Water Services Delivery Plan

Waitaki District Council

9 June 2026

Part A: Statement of financial sustainability, delivery model, implementation plan, and assurance

See an average increase in three waters charges for consumers
Statement that water services delivery is financially sustainable

This plan sets out Waitaki District Council's (WDC) proposed approach for the future delivery of three waters services within its district. The plan proposes delivery through a jointly owned Water Services Entity, Southern Waters. WDC resolved to join Southern Waters in its meeting of 14 April 2026. This plan reflects the decision to join Southern Waters, with a proposed transfer date of 1 July 2027.

The plan highlights that, following its establishment, the Southern Waters delivery model:

Will have access to sufficient financing

- Debt will remain within lending limits that are likely to be set by the Local Government Funding Agency (LGFA) April 2025 guidance.
- There are no expected barriers for Southern Waters to obtain the required borrowing. For additional context:
    - Southern Waters will be established with approximately $288 million of external debt. Specific transfer agreements have yet to be determined but will involve a transfer of existing debt from councils to the new water entity. In this regard, there is no increased demand for debt from the credit market.
    - Annual projected increases in borrowings for Southern Waters are broadly consistent with existing increases in borrowing across the four councils. To date the constituent councils have not faced barriers in accessing debt from the market.

Will make sufficient investment in its infrastructure

- Investment in infrastructure is fully funded through operating cash surpluses and debt.
- Includes investment in services for anticipated future growth.
- Planned investment included in this plan is expected to address all known existing and future compliance obligations and will support the delivery of safe, healthy drinking water throughout the service areas.

Can collect sufficient revenue

- Sufficient revenue will be raised to cover all expected operating costs, depreciation, and financing costs, with surpluses of approximately 7% of operating revenue being provided for.
- Is more affordable than delivery through in-house delivery models.

The plan includes $607 million of capital investment between 2027/28 to 2033/34, of which 38% relates to the renewal of existing three waters assets. Of this approximately $223 million will be spent in the Waitaki district. To support this level of investment, Southern Waters will:

- Require approximately $133 million of total operating revenue in 2033/34.
- See an average increase in three waters charges for consumers in Waitaki of 124% from 2024/25 to 2033/34.
- Require approximately $588 million of debt by 2033/34.

Proposed delivery model

WDC has determined that its preferred delivery model is to join a jointly owned Water Services Entity, Southern Waters. This decision has been made following extensive regional work with Timaru District Council and Mackenzie District Council, and ongoing collaboration with Southern Waters, between January and March 2026 to determine a future delivery model.

This will involve the transfer of all existing water, wastewater and stormwater assets and services to Southern Waters on 1 July 2027. As part of the transfer:

- All of Waitaki's existing three waters will be transferred to Southern Waters.
- The ability to set annual budgets, capital programme, revenue requirements, and charges will be transferred to Southern Waters.
- A review of existing WDC staff whose roles substantially relate to the delivery of water services will be undertaken with a view to then consulting with affected staff regarding the restructuring proposal.
- Southern Waters will be the water services provider registered with Taumata Arowai, and existing resource consents will be transferred to Southern Waters.

WDC has already signed and agreed to the constitution, shareholders agreement and commitment agreement for Southern Waters. Southern Waters has appointed an establishment team, including a Programme Director and Board Chair, and work on the establishment of Southern Waters is well underway.

Southern Waters was officially incorporated on 1 May 2026 with WDC as one of the initial shareholders.

Key principles that were agreed by Southern Waters and are reflected in its foundational documents include:

- A recognition that local pricing will be maintained for a period of time.
- That all shareholding councils have equal votes through a Stakeholders Representative Group.
- That rural water is recognised as a distinct service, and as a "fourth" water in the foundational documents, and through the statement of expectations for Southern Waters.
- That governance of Southern Waters will be through a professional board appointed through a Stakeholders Representative Group (which will be also responsible for developing the statement of expectations for Southern Waters).
- The inclusion of additional councils will be welcomed. However, decisions regarding the inclusion of additional councils will require a unanimous decision of the shareholders.
- There will be mana whenua representation on the Stakeholders Representative Group.

