Wastewater

Asset Management Plan

Christchurch City Council

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Document Control

Version Control

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Version	Date	Author	Description

Document Acceptance and Release Notice

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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.

1 Introduction to our Asset Portfolio

1.1 Background

Christchurch's wastewater system has evolved from the various community reticulation schemes dating back to 1875. The Bromley site began as a sewage farm in 1882 and later developed an upstream treatment works in 1962. Standardisation of wasetwater reticulation and pumping increased from 1989 when five local bodies merged into the new Christchurch City Council. Stand-alone Banks Penninusla wastewater systems came into Council stewardship in 2006 following further amalgamation.

The 2010/2011 Canterbury earthquakes disrupted the wastewater collection, treatment and disposal service. A signficant programme of assessment and rebuilding followed, carried out by the Stronger Christchurch Infrastructure Recovery Team (SCIRT) alliance. 560 km of wastewater pipe was renewed, lined or repaired, 56 lift stations were installed, some existing networks were replaced by local pressure sewer systems and vacuum sewer systems. The SCIRT programme did not remediate all earthquake damage and many pipes with different levels of defects remain for Council to manage. The SCIRT Legacy Report[1] acknowledged that "*it will take many years and significant ongoing funding to address the remaining issues across the network*".

New pipework has been installed to enable the existing wastewater schemes of Governors Bay and Diamond Harbour to be pumped to the Christchurch WWTP, and allow the existing Lyttleton Harbour Basin treatment plant to be decommissioned. New treatment and discharge options are being pursued in Akaroa and Duvauchelle to allow the current harbour discharges to end.

In December 2021, there was a fire at the Christchurch Wastewater Treatment Plant that destroyed the trickeling filters, which are a major part of the treatment process. Following this there was a period while temporary works were being procured to increase aeration and treatment in the existing ponds. This is managing the treatment of the wastewater while permenant replacement works are being worked on. While not a desirable thing to happen, it has given some oppurtunities to modernise part of the treatment process with emphasis on climate resilience.

New Zealand's wastewater services are going through a period of regulation change as part of the Central Government's broad programme of 3 Waters Reform. The new legislation includes 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 changes in direction captured in the Freshwater NES.

The legislative changes will eventually transfer the provision of wastewater services from Council to a new Water Services Entity by 2026. 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.

Christchurch's wastewater system includes five treatment plants, one in Christchurch city and others on Banks Peninsula. Pipes and pump stations convey wastewater (sewage) from homes and businesses to the treatment plant. The total replacement cost of Council's wastewater assets is $5.6 billion.

The Council collects and treats wastewater from approximately 160,000 customers in Christchurch, Lyttelton, Diamond Harbour, Governors Bay, Akaroa, Duvauchelle, Tikao Bay and Wainui, through 1000 km of laterals, 1,900 km of wastewater mains, 150 pump stations, 84 lift stations, and 34 odour control sites.

Each scheme has reticulation, pumping and treatment assets consisting of wastewater treatment plants, pump stations, odour control sites, lift stations, vacuum stations, pipes, and non-pipe assets such as valves and manholes.

[1] Internal Council Document - SCIRT Legacy Report, CCC, October 2017 – 17/851599

Collection, treatment and disposal of wastwater is an essential service to the people of Christchurch. The wastewater activity also supports the community outcomes below.

- Safe and healthy communities
- Healthy waterways
- Sustainable use of resources
- Modern and robust city infrastructure and facilities network
-

The key services that customers want delivered are:

- Council operates wastewater services in a reliable manner;
- Council operates wastewater services in a responsive manner;
- Public health is protected from Council wastewater services;
- Council has high wastewater discharge quality;
- Council wastewater networks and operations are sustainable

These key services form the basis of wastewater collection, treatment and disposal for the community through the sub-functions of:

- Wastewater flow monitoring and control
- Inflow and infiltration control
- Wastewater overflow management
- Wastewater Treatment
- Treatment by-product management
- Laboratory Services

1.2 Asset Lifecycle Approach

Council has established a lifecycle management framework, aligned to the *International Infrastructure Management Manual* as illustrated in **Error! Reference source not found.**.

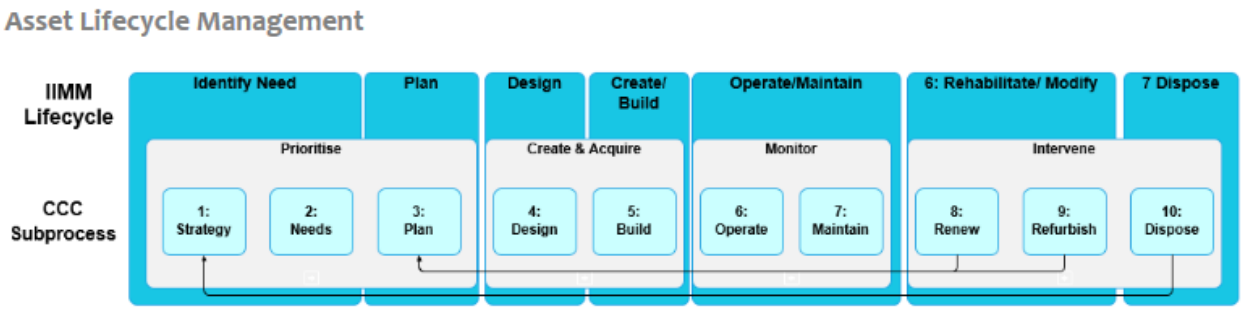

Figure 1-1: Asset Lifecycle Categories

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: Pipe Assets	Private laterals
Reticulation: Non-Pipe Assets	Private on-site low pressure pumping systems
Pump Station Assets	
Lift Station Assets	
Vacuum Station Assets	
Odour Control Assets	
Monitoring Stations	
Wastewater Treatment Plant Assets	

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 **Error! Reference source not found.** and for the purposes of this AMP, the assets are considered to fall in to 3 groups as follows;

1. Reticulation Assets; including pipe and non-pipe assets
2. Pump Station Assets; including pump stations, odour control, lift stations and monitoring sites
3. Wastewater Treatment Plant Assets

Table 2-2 below lists the value of wastewater assets based on the 2023 Valuations. Total replacement cost of wastewater assets is **$5.6 billion** with a book value of $3.0 billion and an annual depreciation of $80 million.

Table 2-2: Detail of Wastewater Assets Based on 2023 Valuations

Asset Class	Asset Type	Replacement Value	Book Value	Annual Depreciation
Pipe Assets	Gravity	2,807,974,213	1,336,466,736	37,605,276
	Pressure	511,195,885	378,966,976	5,930,348
	Local Pressure	73,302,218	67,008,659	743,310
	Syphon	3,614,864	2,014,045	44,012
	Overflow	9,244,650	5,030,239	118,783
	Vacuum	64,129,063	59,357,046	641,890
	Laterals	894,770,608	480,976,223	9,798,716
	Biogas	16,551,520	14,237,139	165,913
	Sub-total	**$ 4,380,783,021**	**$ 2,344,057,064**	**$ 55,048,248**
Non-Pipe Assets	Vacuum System	18,090,005	15,784,785	315,443
	Air Gap Separator	25,633	9,342	480
	Flush Tank	299,084	202,148	2,988
	Manhole	314,933,504	171,353,083	3,102,181
	Outfall	669,229	392,886	6,678
	Pipe protection	3,129,337	2,222,407	31,203
	Pipe Restraint	142,484	110,324	1,425
	Structures	16,424,009	12,883,769	231,128
	Valves	19,720,621	11,671,194	446,144
	Vents	499,261	310,765	9,862
	Pressure Sewer	49,700,627	41,701,560	1,343,406
	Sub-total	**$ 423,633,792**	**$ 256,642,262**	**$ 5,490,939**
Pump Station Assets	Buildings & Structures-Civil	48,361,870	16,966,014	599,994
	Crane	5,369,812	4,219,185	106,005
	Electrical	34,756,809	15,991,718	1,021,395
	Control	14,242,042	5,191,432	752,034
	Pipework	53,146,507	42,750,017	567,742
	Pumps/mechanical	20,952,668	8,377,480	406,599
	Standby Equipment	6,051,046	3,719,900	119,367
	Soil Filter	1,993,669	1,408,859	39,873
	Sub-total	**$ 184,874,424**	**$ 98,624,605**	**$ 3,613,008**

Asset Class	Asset Type	Replacement Value	Book Value	Annual Depreciation
Lift Stations / Monitoring Stations	Lift Stations	12,187,207	10,992,472	130,203
	Monitoring Stations	632,531	484,287	12,354
	Sub-total	**$ 12,819,738**	**$ 11,476,758**	**$ 142,557**
Odour Control Assets	Fan	1,183,272	356,020	38,474
	Filterbed	1,498,675	849,249	29,974
	Pipework	899,214	674,411	8,992
	Electrics	946,635	286,667	30,694
	Building and Structures (Civil)	803,462	465,259	16,069
	Sub-total	**$ 5,331,258**	**$ 2,631,606**	**$ 124,202**
Treatment Plant Assets	Buildings and Structures (Civil)	212,075,838	115,335,759	2,689,781
	Civil Earthworks	18,210,347	18,210,347	N/A
	Electrical	31,982,131	11,998,735	721,295
	Instrumentation & control	115,306,975	38,703,351	6,393,214
	Mechanical Equipment & Plant	149,604,243	52,754,117	5,009,780
	Pipework	22,156,570	11,936,412	295,421
	Standby and Generation	17,096,287	8,699,199	428,833
	Sub-total	**$ 566,432,390**	**$ 257,637,919**	**$ 15,538,323**
Total Wastewater		**$ 5,573,874,624**	**$ 2,971,070,215**	**$ 79,957,277**

Figure 2-1 and Figure 2-2 on the next pages show an overview of where the wastewater reticulation, station and treatment assets are located in Christchurch city and in Banks Peninsula.

