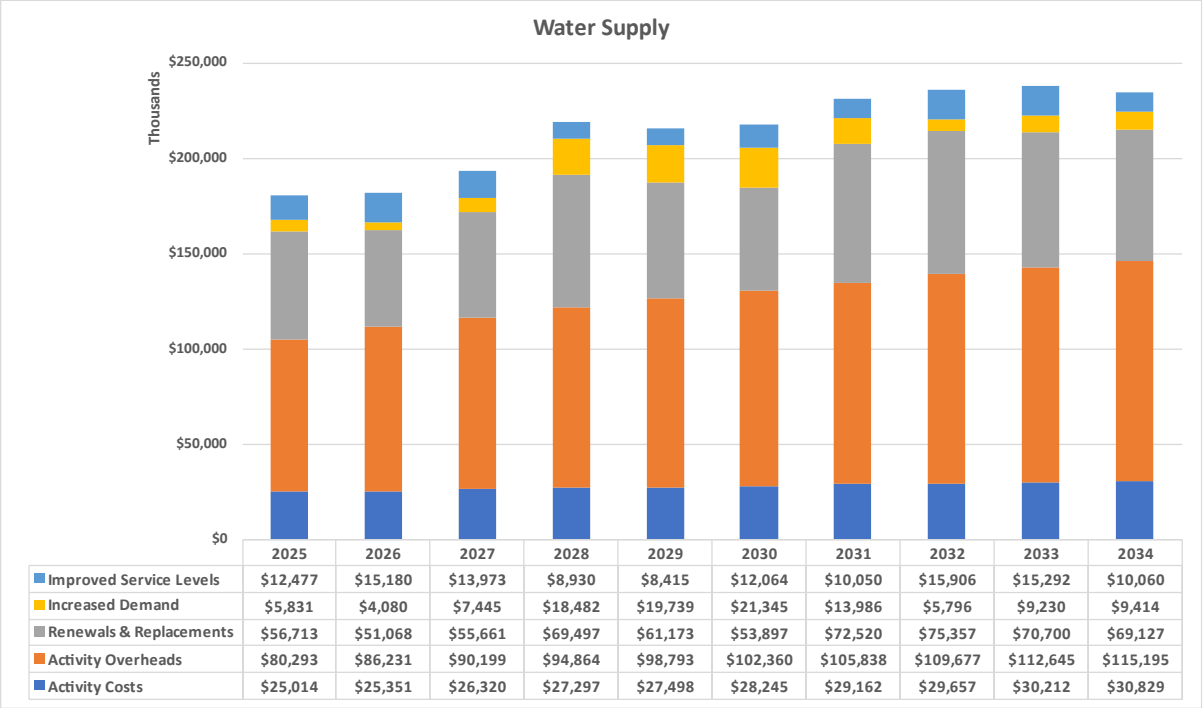
Primary Driver	ProjectID	Project Title	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	Total
Improve the Level of Service	2201	Programme - WS City Water Supply Rezoning & Demand Management										615	615
	37846	Programme - WS Security Long Term Budget									60	62	122
	43331	WS Birdlings Flat Improvements	300							381			681
	43873	Programme - WS Backflow Prevention	50	52	53	54	55	57	58				379
	45202	WS Wrights Road Suction Tank & Pump Station Building (PS1080)	169	3,136	2,923								6,228
	52902	WS Okains Bay New Water Supply	500	890	3,870	2,188							7,448
	56783	WS Smart Water Network	500	517	529	433	444	453	463	473			3,813
	57808	WS Duvauchelle Membrane Filtration	1,056	2,973									4,029
	58175	WS Backflow Prevention for Water Safety Plan	300	310	317	325	388	283	290	296	302	308	3,119
	58177	WS Pump Station Resilience Renewal	351										351
	59941	WS Banks Peninsula Communal Fire Water Storage Tanks	54	57	116	119							346
	60258	Programme - Water Supply Safety Improvements						567	579				1,146
	60328	Programme - WS Pumping & Storage Water Security Improvements						113	116	118			347
	60329	Programme - WS Reservoir & Suction Tank Water Security Renewals		52	423	433	416	425	434	444	452	461	3,541
	60330	WS Little River, Exeter, Silverbirch Reservoir Security Renewals.	235	110									345
	68390	WS - Main Pumps UV Reactor System Rehabilitation	1,181	1,560									2,741
	69983	WS Dedicated Water Take/Filling Sites	350	652									1,002
	69993	WS Water Supply Safety Improvements for Banks Peninsula	400	500	400								1,300
	70349	WS Reservoir & Suction Tank Delivery Package	20										20
	71598	Programme - WS New Chlorination Equipment & Controls (D3 com	1,000	2,068	2,116	2,166	2,218	5,668	5,793	11,828	12,065	6,153	51,075
	72854	WS Smart Customer Water Meter Rollout	1,000	1,034	1,058	1,083	1,664	1,700	2,317	2,366	2,413	2,461	17,096
	73447	WS L'Aube Hill Membrane Backwash Recycle			529								529
	73967	WS Rezoning Stage 1 Implementation				654	3,106	2,670					6,429
	74223	WS Wellhead Security Cage Upgrade	545										545
	74451	WS Flow Meters at Booster Pump Stations and Reservoirs Stage 1	10	316	334								660
	74452	WS Flow Meters at all Stations Stage 2		10	587	612							1,209
	74992	WS - Diesel Tank Telemetry	100	207	138								444
	74994	WS - Installation of Telemetry and Unmonitored Sites	100	310	212								622
	75766	WS Extension of Water Supply Well Head Plinths	145										145
	76081	WS Tanner PS1095 Treatment Equipment & Controls	3,900										3,900
	76389	WS Parklands Rezoning	100	310	370	862							1,643
	865	Programme - WS Security	112	116			124	127					479