Implementation plan

This plan will be delivered through the establishment of Southern Waters, work for which is already underway as described in the previous section. This will involve the legal transfer of all necessary assets, rights, obligations, debt, and where possible, the transfer of existing staff to Southern Waters. Implementation is underway and the implementation plan for Southern Waters is set out in its Water Services Delivery Plan and is replicated below.

Tasks already complete:

- Tasks that are ongoing - Water Services Delivery Plan adoption and approval.
- Project team resourcing.
- High level implementation planning based on agreed design principles.
- Ongoing engagement with mana whenua and Iwi throughout the establishment period.
- Detailed planning, including workstreams and implementation plan activation.
- Resourcing - initial transition functions including interim leadership and Establishment Board. Governance including Constitution, Shareholding Agreement, CCO structure and accountability documents.
- Worked with Timaru District Council and Waitaki District Council to enable those councils to make a decision whether to join Southern Waters.
- Legal constitution of Southern Waters.
- Workstream priorities:
    - Establishment of Southern Waters.
    - Business and service design/operational matters for Southern Waters.
    - People and capability workstream- to identify and implement necessary transfer arrangements for staff and contractors and ensure a smooth transition to Southern Waters.
    - Finance workstream - to develop the first annual budget for Southern Waters, the initial pricing and tariff structures, manage the transfer of debt, agree and implement billing arrangements, manage the transfer of insurance and banking arrangements, and future lending facilities.
    - Legal workstream to support the transfer of consents, contracts, and preparation of the transfer agreement, compliance, reporting, and probity.
    - Asset management workstream to support joint asset management plan and capital works programme and any new asset management systems.
    - Operations workstream - to support the smooth transfer of operations and the development of necessary processes and procedures for the day-to-day operation of water, wastewater, and stormwater networks.
    - Communications and engagement workstream to manage communications with the public, stakeholders, and staff during the transition.
- During the 2025/26 and 2026/27 financial years, council staff will continue to work for their respective councils. However, they may be required to complete some tasks for Southern Waters. It is expected that council staff will work closely with transition leads to ensure existing work is aligned with Southern Waters' broader objectives and manage workloads and priorities.
- Operational go live for Southern Waters – 1 July 2027.

Specific asset management implementation matters

There are various asset management frameworks and practices that Southern Waters will develop as part of the transition process and harmonisation of existing practices. This will ensure that there is a consistent asset management approach aligned with good industry practice as well as meeting the new economic regulator's requirements for the water sector. These include development of:

- Asset Management Policy and Strategy.
- Asset criticality Framework.
- Asset condition strategy/approach.
- Comprehensive Asset Management Road map including Information Management and System Programme.
- Assessment of the current service level provision and the collection of supporting data and information.
- Level of service framework.
- Prioritisation framework for capital programmes.
- Strategic procurement strategy.

Consultation and engagement

Public consultation was undertaken between 6 May and 9 June 2025. Consultation sought feedback on four options including a joint Council Controlled Organisation (CCO) with Central Otago District Council, Clutha District Council, and Gore District Council (SWDW), a standalone CCO, an in-house business unit, and a joint CCO with Canterbury councils. The SWDW option was identified as the proposed delivery model at the time of consultation.

Information was made accessible to the community through multiple channels, using clear language to support broad understanding and participation. For WDC consultation comprised of**:**

- A Consultation Document and submission form.
- SWDW consultation material, including summary information and frequently asked questions, made available via WDC's online engagement website.
- Two joint mayoral videos delivered via social media and other WDC digital platforms.
- Hard copy consultation materials published via local newspapers.
- Hard copies of the submission form and consultation materials available at WDC Customer Services Centres and libraries.
- Facebook livestreams.
- Stakeholder briefings and presentations upon request.

Where possible, public sessions were livestreamed and recordings made available online for those unable to attend in person. Throughout the consultation period, WDC's consultation platform was regularly updated with additional information and responses to common questions.