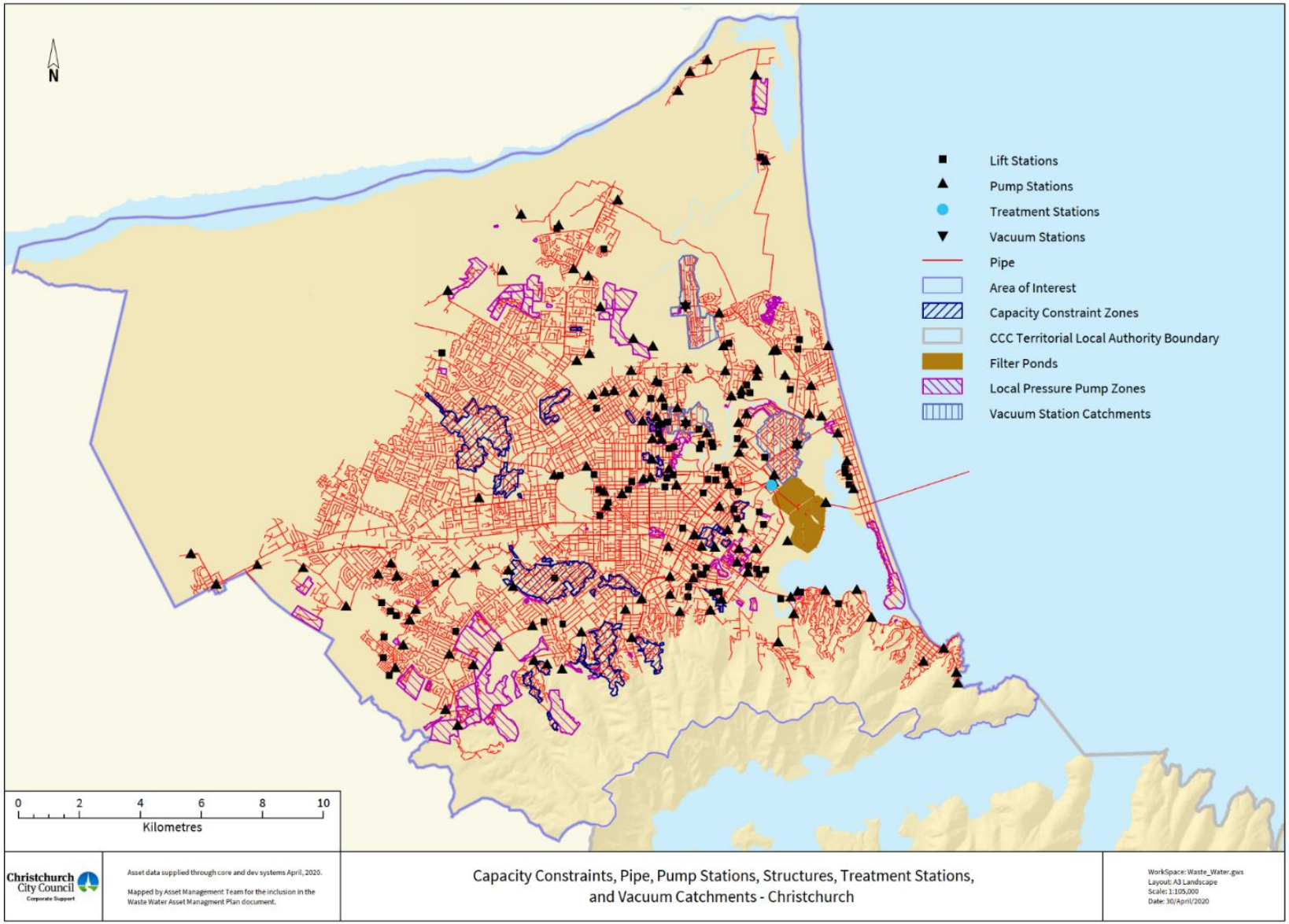

Figure 2-1: Christchurch City Wastewater Asset Locations

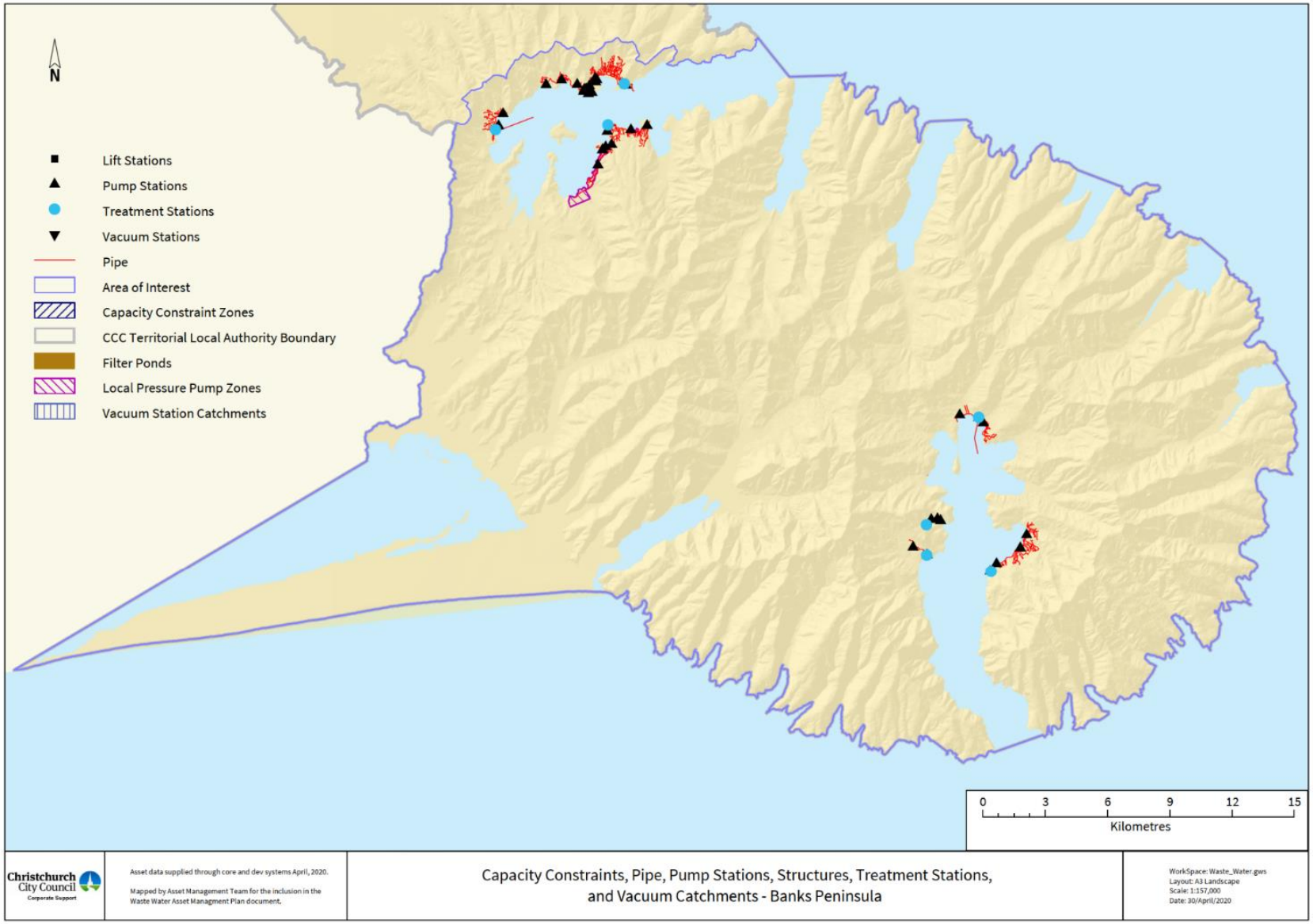

Figure 2-2: Banks Peninsula Water Supply Asset Locations

2.3 Asset Data Confidence

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

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

Table 2-3: Data Confidence for Each Asset Group

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

Table 2-4: Confidence Grade Description

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

Wastewater reticulation condition grades use the 1 to 5 scale. CCTV inspection results are the primary source of wastewater reticulation condition data with valid inspections recorded for 52% of mains. The remaining 48% have an estimated condition grade based on installation year. These theoretical useful lives are based on industry guidelines and staff knowledge.