Improve the Level of Service Total			**12,477**	**15,180**	**13,973**	**8,930**	**8,415**	**12,064**	**10,050**	**15,906**	**15,292**	**10,060**	**122,348**
Meet Additional Demand	1258	Programme - WS New Pump Stations for Growth			899	3,087	2,107	7,368	1,912	1,005	4,645	4,738	25,762
	45	WS New Connections	1,500	1,551	1,587	1,625	1,664	1,700	1,738	1,774	1,810	1,846	16,794
	45281	WS Highfield Water Supply Mains - Stage 2	1,171	1,191	902								3,264
	49	WS Subdivisions Add Infrastructure For Development	100	103	106	108	111	113	116	118	121	123	1,120
	50	Programme - WS Reticulation New Mains					555	1,134	1,159	1,183	1,206	1,231	6,467
	57800	WS Moorhouse Avenue Pump Station	5	207	2,644	3,791	2,791	2,374					11,813
	59938	WS Metro Pump Station to Antigua Street Link Main	855										855
	64	Programme - WS Land Purchase for Pump Stations				1,083	555	850	1,738	296			4,521
	67456	WS Koukourārata Drinking Water Scheme	300	310	779	6,038	3,078						10,505
	71995	WS Grassmere to Mays Link Main	1,900	615									2,515
	73886	WS Ferrymead WSZ Capacity Upgrade		103	529	1,450	7,547	6,445	5,934				22,009
	870	Programme - WS New Wells for Growth				1,300	1,331	1,360	1,390	1,419	1,448	1,477	9,725
Meet Additional Demand Total			**5,831**	**4,080**	**7,445**	**18,482**	**19,739**	**21,345**	**13,986**	**5,796**	**9,230**	**9,414**	**115,349**

Primary Driver	ProjectID	Project Title	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	Total
Replace Existing Assets	17885	WS Eastern Terrace Trunk Main Renewal	1,281										1,281
	17924	WS Averill Street Pump Station Renewal (PS1005)	100	103	5,289	8,070	3,327	1,134					18,023
	2355	WS Pump Stations Reactive Renewals	200	207	212	217	222	227	232	237	241	246	2,239
	33813	WS Jeffreys Road Pump Station Upgrade (PS1076)	2,166										2,166
	41882	Programme - WS Pumping & Storage Electrical Renewals	10	333	638	668	460	761	1,127	1,242	1,313	713	7,264
	41883	Programme - WS Pumping & Storage Mechanical Renewals		207	113	23	198	219	348	355	241	246	1,950
	41884	Programme - WS Control Software Renewals (SCADA)	20	128	131	134	138	141	144	77	78	80	1,071
	41885	Programme - WS Banks Peninsula Treatment Plant Civils Structures Renewals										1,655	1,655
	41888	Programme - WS Banks Peninsula Treatment Plant Mechanical Rei	50	517	264	433	444	567	579	591	483	492	4,421
	48081	WS Mains Renewal - Halswell Junction Rd Roading Extension	324										324
	48891	WS Mains Renewal of Colombo to Moorhouse Utility Tunnel	489										489
	48902	WS Pump & Storage Equipment Renewals (MEICA) & Transient Miti	1,570										1,570
	48907	WS Health & Safety Renewals	500	50	50	50	50	17	17	59	60	62	915