Consultation Outcomes

WDC received a total of 300 submissions from individuals, organisations, and community groups. The in-house business unit received the highest level of support from respondents (54% of "first choice" selections), followed by the standalone CCO (21%) and the SWDW joint (15%).

Submitters were asked to rank their choices 1 to 4 and when taking into account weighting of rankings the in-house business unit was still preferred (78%) followed by standalone CCO (72%) and the joint CCOs with South Canterbury councils (55%) and SWDW (44%).

Post rejection of initial WSDP

Following the initial rejection of WDC's initial WSDP, WDC engaged in further work to identify its preferred water services delivery model. This included working with Southern Waters, and Timaru and Mackenzie District Councils to assess potential joint water services delivery options.

This work resulted in WDC expressing a preference to join Southern Waters. This decision was reached having regard to the potential benefits and risks of all of the options, including the strength of existing relationships, existing progress on the development of models and regional alignment.

Assurance and adoption of the Plan

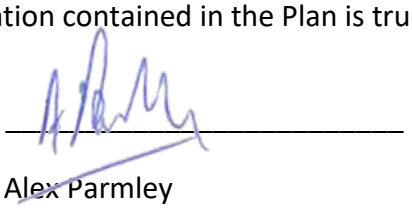
WDC resolution to adopt the plan

WDC resolved to adopt this plan in its meeting of 9 June 2026. The resolution to adopt this plan has been attached as Appendix 2.

Chief Executive's certification

I certify that this Water Services Delivery Plan:

- complies with the Local Government (Water Services Preliminary Arrangements) Act 2024, and
- the information contained in the Plan is true and accurate.

Signed: 

Name: Alex Parmley

Designation: Chief Executive

Council: Waitaki District Council

Date: 9 June 2026

Part B: Network Performance

Part B Overview

The Network Performance Section has been structured so the asset performance and compliance issues and future investment requirements are better linked. It broadly follows the Department of Internal Affairs' template content.

1. Description of water services in Waitaki District

Section 1 overview – This section covers:

- Describing the district's water supply, wastewater, and stormwater schemes.
- Providing information on the number and location of residential and non-residential connections and unserviced areas.