The oldest reticulation assets still in use date back to 1882 in Christchurch City, 1885 in Akaroa, 1900 in Lyttelton. Typically a network dating back to 1880 with building booms in 1910-1920, 1950-1960 and the 1980s, there would be a very large cohort of pipes approaching end of life at the same time. For Christchurch a significant portion of the reticulation network was renewed after the earthquakes and this peak is not as pronounced. Installation dates and materials of the Council wastewater reticulation network is shown in Figure 2-3 below.

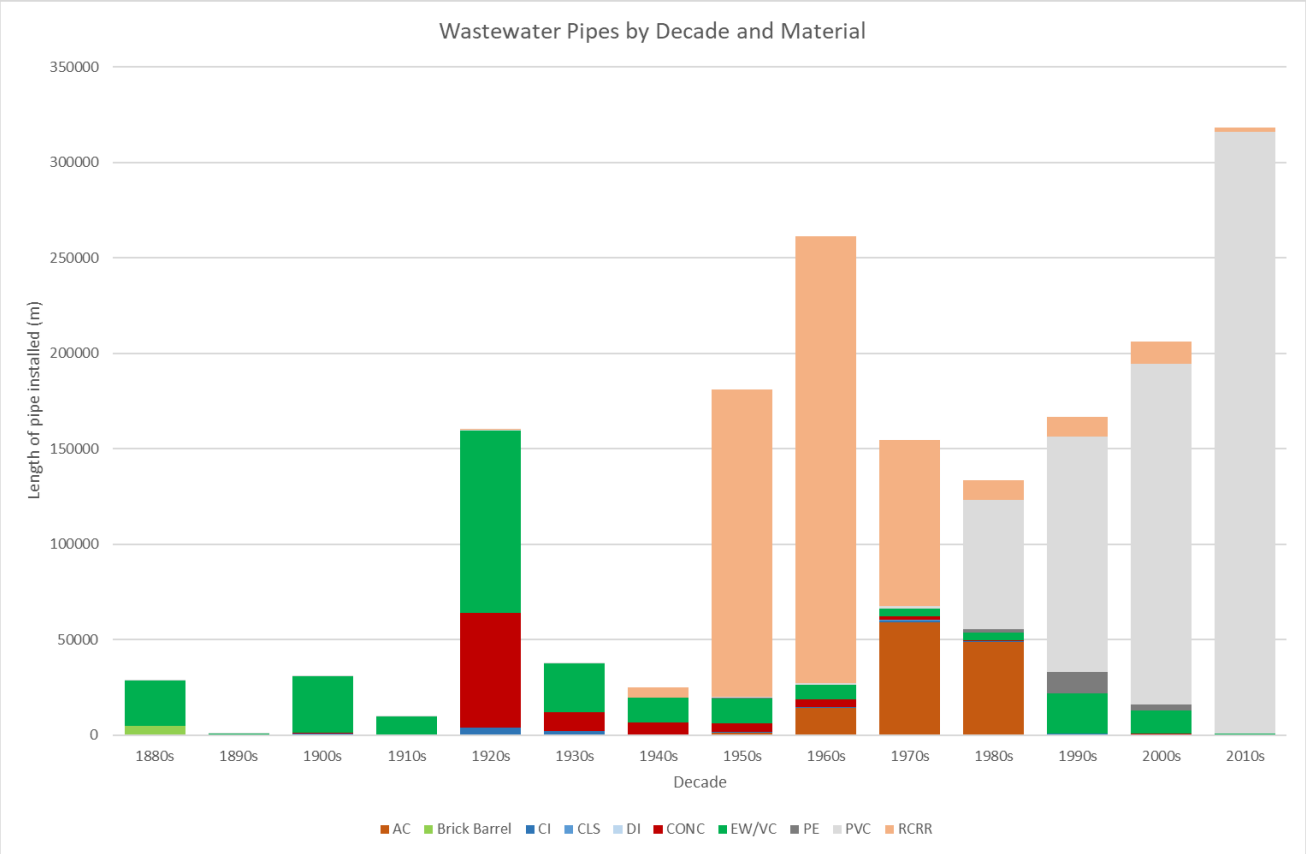

Figure 2-3: Pipe Installation Decades

The overall condition profile of the Council wastewater reticulation network is shown in Figure 2-4. This figure indicates a significantly improved condition profile compared to previous AMPs, due to the new condition grading process developed as part of the AAIF project.

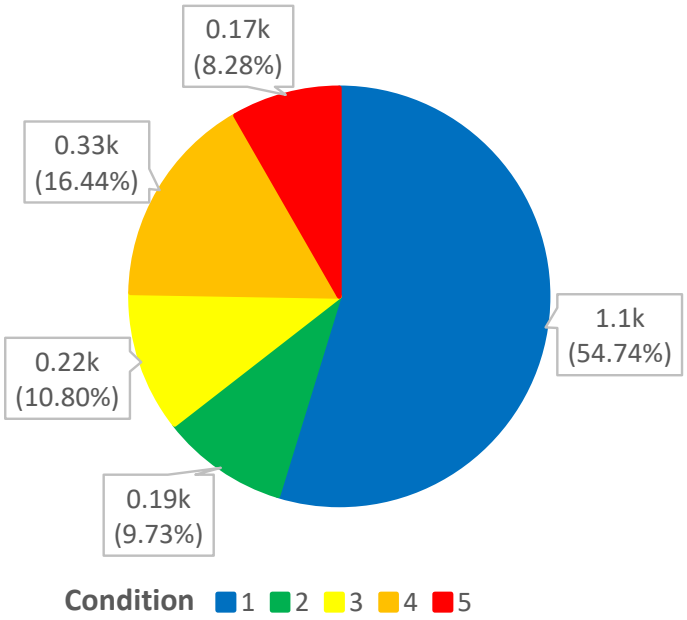

Figure 2-4: Wastewater Main Condition

CCTV inspections are targeted at pipes approaching the end of their lives. The proportion of condition grades based on CCTV evidence is 64% for condition 4 pipes, and 95% for condition 5 pipes. Continued proactive CCTV inspection is essential to maintain these levels of condition grade confidence.

Damage to wastewater pipes includes:

- Cracks and breaks from ground movement, including movement from construction, traffic or earthquakes.
- Corrosion of cementaceous pipes from hydrogen sulphide gas given off by wastewater.
- Changes in pipe levels when ground has liquefied or moved.
- General deterioration and loss of strength from age.
- Corrosion or abrasion of pipe interiors from discharge of harmful substances.

A higher proportion of earthquake damage was to the older, more brittle pipes. However, newer pipes also suffered damage. Earthquake recovery budget limits mean that some of this legacy earthquake damage remains. RCRR pipes make up a large proportion of the remaining poor condition pipes, both due to their brittle nature and the corrosive effects of sewer gases. This is shown in the breakdown of the condition 5 pipes shown in Figure 2-5.

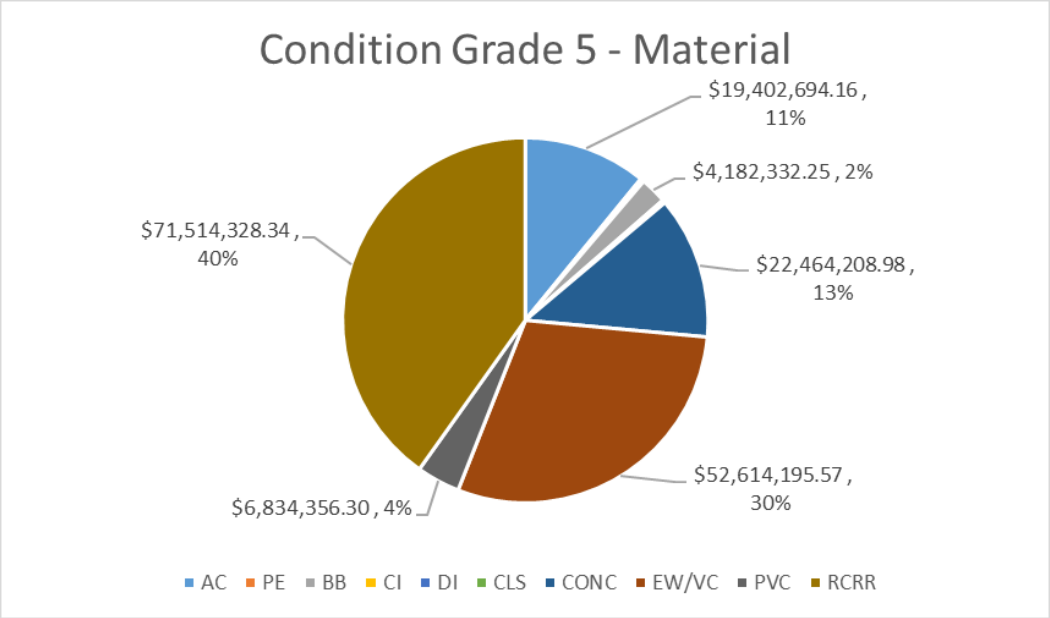

Figure 2-5: Breakdown of the condition 5 pipes by material (2020 dollar values)

Figure 2-6 on the next page shows condition grades over the Christchurch water supply network by location.