	50437	WS Treatment Plant Reactive Renewals	40	41	42	43	44	45	46	47	48	49	448
	50446	WS Denton, Sockburn, Mt Pleasant 3, Grassmere, Mays & Halswell :	1,584	368									1,951
	50449	WS Sydenham Suction Tank Replacement	555	1,199									1,754
	51	Programme - WS Mains Renewals	2,100		1,233	32,560	33,249	39,540	52,292	56,185	51,879	52,917	321,955
	52	Programme - WS Headworks Well Renewals		207	1,058	1,083	1,109	1,134	2,317	2,366	1,206	1,231	11,710
	53	Programme - WS Submains Renewals	2,754	4,136	4,231	4,333	4,437	4,534	9,268	9,463	9,652	6,153	58,961
	55783	WS Scruttons Road Pump Station to Lyttelton Road Tunnel & St An	3,708										3,708
	55790	WS Puriri Kilmarnock Wharenui Ilam Maidstone Wainui George Div	390										390
	55797	WS Park, Governors Bay, Cressy, Pages, Buxtons & Gladstone Quay	767										767
	56060	WS Update Model Base Data	400	284	338	366	373	300	300	300	300	300	3,261
	56683	WS Reactive Mains & Submains Renewal	600	620	635	650	665	680	695	710	724	738	6,718
	57144	WS Reactive Water Meter Renewal	500	517	423	433	444	453	463	473	483	492	4,682
	58178	WS Hackthorne Reservoir Renewal	1,050										1,050
	58910	WS Quarry Reservoir Renewal	3										3
	59075	WS Yokogawa Automation Blocks Renewal as Part of Water Supply	504										504
	60079	Programme - WS Banks Peninsula Pumping & Storage Civils & Structures Renewals						567	2,317	828			3,712
	60096	WS Blighs Road Pump Station Well 3 Renewal (PS1007)	121										121
	60152	WS Kerrs Road Pump Station Renewal (PS1022)	50	672	5,289	6,066	3,327	1,134					16,538
	60153	WS Tara Street Replacement Building, Electrics & Controls (PS108	296	685	98	193	246	121					1,639
	60154	WS Grampian Street Suction Tank Renewal (PS1074)	150	155	1,587	3,011	5,444						10,347
	60155	WS Auburn Avenue Pump Station Renewal (PS1068)	300	259	1,058	987							2,603
	60158	WS Pump & Storage MEICA Renewals for FY2023	500										500
	60159	WS Burnside & Farrington Generator Replacement	481										481
	60162	WS Mount Herbert Reservoir Replacement	30	384									414
	60163	WS Scarborough 1 Pump Station Relocation out of Rock Fall Zone	60	103	1,178	2,063							3,405
	60164	WS Lock Renewals	424	330									755
	60171	Radio Communications Upgrade (4RF)	1,240										1,240
	60200	WS Woolston Well 3 Renewal (PS1065)	273	662	155								1,090
	60257	WS Spreydon Well 2 & Well 3 Renewal (PS1030)	396										396
	60261	WS Montreal Street Well 2 Renewal (PS1027)	175	786	89								1,050
	60325	WS Pump Station Diesel Tank Renewals to Meet Regional Plan	309										309
	60375	WS Mains Renewal - Multi-Use Arena - Barbadoes Madras Lichfield	1,550	1,727									3,277