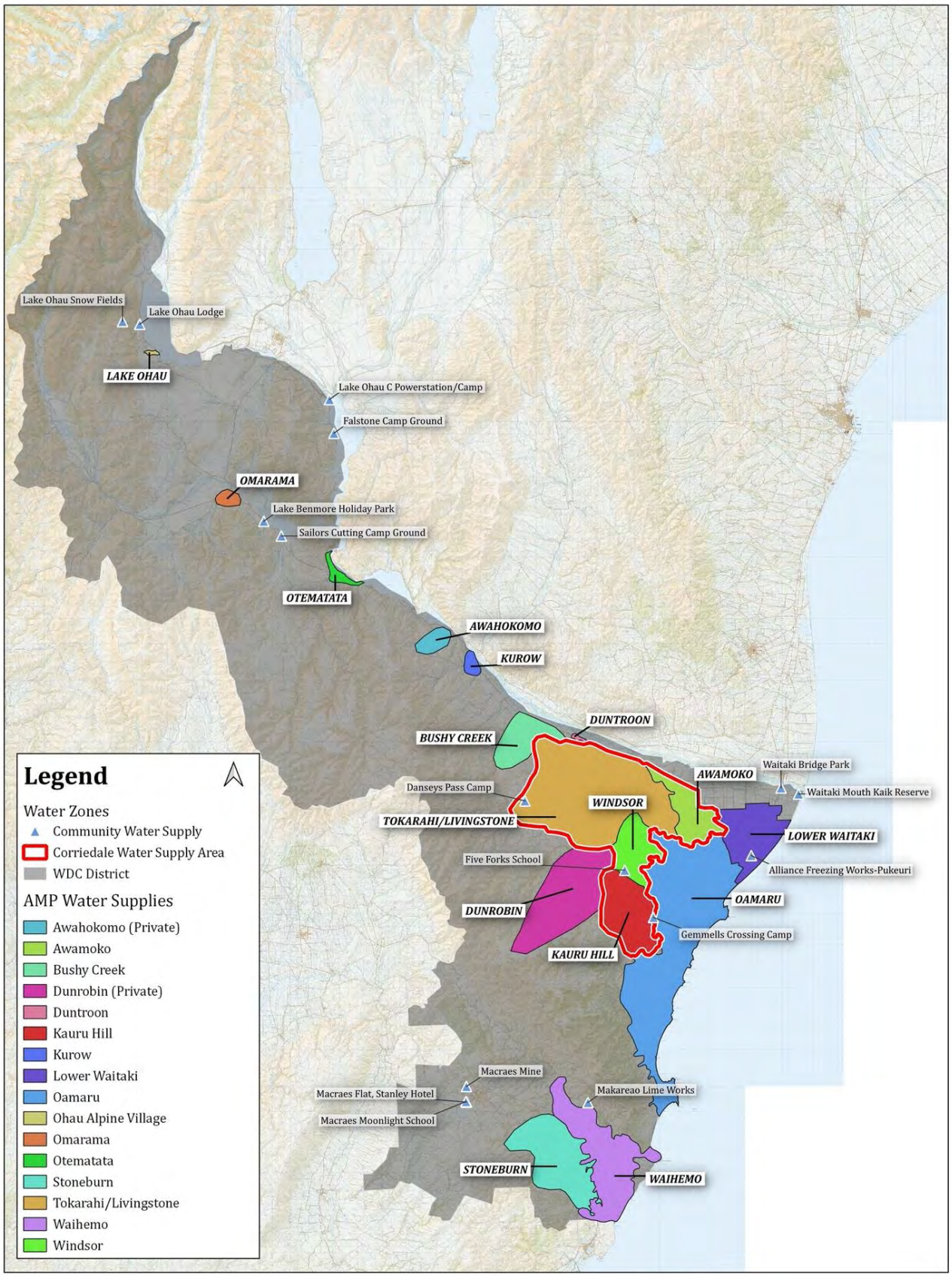
The Waitaki District stretches from the Southern Alps to the Pacific Ocean, across Otago and Canterbury regions, with Ōamaru as the main urban centre with many smaller townships. The district covers a large area at 7,216km^2 and has a total population of 25,100. It is a relatively sparsely populated district compared with other South Island districts at 3.47 people per km^2.

1.1 Water supply scheme description

Number of schemes – WDC provides water supply to 86% of the district's population through the operation of 15 individual domestic water supplies providing on-demand supply to urban areas and/or a continuous but restricted-supply for domestic-use and some stock-drinking water in rural areas.

These water schemes are categorised as follows and shown on the map below:

- Ōamaru – supplying a mix of on-demand and restricted zones (including formerly stand-alone supply areas of Weston, Enfield, Kakanui, Reidston, Maheno, Herbert-Waianakarua, Hampden-Moeraki).
- Waihemo - supplying a mix of on-demand and restricted zones from Palmerston south to Goodwood and inland to Dunback (formerly stand-alone supply zones).
- Five township supply systems (Kurow, Lake Ōhau, Ōmārama, Ōtematatā and Duntroon).
- Eight rural water supply systems operated by WDC (Lower Waitaki, Bushy Creek, Stoneburn) or a third party (Awahokomo, Awamoko, Kauru Hill, Tokarahi, Windsor).



Waitaki DISTRICT COUNCIL
TE KAUNIHERA Ā ROHE O WAITAKI
Growing strong communities.