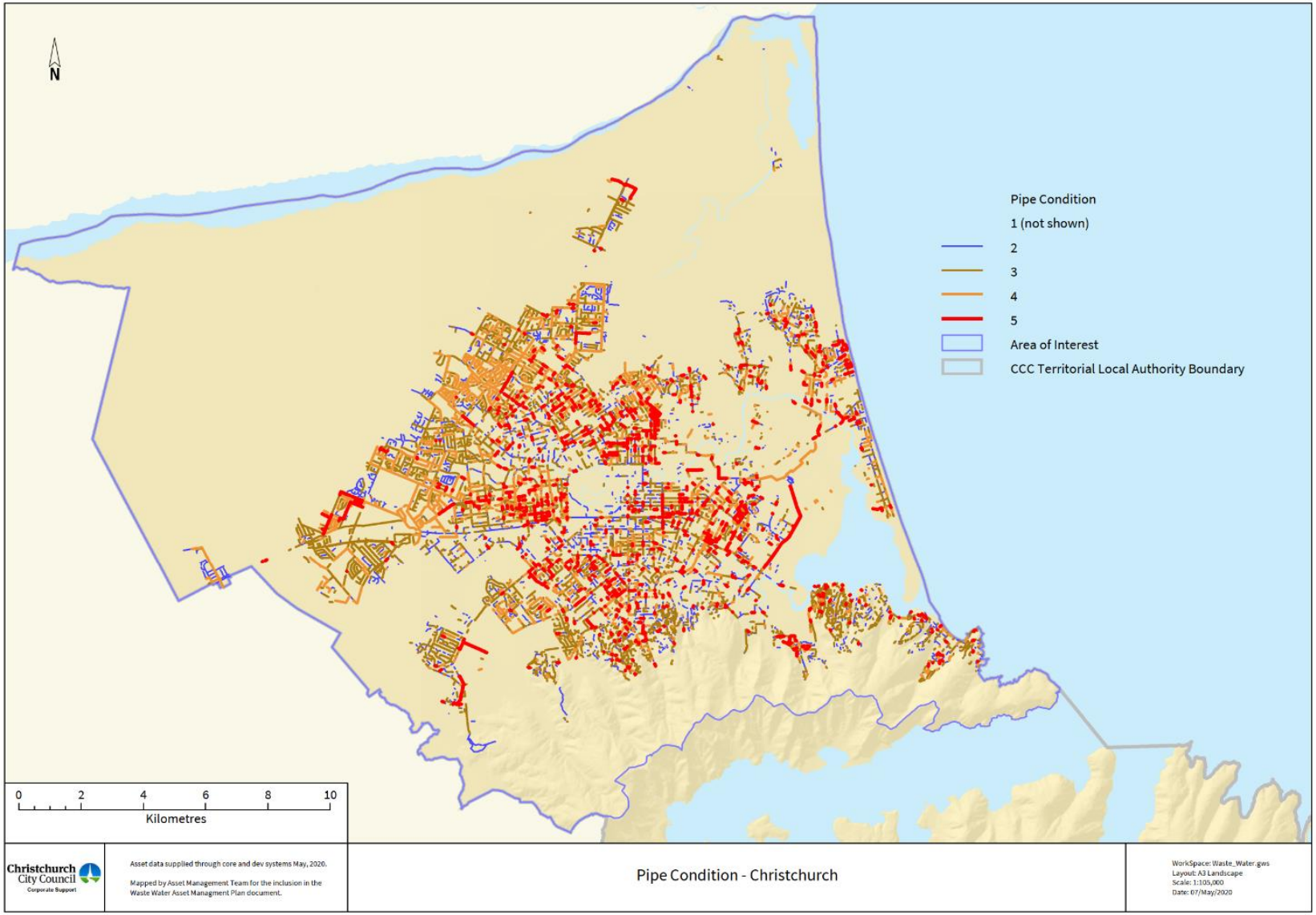

Figure 2-6: Wastewater Pipe Condition Map

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.

Asset condition is measured on a 1-5 scale.

Figure 2-7 below shows the condition grading profile of the station assets by replacement value (from the 2021 LTP).

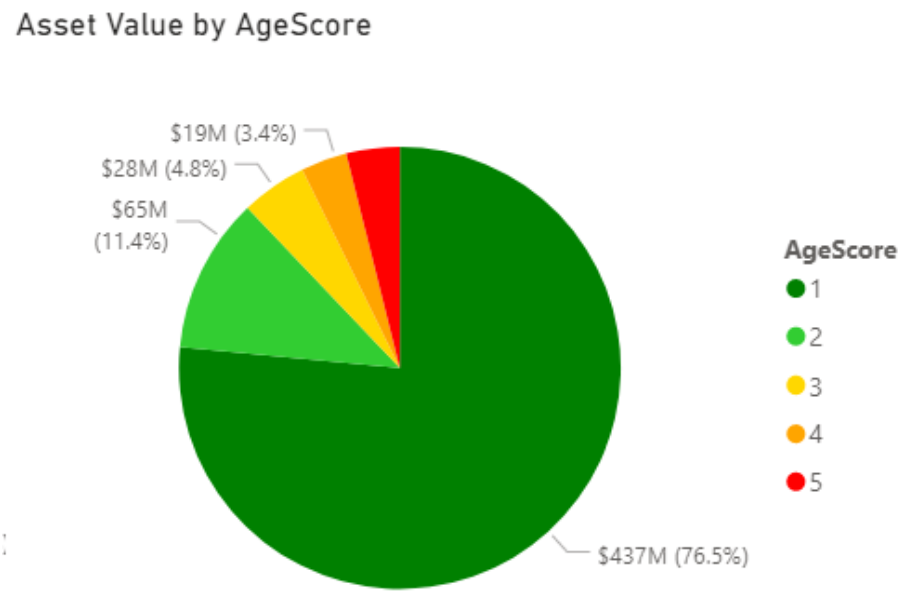

Figure 2-7: Station asset condition by value

8% of the total station asset value have a condition grade of 4 or 5.

Figure 2-8 below show which categories make up the worst assets i.e. where the condition score is 4 or 5. The first graph shows the split by number of assets and the second graph in Figure 2-9 shows the split by replacement value.

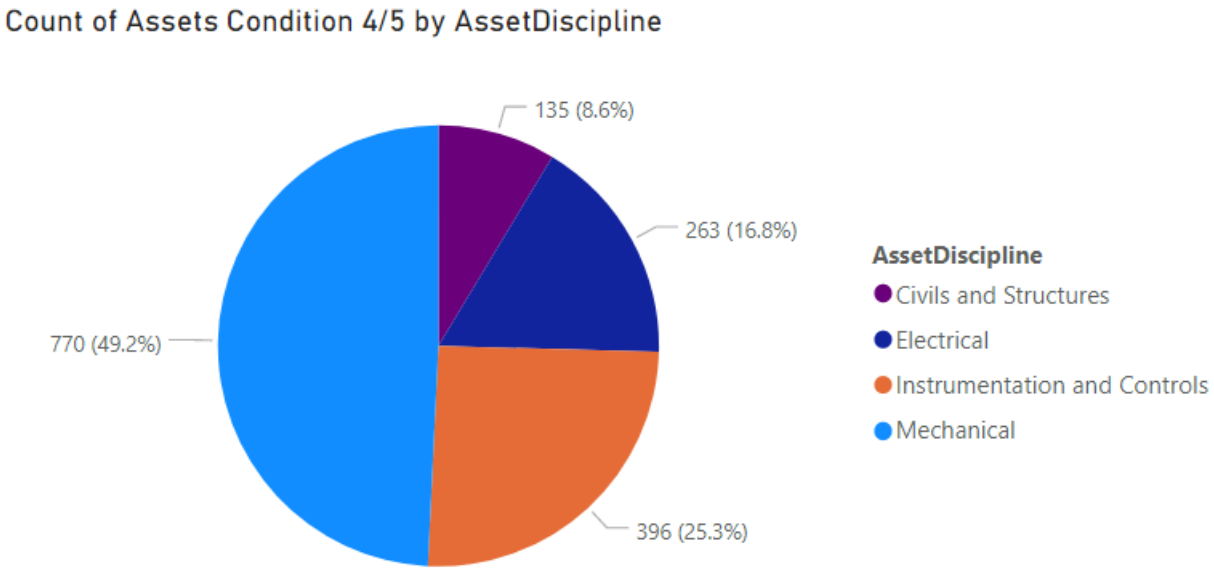

Figure 2-8: Types of assets in poor or very poor condition (by number)