	64331	WS Sefton, Pascoe, Webb, Walnut, Hutcheson, Bradford, Walsall, H	500										500
	64986	WS Akaroa L'Aube Hill Reservoir Replacement	4,134										4,134
	65001	WS Banks Peninsula Treatment Plant Reactive Renewals	150	155	159	217	222	227	232	237	241	246	2,085
	65002	WS Wainui 2 Reservoir Communications Upgrade	169										169
	65033	WS Exeter Takamatua Aylmers & Little River Equipment Renewals	451	518									969
	65038	WS Banks Peninsula Pumping & Storage Equipment Renewals 2025 (MEICA)			0								0
	65039	WS Banks Peninsula Pumping & Storage Reactive Renewal	50	52	53	54							209
	65100	WS Tilford, Frensham, Jura, Islay, Staffa, Gow, Bute & Alport Subm	400										400
	65101	WS Maunsell, Worcester, Adams, Bromley, Lane, Bayswater, St Joh	200										200
	65111	WS Bridle Path, Ticehurst, Hawkhurst, Coleridge, Dublin, Selwyn, I	500										500
	65112	WS Grahams, Powell, Pulford, Sunningvale, Bainton, Rolfe, Gregar	1,293										1,293
	65113	WS Mt Pleasant, Moorhouse, Struthers, Troup, Oxford, Kevin, Dalk	101										101

Primary Driver	ProjectID	Project Title	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	Total
	68838	WS Little River, Sparks, Springs, Various Lyttelton & Akaroa Mains	1,580	2,117									3,697
	68843	WS Ayr,Darvel,Mona Vale,Mathias,Chapter,Jacksons,Peverel,Dalla	1,868										1,868
	68844	WS Mains Memorial, Hampton, Frith, Grangewood, Kyburn & Brac	3,657	2,443									6,100
	68898	WS Domain,Cobham,Kaiwara,Diamond,King,Frankleigh,HoonHay	1,126										1,126
	69132	WS Mt Pleasant, Major Hornbrook, Muritai, Soleares, Toledo & San	246										246
	70659	WS Innes, Condell & Matsons Mains Renewal	1,308										1,308
	70894	WS Mains Burwood, Stanford & Newhaven Renewals	1,924	16	506								2,445
	71307	WS Mains Mona Vale & Matai Renewals	132										132
	71937	WS Harewood Mains Renewal	2,589	2,100									4,689
	73	Programme - WS Pumping & Storage Civils and Structures Renewals			500	162	1,109	1,134	1,159	1,183	2,724	2,461	10,432
	73356	WS Mains Silvester,Corso,Desmo,Finla,Whiteh,Fernbr,Idri,Bradn,Ir	401	4,356									4,757
	73544	WS Mains Halswell, Hendersons, Cardinal, Warren & Kinnaird Ren	617	1,321									1,938
	73680	WS Banks Peninsula Akaroa L'Aube Hill Membranes Modules Repla	600										600
	73879	WS Stanmore Submains Renewal	42										42
	73924	WS Mains Brougham, Jerrold, Selwyn, Somerset, Colombo, Waltha	308	2,313	12,921								15,542
	73937	WS Banks Peninsula surface water intakes renewals	500	95									595
	74110	WS High Submains Renewal	39										39
	74436	WS Eastern Reservoirs EICA Upgrade		10	310	1,034	1,395						2,749
	74437	WS Ashgrove and others MEICA renewals	10	1,275	1,352								2,637