Asset Management Plan 2024

Community Water Supplies in the Waitaki Distirct

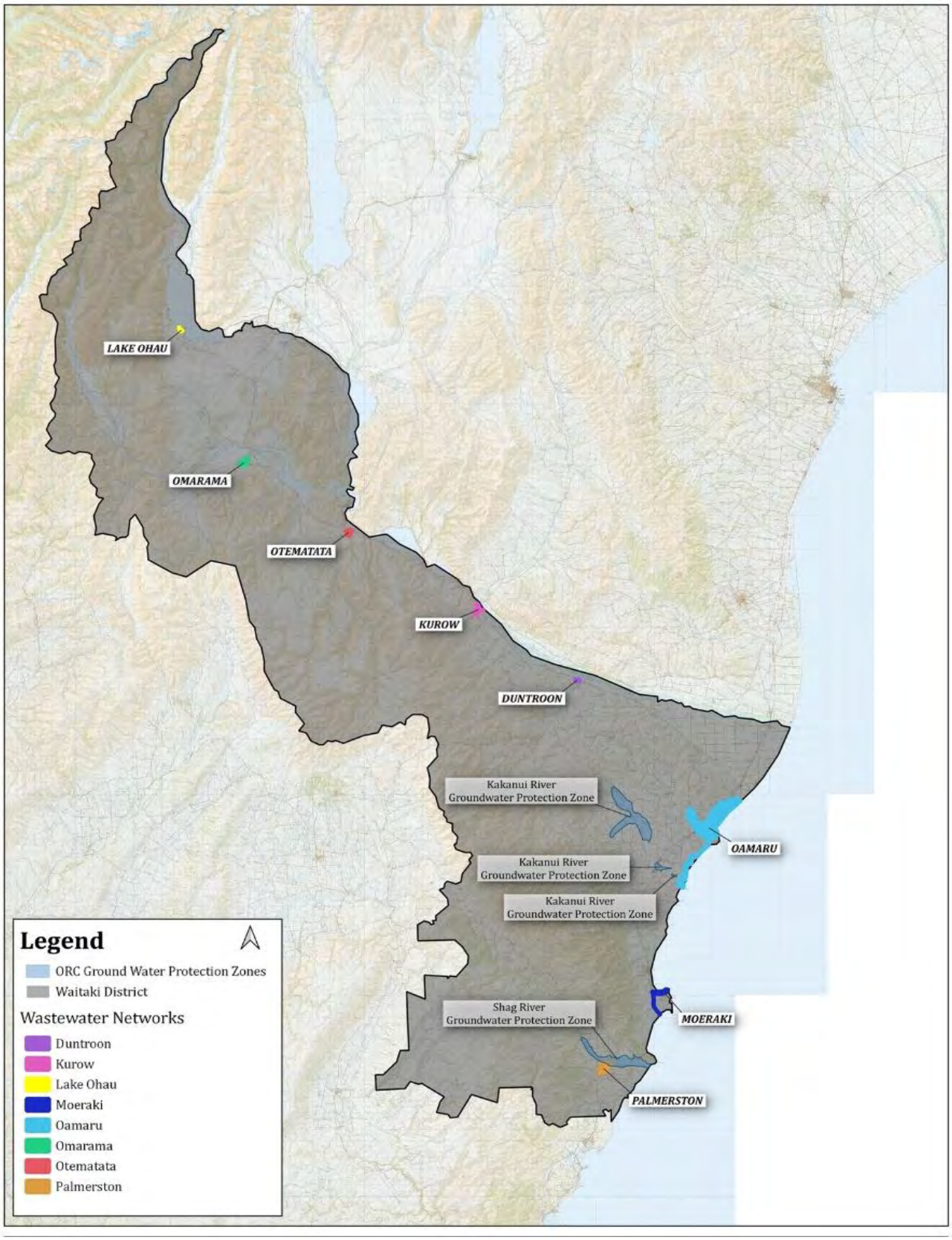
Number of connections – The number of connections by water supply schemes is detailed in the table below (as recorded in WDC's rates database).