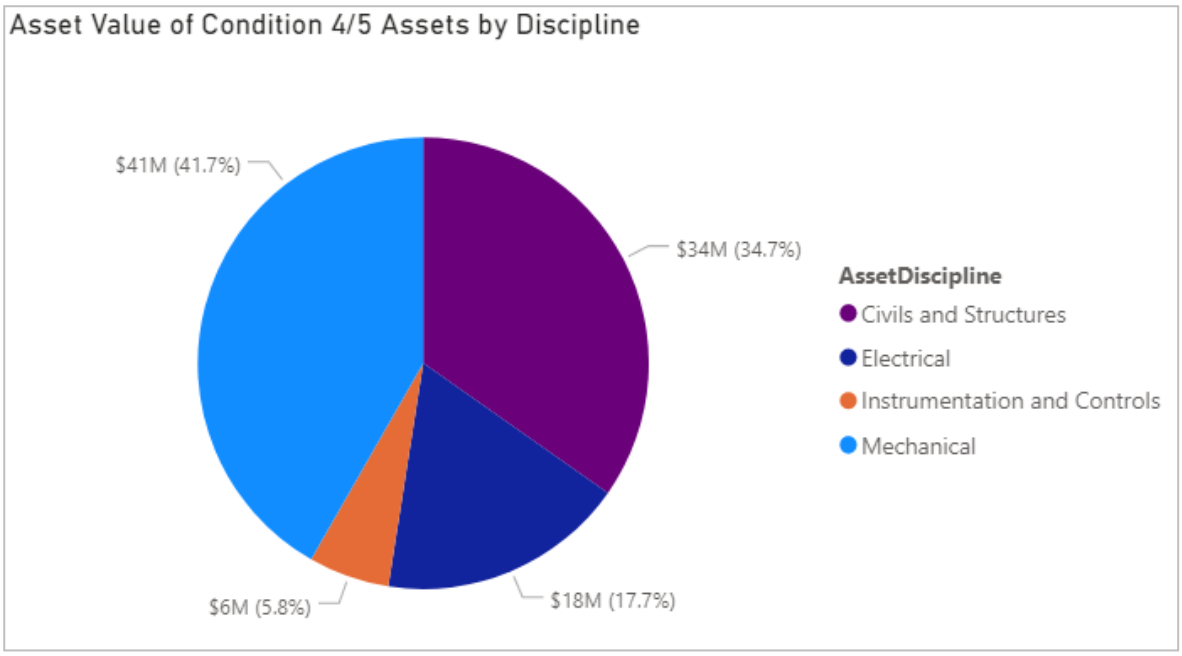

Figure 2-9: Types of assets in poor or very poor condition (by value)

The worst category is mechanical assets that represent approximately half of the poor condition assets. There are a small number of civil and structures assets that are relatively expensive to replace. 7% of the poor condition assets represent 28% of the value.

The poor condition IAC assets are relatively inexpensive to replace. IAC makes up 21% of these poor condition assets but just 6% of the value.

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.

Despite current data limitations, the condition profiles shown above agree with operation and maintenance observations:

- The SCADA system has a backlog of assets that are obsolete and beginning to fail. Some of these assets are running on spares gifted from other councils. This SCADA system underpins the wastewater collection activity.
- Mechanical assets at terminal stations are old, have been overhauled several times and require reactive repair and renewal. These are high value assets where renewal includes a long lead-in time for design and construction. Funding provision and condition assessment is needed in the short term as several sites are likely to require significant renewal in the next 10 years. Priority intervention is needed at pumping stations PS0001 and PS0015.
- Initial assessments of “bunker style” stations found that internal pipework and concrete well structures are in very poor condition and need intervention. Priority intervention is needed at pumping stations PS0057 and PS0034.
- Some pumping stations are degrading rapidly due to hydrogen sulphide gas (H2S). A new H2S monitoring programme is proposed in this AMP so that the right interventions are made.

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 include 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 wastewater assets are defined in the 3 Waters Lifecycle Management Manual. Consequence of failure assessments have been completed for reticulation assets but criteria are still being developed for station and treatment assets. In the interim a basic criticality 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.

2.5.1 Reticulation Assets Consequence of Failure

The overall consequence of failure is a weighted average of the score from several consequence of failure categories The consequence of failure framework was developed as part of Council's Asset Assessment and Intervention Framework and is aligned with the organisational risk policy. The framework is covered in more detail in the 3 Waters Lifecycle Management Manual.

Some pipes have a unique consequence of failure due to being so old that they are archaeologically significant sites requiring special attention if exposed and renewed. Pipes falling into this category are typically the larger brick and rock constructed pipes.

Figure 2-10 shows the consequence of failure profile for wastewater reticulation.

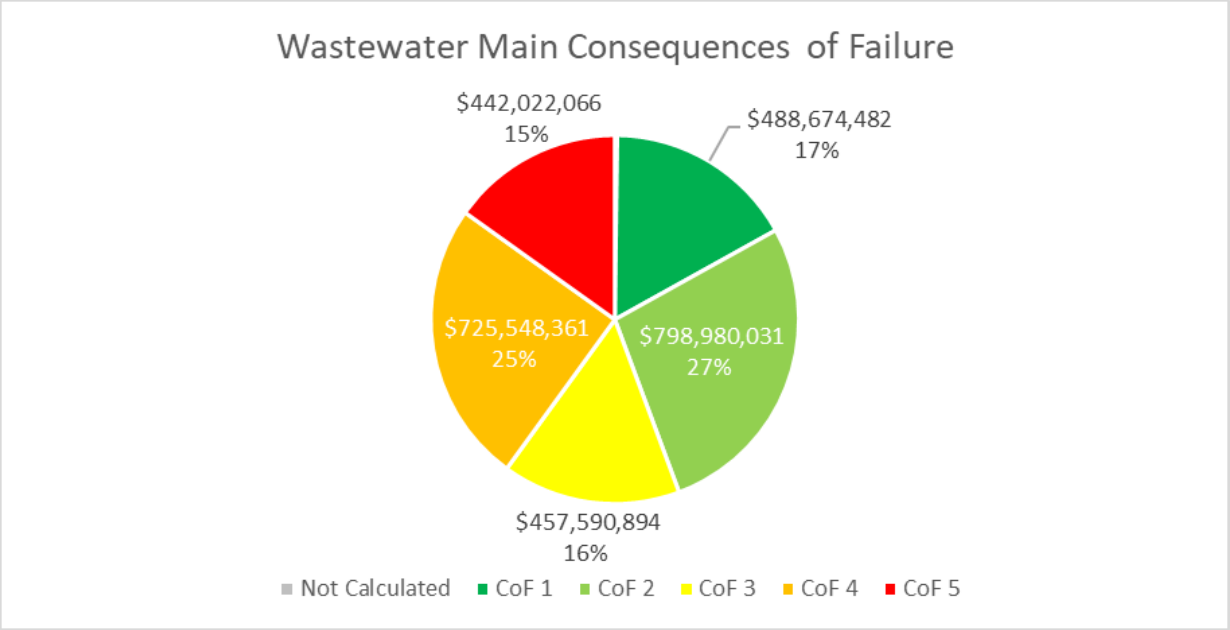

Figure 2-10: Consequence of failure profile for wastewater reticulation

Pipe consequence of failure grades are shown by location for Christchurch City in Figure 2-11.