	74678	WS Banks Peninsula Pumping & Storage EICA 2025	10	98	111								219
	74679	WS Banks Peninsula Pumping & Storage MEICA 2026		10	120	134							265
	74722	WS Mains Seaview, Hardy, New Brighton, Bower, Palmers, Baker,	200	453									653
	74839	WS Wainui Treatment Plant Power Resilience EICA	10	98	111								219
	74840	WS Banks Peninsula Treatment Plants Elecrtical Renewals 2026		10	182	176							368
	74863	WS Reactive Water Supply Reticulation Renewal (Maintenance Co	100	103	106	162	166	170	174	177	181	185	1,525
	74864	WS Reactive Water Supply Pumping Renewals (Maintenance Conti	200	207	212	271	277	283	290	296	302	308	2,644
	75397	WS Main Pumps Well 4, 5 & 6 Services Renewal (PS1024)	210	310	666								1,186
	75897	WS Reactive Water Supply Reticulation Renewal (Ops)	50	52	53	54	55	57	58	59	60	62	560
	75898	WS Reactive Water Supply Pumping Renewals (Ops)	150	155	159	217	222	227	232	237	241	246	2,085
	76311	WS Well Pump Renewals at Brooklands (PS1066) & Kainga (PS1067	350	217									567
	77701	WS Mains Hugg, Trur, Norw, Worc, Mari, Copen, Gain, Akar, Daw, (	1,513	4,219	1,300								7,032
	77702	WS Mains Greers, Wairakei, Sealy, Guildford, Cottesmore & Lauren	281	3,863	400								4,544
	77703	WS Mains Main South, Main North & Cassidy Renewals	149	4,026	3,363								7,538
	77704	WS Mains Marine, Ngatea, Te Ara, Marama, Ranui, Koromiko & Jar	124	3,689	3,093								6,906
	77705	WS Mains Major Hornbrook, Taylors Mistake & L'Aube Hill Renewa	51	1,590	1,433								3,074
	888	WS Lyttelton Rail Tunnel Pipeline Renewals	200	310	4,231	5,416	3,327						13,485
	89	WS Submains Meter Renewal	200	207	212	217	222	227	232	237	241	246	2,239
Replace Existing Assets Total			**56,713**	**51,068**	**55,661**	**69,497**	**61,173**	**53,897**	**72,520**	**75,357**	**70,700**	**69,127**	**635,714**
Grand Total			**75,022**	**70,329**	**77,080**	**96,910**	**89,327**	**87,306**	**96,556**	**97,058**	**95,222**	**88,602**	**873,411**

Figure 5-2: Water Supply Long Term Plan Capital Programme

5.7 Total Capital and Operating Expenses for 2025-2034



	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Improved Service Levels	$12,477	$15,180	$13,973	$8,930	$8,415	$12,064	$10,050	$15,906	$15,292	$10,060
Increased Demand	$5,831	$4,080	$7,445	$18,482	$19,739	$21,345	$13,986	$5,796	$9,230	$9,414
Renewals & Replacements	$56,713	$51,068	$55,661	$69,497	$61,173	$53,897	$72,520	$75,357	$70,700	$69,127
Activity Overheads	$80,293	$86,231	$90,199	$94,864	$98,793	$102,360	$105,838	$109,677	$112,645	$115,195
Activity Costs	$25,014	$25,351	$26,320	$27,297	$27,498	$28,245	$29,162	$29,657	$30,212	$30,829

Figure 5-3: Water Supply Capital and Operating Expenses 2025-2034