Serviced areas (by reticulated network)	Water supply schemes – numbers of connections
Residential	• Ōamaru / urban - 5384 • Ōamaru – Her - Waianak - 74 • Ōamaru / Enfield - 38 • Ōamaru / Ham Moe - 424 • Ōamaru / Kakanui - 366 • Ōamaru / Weston - 482 • Kurow - 205 • Lake Ōhau - 56 • Ōmārama - 242 • Ōtematatā - 496 • Waihemo / Palmerston - 441 • Waihemo Dunback - 72 • Waihemo Goodwood - 37 • Awamoko - 18 • Duntroon - 49 • Kauru Hill - 3 • Lower Waitaki - 39 • Bushy Creek - 1 • Stoneburn (rural) - 3 • Tokarahi - 42 • Waik / Goodw - 17 • Windsor - 11
Non residential	• Ōamaru / urban - 969 • Ōamaru / Her- Waianak - 239 • Ōamaru / Enfield - 99 • Ōamaru / Ham Moe - 136 • Ōamaru / Kakanui - 104 • Ōamaru / Weston - 413 • Kurow - 85 • Lake Ōhau - 74 • Ōmārama - 80 • Ōtematatā - 30 • Waihemo / Palmerston - 130 • Waihemo Dunback - 92 • Waihemo Goodwood - 120 • Awamoko - 74 • Duntroon - 18 • Kauru Hill - 71 • Lower Waitaki - 164 • Bushy Creek - 10 • Stoneburn - 59 • Tokarahi - 188 • Waik / Goodw - 10 • Windsor - 61

Unserviced areas – There are 869 households not connected to the public water supply system.

1.2 Wastewater scheme description

Number of schemes – WDC operates eight wastewater systems (as shown on the map below) at Duntroon (limited-service area), Kurow, Lake Ōhau, Moeraki, Ōamaru (including Kakanui and Weston), Ōmārama, Ōtematatā, and Palmerston servicing a population of over 16,430 across the district.



Number of connections – The number of connections by wastewater schemes is detailed in the table below (as recorded in WDC's rates database).

Serviced areas (by reticulated network)	Wastewater schemes – numbers of connections
Residential	• Ōamaru - 5,239 • Ōamaru / Kakanui - 313 • Ōamaru / Weston - 399 • Duntroon - 9 • Kurow - 196 • Lake Ōhau - 64 • Moeraki - 157 • Ōmārama - 227 • Ōtematatā - 517 • Palmerston - 418
Non residential	• Ōamaru - 610 • Ōamaru / Kakanui - 24 • Ōamaru / Weston - 51 • Duntroon - 0 • Kurow - 49 • Lake Ōhau - 0 • Moeraki - 11 • Ōmārama - 29 • Ōtematatā - 20 • Palmerston - 80

Unserviced areas – There are 2,930 households not connected to a public wastewater system.

1.3 Stormwater scheme description

Number of schemes

WDC operates stormwater systems in eight community areas in the Waitaki District (in Canterbury and Otago) which provide a degree of protection against rainfalls of a moderate intensity, as summarised in the table below.

Of these, only the Ōamaru, Ōtematatā, Palmerston and Weston systems are considered substantial. The remaining four systems in Ōmārama, Kurow, Lake Ōhau and Moeraki are small, consisting of only one or two pipes each.

Region	Township serviced with public stormwater system
Otago	• Ōamaru • Weston • Moeraki • Palmerston
Canterbury	• Lake Ōhau • Ōmārama • Ōtematatā • Kurow

Number of connections – The number of connections by stormwater serviced townships is detailed in the table below (as recorded in WDC's rates database).

Serviced areas (by reticulated network)	Stormwater serviced townships – numbers of connections
Residential	• Ōamaru - 5,613 • Kurow - 203 • Lake Ōhau - 132 • Moeraki - 203 • Ōmārama - 246 • Ōtematatā - 545 • Palmerston - 528 • Weston - 447
Non residential	• Ōamaru - 1,057 • Kurow - 50 • Lake Ōhau - 0 • Moeraki - 14 • Ōmārama - 64 • Ōtematatā - 25 • Palmerston - 104 • Weston - 88

Unserviced areas – It is estimated that 69% of the district's population have access to a public reticulated stormwater system with the remainder being served by individual soak pits and associated disposal systems.