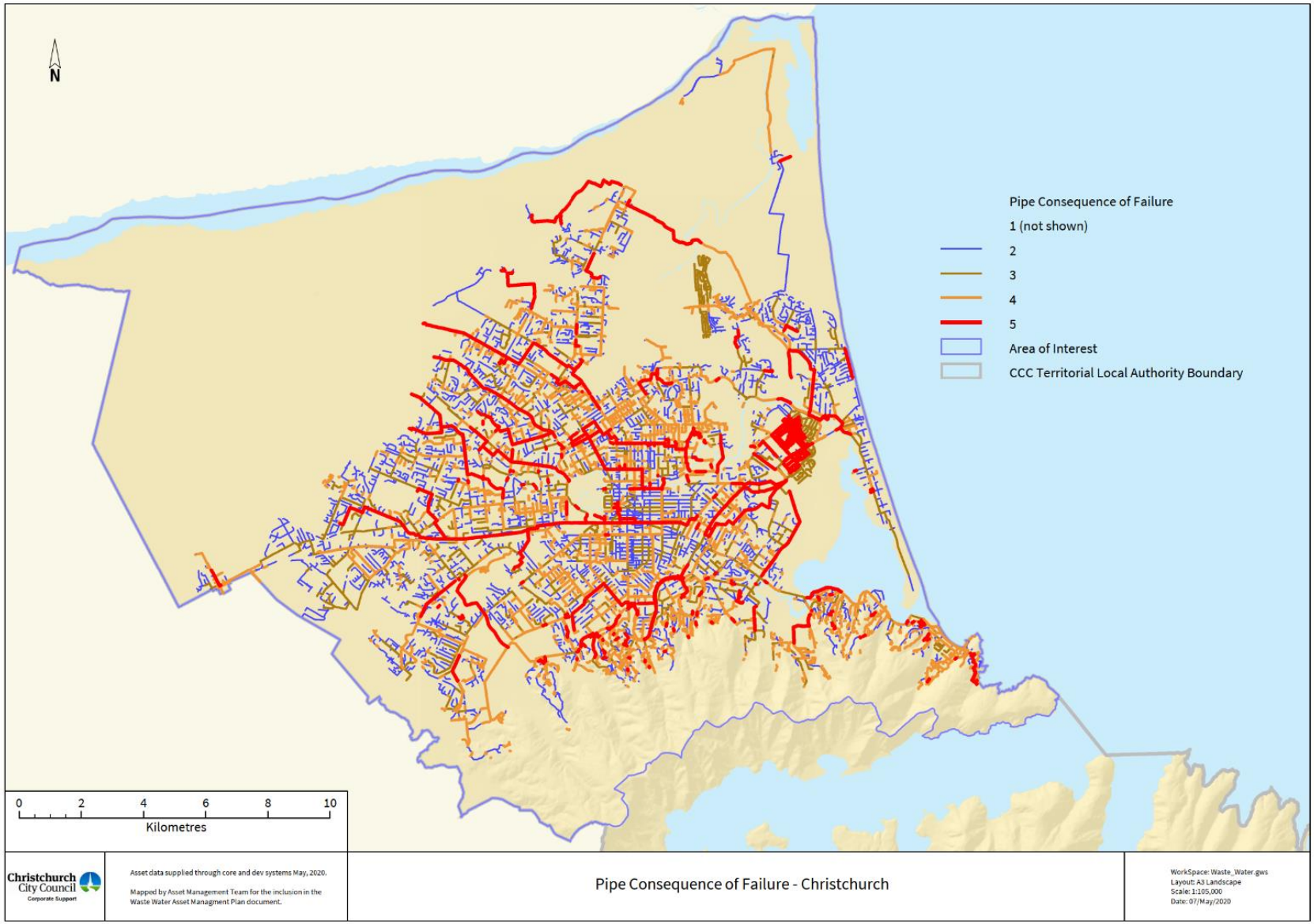

Figure 2-11: Pipe Consequence of Failure Map

2.5.2 Stations Criticality

Criticality criteria is still being developed for station assets. Current criticality criteria is based on the sum of electric motor power as shown in Table 2-5**Error! Reference source not found.** below.

Table 2-5: Stations Criticality criteria

Score	Size (kW)
1	Up to 5kW
2	Up to 22kW
3	Up to 60kW
4	Up to 150kW
5	Over 150kW

Additionally, stations with generators are criticality 5.

Smaller monitoring sites and lift stations are criticality 1. Lift stations have bypasses that mean flows are still contained within the network if the lift station is not working.

The criticality profile is shown in Figure 2-12**Error! Reference source not found.** which shows the distribution of criticality across the stations sites in the wastewater portfolio. Each site represents one pump station, or lift station or monitoring site etc.

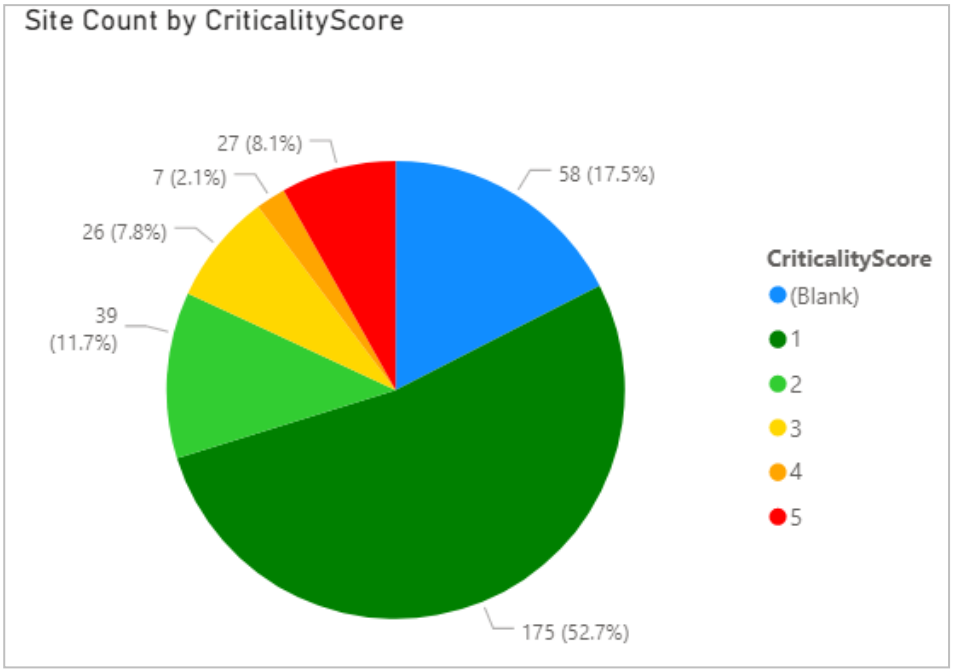

Figure 2-12: Station site criticality (by number)

10% of all wastewater station sites are criticality 4 or 5.

Looking at both condition and criticality at the same time shows that a large number of the poor condition assets have high criticality. Figure 2-13 below shows the criticality profile of those assets with a condition score of 4 or 5.

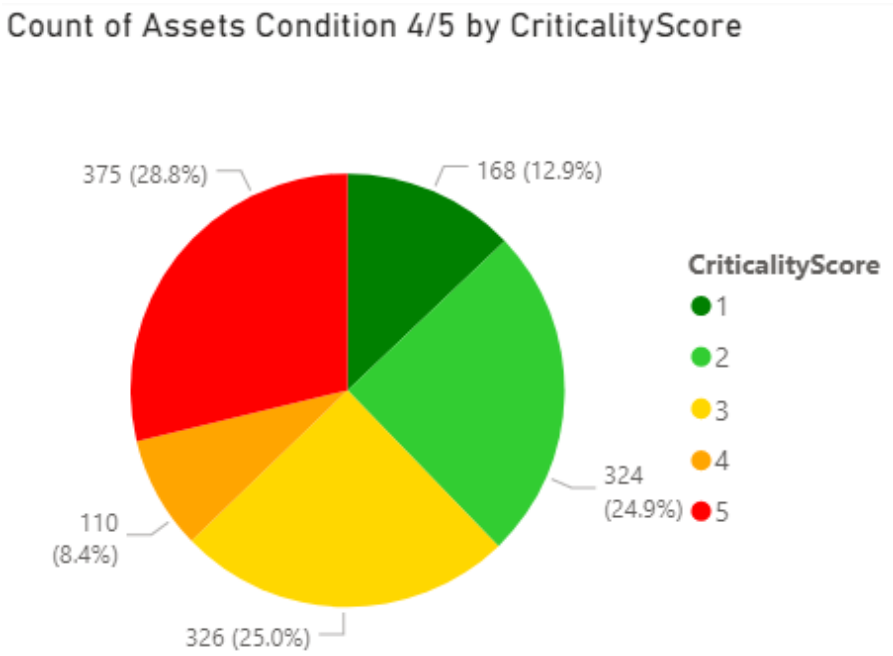

Figure 2-13: The criticality of poor and very poor condition station assets

The high risk, resulting from the high criticality of the poor condition assets, demonstrates the need to focus on increasing condition assessment and renewal of wastewater station assets across the portfolio.

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 (CCTV records). Asset failure and disposed asset post-mortem to understand failure mechanisms and verify condition grading. Improve maintenance activity and failure data capture to strengthen the connection between network 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 relies on ongoing CCTV inspection. Failure data and maintenance events are not always captured in a way that 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.

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

Significant effort has been applied to updating design and construction standards for infrastructure to become more resilient to earthquakes, specifically targeting: flexible materials, jointing systems, foundation designs, structural interfaces and alternative sewerage systems.

Design requirements are set out in Council's Infrastructure Design Standards (IDS). This includes:

- Approved materials, jointing systems and design solutions to provide resilient earthquake performance
- Duty/standby pumping for redundancy
- Storage requirements

Where necessary, new infrastructure installed since the 2010/2011 Canterbury earthquakes is made of modern materials to the latest design standards and therefore has greater resilience to future earthquake damage and potentially other disruptions.

Insurance

The Strategic Asset Management plan states:

"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

The business continuity plans for wastewater are located within the Three Waters and Waste Business Continuity Plan. An index of the individual plans is shown below:

- CWW-WW-051: Process Failure at a WW Treatment Plant
- CWW-WW-052: Rupture of Large Gravity Main
- CWW-WW-053: Rupture of Sewer Pressure Main
- CWW-WW-054: Failure of WW Terminal Pump Station
- CWW-WW-055: Failure of other WW Pump Station
- CWW-WW-056: Biological, Toxic or Explosive Substance released into the Sewage Network
- CWW-WW-057: Death or major harm incident in the operations area (all activities). Workplace accident or incident
- CWW-WW-058: Failure to repeatedly meet Resource Consent discharge parameters
- CWW-WW-059: Other natural event incidents excluding earthquake and tsunami (3 waters)
- CWW-WW-060: Contractor is terminated for insolvency or poor performance

3.2 Critical Risk Identification and Management

3.2.1 Climate Change Impacts

Key climate risks for the Wastewater Collection, Treatment and Disposal activity includes:

- Sea Level Rise Related
    - Some coastal wastewater assets may be at risk
    - Limitations in asset life due to corrosion from saltwater

- Rainfall and Flooding Related
    - Increased inflow and infiltration due to more frequent storm events that could increase overflow frequency
    - Higher groundwater levels leads to increased infiltration that could increase overflow frequency

- Heat, Drought, Fire Related
    - Increased odours in wastewater network because of higher temperatures and microbial activity

- Other
    - Increase in overflow events resulting in untreated wastewater flows to the environment have potential public health and environmental health impacts
    - Potential untreated overflow discharges into the ocean could cause beach closures or deterioration of water quality of receiving waters, impacting the mauri of the water for Māori and opportunities to practice mahinga kai

Options being considering to reduce the risks to the Wastewater Collection, Treatment and Disposal activity and the community posed by those climate risks include:

- Request (in terms of the Water Supply and Wastewater Bylaw 2022) the inspection and repair of sewer drains on private properties to avoid rainwater or groundwater from entering the wastewater system
- Provide educational resources and messaging relating to wastewater use best practices such as not flushing wet wipes and separation of fats and oils
- Undertake a programme to identify and eliminate tree planting over pipes to avoid damage that leads to groundwater infiltration
- Reduce stormwater and potentially seawater inflow and infiltration through continuance of renewals programme
- Fund the implementation of projects identified to reduce the frequency of wastewater overflows
- Explore options for increased resilience of the wastewater system against climate change impacts and fluctuating operational statuses.

Key sources of greenhouse gas emissions from this activity includes:

- Processes and activities associated with wastewater treatment, including:
    - Primary, secondary, and tertiary treatment within the treatment process – biological processes (~47% of total CWTP plant emissions)
    - Treated effluent discharged to ponds and to the marine environment (~49% of total CWTP plant emissions)
    - Biogas and biosolids production and disposal (~4% of total CWTP plant emissions)
- Energy consumption in the form of electricity used for wastewater pumping, aeration, heating, etc
- Travel associated with operations and maintenance activities

Untreated wastewater overflows into the environment during high rainfall events (potential to increase with climate change)

Wastewater Collection, Treatment and Disposal are taking the following actions to reduce greenhouse gas emissions:

Operational/embedded greenhouse gas emissions

- Develop a monitoring plan and monitor emissions from the wastewater treatment plant at Bromley.
- Consider and implement alternative treatment configurations which have lesser greenhouse gas emissions.
- Develop a greenhouse gas emissions baseline for the wastewater service operations and maintenance function.
- Explore renewable energy options such as solar power generation.
- Consider ways to reduce our carbon footprint through changes in design, material choice and construction of new assets without compromising service quality, reliability and resilience.

Greenhouse gas emissions by users of Wastewater Collection, Treatment and Disposal activity

- Don't flush wet wipes, sanitary products, rags, fats and oils, or other items which may cause blockages and increase operational interventions.
- Regularly inspect and repair sewer drains to avoid inflow and infiltration which leads to wastewater overflows.
- Follow-up on required inspections of septic tanks to ensure systems are fit for purpose and not discharging untreated flows to the environment.
- Adopt water efficient appliances.

3.2.2 Asset Risks

The three waters unit has identified and recorded risks at a more detailed level. These high-risk issues from Promapp fall into the following strategic themes for wastewater:

- Risk of consent breach (pollution/odour) due to capacity constraints at the Christchurch Wastewater Treatment Plant (following trickling filter fires)
- Major/critical infrastructure fails
- The wastewater operation harms staff, public or the environment
- The assets are planned and managed poorly, resulting in high costs or poor service outcomes
- Our staff are not able to deliver our project, operational, and improvement commitments
- Not able to reach wastewater overflow targets (exacerbated by climate change)

A detailed risk register with treatments is included in Appendix 5.2.

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

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 appropriate level of AM practice for this Activity has been defined in our AM Policy 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:

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

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 Wastewater**

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.

In addition to the items within the improvement programme, the following improvements have been made to the activity since the last AMP:

- Nil

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.

Additional improvement items were identified during the maturity assessment and as part of this asset management plan review. These items were added to the outstanding items from the 2020 Improvement programme.

We are currently engaged with the improvement programme horizon with the next maturity assessment scheduled for September 2023. This will put in place the programme for 2023 through to 2026.

Table 4-1 details those tasks that will be completed over the next three years. These tasks have focus specifically on those areas where the risk is most critical. 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 the 3–year target.

Table 4-1: Asset Management Improvement Tasks

Task ID	Project / Task	AM Maturity Gaps	Priority (H, M, L)	Responsibility	Resources (teams, $)	Timeframe
	Asset inventory, condition assessment and failure data improvement programme	Data, lifecycle asset management	H	Asset management	Up to $1M / yr	Intensive 2 years, then ongoing
	Financial tracking, forecast and relationships improvement programme	Data, lifecycle asset management, financial	H	Asset management	$200k / yr	12 months
	Demand management improvement programme	Demand, data	M	Planning	$100k / yr	4 years
	Integrated master planning improvement programme	Demand, lifecycle asset management	M	Planning	$100k / yr	12 - 24 months
	Climate change response improvement programme	Risk and resilience	M	Planning	$100k / yr	12 months
	Level of service and customer engagement improvement programme	Levels of service, financial	L	Service delivery	Combine with water supply activity	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.

5 Appendices (Supporting information)

5.1 Asset Management Objectives

5.1 Risk Register

5.2 Asset Management Maturity Assessment 2020: Summary

5.3 2021 AMP Improvement Programme

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

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 Description**
R00727	The Oxidation Ponds were subject to significantly loading of both potentially toxic and organic loading following the fire and loss of the trickling filters on the 1st November 2021. The medium to long term impacts are still unknown.	Very High	Weekly monitoring of oxidation pond performance and response planning / instructions by Process Engineer, issued by Team Leader Shift Engineers. Complete a sludge survey of all 6 Oxidation Ponds to determine the level of sludge loading, to understand potential work required.
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).
R00726	The new temporary secondary treatment process is operating at maximum capacity with no redundancy. Capacity will reduce (i.e. risk increases) in winter due to environmental factors on the biological treatment process. By-passing of settled sewage to the oxidation ponds is also occurring at times, as the maximum throughput of the temporary system is below the incoming flows to prevent overloading / failure of the secondary treatment process.	Very High	Daily monitoring of temporary secondary treatment performance and response planning. Instructions by Process Engineer, issued by Team Leader Shift Engineers. Provision of Process Documentation and Operational Information (i.e. set-points) for temporary secondary treatment process by Process Engineer and Training / Instruction / Competency Assessment of Shift Engineers by Team Leader Shift Engineers.
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	Very High	Monitor and record resource consent parameters. All CCC resource consents from ECAN database maintained in HPRM 12/163439. Key 3 waters activities have consent year planners in Excel see WW-008: Monitoring Resource Consent Compliance for details. Establish and maintain open and honest communications with stakeholders especially the regulator (ECAN). Currently undertaken through a quarterly compliance meeting with ECAN local zone manager and consent processing team leader. For the transport of sludge and or screenings we have response, communication and clean-up plan. MSDS's and appropriate HAZCHEM signage to be displayed. Trucks and bins to be properly maintained and checked for water tightness. Implement clean up and communication plan. Fill out spill report and provide to Contract Manager. Trade waste Bylaws in place to reduce likelihood of overloading wastewater treatment plant.

	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.		Bromley WWTP Operated and Maintained in line with documented procedures. Monitor and record key plant process indicators on a regular basis. Training for staff is appropriate to operate and maintain plant Plant capacity reviewed every 4 years.
			Odour treatment facilities designed into WWTP and pump stations as required. CCL to ensure plant maintained and operated according to Contractor plans.
			Reactive; but part of SOP. Investigate all odour complaints. Modify process where able to overcome problem. Open communication with affected stakeholders. Deploy masking sprays to neutralise odours.
			Develop load models for each plant and compare regularly against actual loads to determine needs for upgrades or process changes.
			Ocean Outfall diffusers are operated according to the management or contractors plan. Pump test to monitor outfall performance. Undertake reactive maintenance and repair.
			Manage facilities within the network (Tim) and treatment plants (Adam) so noise standards are not breached. Network 1. In the network CCL to investigate, recommend appropriate remedial actions and ensure plant maintained and operated according to Contractor plans. 2. Facilities designed to meet district plan requirements. 3. Management of network station noise complaints and reports. Network operations will endeavour to investigate any reported noise complaints and rectify issue as they are presented. Treatment 1. In the treatment plants either CCC or CCL to investigate, recommend appropriate remedial actions and ensure plant is maintained and operated according to plans. 2. Facilities designed to meet district plan requirements. 3. Management of treatment plant noise complaints and reports. CCC or CCL will endeavour to investigate any reported noise complaints and rectify issue as they are presented.
			CCC to conduct sewer trunk modelling to identify catchment wide overflows and formulate capacity upgrades to overcome to meet agreed terms and conditions of water resource consent for wet weather overflows.
			Reduce I&I through infrastructure rebuild/renewals.
			Contractor to perform performance tests on wastewater pumps as required in agreed contractors plan.

			Minimise discharge of toxic substance in the network. 1. Mapping of high risk H2S generation areas and logging of H2S in the network. 2. Back pressure monitoring in the odour fan. 3. Investigate alternate odour control technology and apply correct technology for individual situations.
			Strategy to improve the prioritisation of maintenance and repair strategies used by contractors, and agree unit costs for reactive responses where appropriate.
			Execute the Sewer Overflow Response Plan and Wastewater Wet Weather Plan 17/833401.
			Odour mitigation developed to manage chronic odour associated with Council owned Resource Recovery facilities as required. Operational Contractors to ensure plant maintained and operated according to odour management best practice and approved odour management plans. Council to ensure mitigation processes effective in meeting any potential breach of the Act.
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.
R00732	Potential for increased number of midges arising from the ponds causing nuisance to the adjacent residents due to climate change extending the 'midge season' and the unknown effects of the trickling filter fire.	High	Implement the Midge Management Plan (18/1024967), including midge number monitoring, midge dredging and native vegetation planting etc.
R00733	The CWTP Oxidation Ponds are susceptible of seasonal outbreaks of avian botulism, which can be influenced by operational configurations and seasonal variation.	High	Implement Regional Parks Avian Botulism Response Operational Plan (12/196629) in collaboration with Parks Team (who lead the response, Three Waters generally covers expenses associated with response costs on Three Waters land).
R00734	The thermal sludge dryer process at the CWTP is degrading with extended use, with no formal assets management in place to manage or identified funding for refurbishment / replacement. Risk is predominantly around contractual obligations and financial.	High	Support the creation and Implementation of a condition survey and asset management plan for refurbishment or alternative plan for the thermal sludge dryers at the CWTP.
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.
R00743	The Duvauchelle Wastewater Treatment Plant is located at the base of an old quarry face. Frequent minor rock falls are a real risk to personnel and the assets.	High	Create, brief, and install the controls required in a Standard Operating Procedure for when and how to safely access and work on the Duvauchelle Wastewater Treatment Plant.

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.

R00728	Compost from the Organics Processing Plant (OPP) is being used to enhance the paddocks around the Oxidation Ponds in preparation for native planting. This is part of the Midge Management Plan for the Oxidation Ponds.	High	Periodic monitoring of compost application, including weekly reporting, in collaboration with the contractor.
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 - Wate Increased Opex or litigation costs - Failure r 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 - 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.
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 - Repairs, replacement or cleaning of infrastructure being required - Rivers or aquifers being polluted.	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.

5.3 Asset Management Maturity Assessment 2020: Summary

Table 5-1 Extract from 2020 Asset Management Maturity Assessment

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. There is 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 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'.	Re-engage with community around level of service options (beyond 'document submissions' processes). Advancement of 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
Forecasting Demand	85	95	Wastewater model recently updated and calibrated following a 4 months flow monitoring programme. Re-running wastewater optimisation process to identify wastewater constraints and optimisation software to evaluate solutions to achieve outcomes (environmental, cultural, etc), last done in 2016/17. A reduction in Inflow and infiltration, in combination with buffering, are the main demand management techniques to maximise value from the existing treatment facilities and delay growth expenditure.	Ongoing improvements to network modelling and supporting information.
Asset Register Data	80	95	There is a robust core dataset for reticulation assets, with data quality improvements for reticulation recently being driven by AAIF. WW PS data capture has been trialled on a pilot dataset with an intention to roll this out across the network. Data quality dashboards are being established to be able to monitor data quality and easily identify remaining gaps. There is several years of lifecycle cost information captured in SAP (though only at facility level for pump stations). 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 information improvements for non-reticulation data. Continue development of data quality monitoring/data improvements through data quality dashboards (e.g. laterals update). Review/audit processes for incoming data streams and implement improvements.
Asset Performance /Condition	75	90	A significant condition information base was inherited for SCIRT (over half pipes CCTV assessed) though this information value is decreasing without progressing an ongoing CCTV programme (beyond reactive inspections). Budget pressure on the CCTV programme and modelling may reduce the reliability of information over time. Performance of the network is monitored (actual data) and modelled (models are well validated). Condition of stations and treatment plants has not been assessed, but performance is known. Council is in the process of implementing alternative communication and control technologies to provide improved accuracy in planning and responding to changes in demand. 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.	Implement pipe CCTV programme (AAIF). Pump station condition and performance assessment programme. 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	80	90	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. 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.	Review alignment/links from strategic Promapp risks to operational risk mitigations (water supply safety plan approach). 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
			Criticality and risk ratings have been applied to reticulation assets and used to prioritise renewals (AAIF).	Noted that Risk team are also progressing other recommendations from Deloitte risk review 2019.
Operational Planning	85	95	Operations, inspections and maintenance schedules have been developed over many years. AAIF will assist with refining risk-based inspection frequencies. A significant review of pump station maintenance schedules and performance monitoring is underway with a pilot just completed. The wastewater network is remotely monitored, intervention levels are defined and corrective actions implemented. 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. overflows) are in place but the emergency plan needs ongoing review and exercising.	Develop, implement 'Smart Network' strategy to support optimisation of network operations. Continue AAIF programme to inform 'optimised' inspections/ maintenance programmes. Emergency management plan review and exercise programme. Review operational KPIs.
Capital Works Planning	85	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 and cost (AAIF). Wastewater optimisation modelling supports development of investment scenarios across a wide range of objectives (environmental, service, etc).	AAIF enhancements and expansion to non-reticulation 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/ 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.	Ongoing improvements to data confidence will improve the quality of revaluations and financial forecasts. 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 such as the Delegates Liaison Group and AMP workshops and this has been an area of improvement. Generally, AM practice is becoming more standard Council language and culture.	Continue to use opportunities to grow understanding and improve 'AM System' - i.e. how various Council teams work together to deliver good AM outcomes. Continue 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	Review relative content, timing and scope of AMP and Activity Plan prior to the next LTP.

5.4 2021 AMP Improvement Programme

A combination of existing 2018 improvement tasks and new improvement tasks from Asset Management Maturity Assessment make up the 2021 Improvement Plan as shown in tables below. These have been grouped into 6 focus areas. These tasks will be worked on over the next three years and focus specifically on the most critical areas. For practicality, these tasks are designed to address several issues concurrently and allow logical progression towards the 3–year target.

The improvement focus areas are:

1. Asset inventory, condition assessment and failure data improvement programme
2. Financial tracking, forecast and relationships improvement programme
3. Demand management improvement programme
4. Integrated master planning improvement programme
5. Climate change response improvement programme
6. Level of service and customer engagement improvement programme

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 (CCTV records). Asset failure and disposed asset post-mortem to understand failure mechanisms and verify condition grading. Improve maintenance activity and failure data capture to strengthen the connection between network 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 relies on ongoing CCTV inspection. Failure data and maintenance events are not always captured in a way that 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; $60,000 per year for wet well inspection (target 5 sites per year), expand programme for pipe condition testing and failure post mortem, $150,000 data collection.
Timeline	Intensive 2 years, then ongoing

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

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. Determine options and benefits for inflow and infiltration reduction. Identify new bulk metering sites required to support accurate demand calculation and management.
Issues addressed	Infrastructure costs can be reduced by lowering flows 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. Inflow and infiltration is a diffuse source of additional wastewater flow and is difficult to target, however the cumulative impact has a high impact on the capacity of downstream infrastructure and contributes to overflow likelihood.
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 Demonstrate demand management leadership prior to targeting private infrastructure I&I issues Monitor flows more accurately to enable system improvements. Reduce overflow likelihood.
Resourcing	1 x FTE with skillset engineer/asset manager/analyst
Budget	$100,000 per year for 4 years ($400,000 total)
Timeline	4 years

Improvement programme	Integrated master planning improvement programme
Scope	To create a high level infrastructure master plan that sets out strategy for, 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

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 wastewater activity. Set clear goals, identify options and identify the costs and benefits.

	Develop a long term strategy for supplying wastewater service to 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 wastewater 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 wastewater 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

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 wastewater levels of service was over 20 years ago. Informed perspectives of wastewater customers are essential for setting levels of service targets and long term programmes.
Benefits	To ensure alignment between the views of wastewater customers and the decisions made regarding wastewater costs and levels of service
Resourcing	1 x FTE with skillset in community engagement/customer relations. Internal support from asset management/planning
Budget	Combine with water supply activity, part time staff commitment from asset management/planning
Timeline	Ongoing

The table below provides a summary of the improvement programme.

Project / Task	AM Maturity Gaps	Priority (H, M, L)	Responsibility	Resources (teams, $)
Asset inventory, condition assessment and failure data improvement programme	Data, lifecycle asset management	H	Asset management	Up to $1M / yr
Financial tracking, forecast and relationships improvement programme	Data, lifecycle asset management, financial	H	Asset management	$200k / yr
Demand management improvement programme	Demand, data	M	Planning	$100k / yr
Integrated master planning improvement programme	Demand, lifecycle asset management	M	Planning	$100k / yr
Climate change response improvement programme	Risk and resilience	M	Planning	$100k / yr
Level of service and customer engagement improvement programme	Levels of service, financial	L	Service delivery	Combine with water supply activity

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PMO to provide this