2. Asset management and service delivery

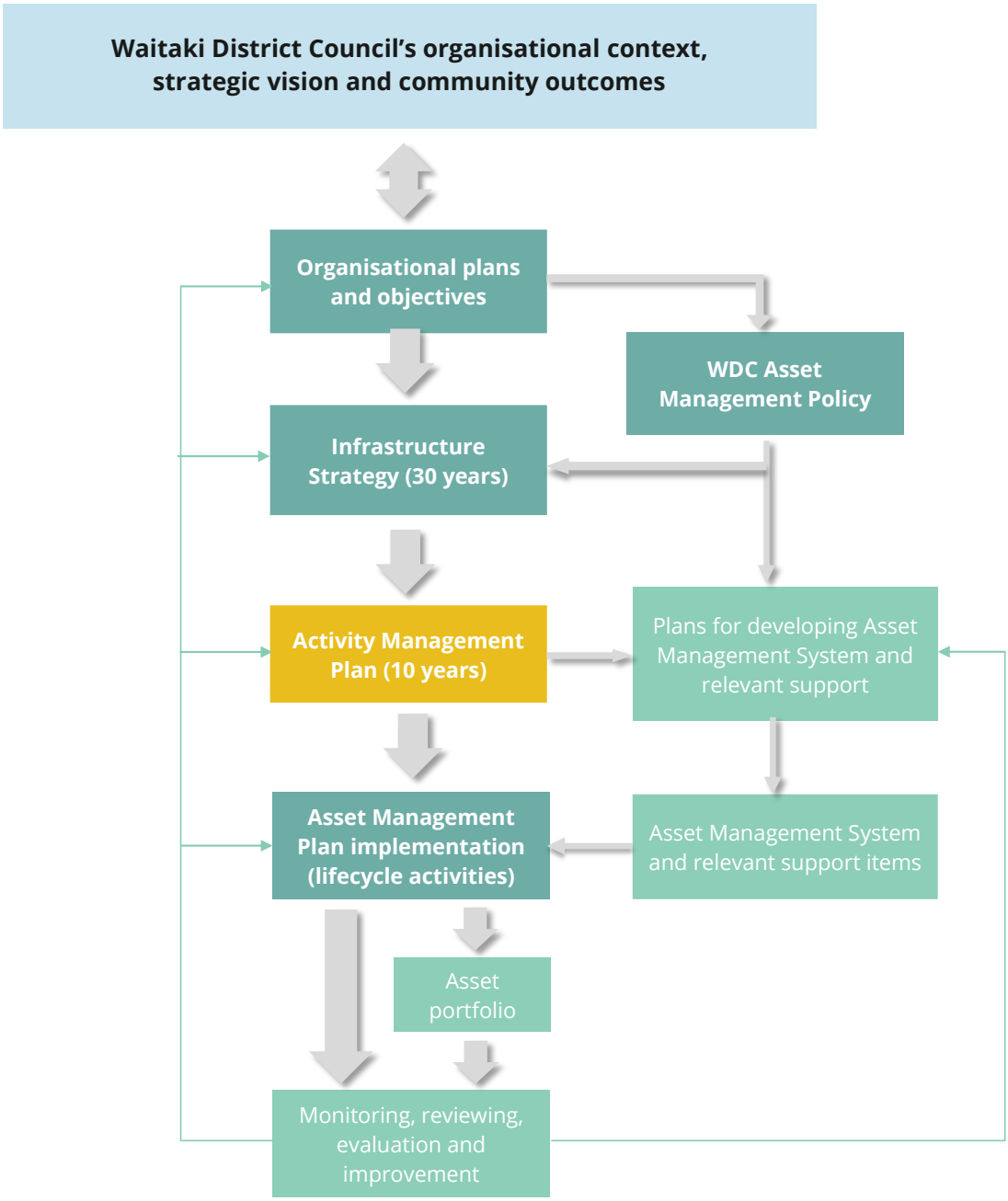
Section 2 overview – This section covers:

- WDC's asset management (AM) approach including AM framework, maturity, and systems.
- Current and proposed water services delivery arrangements.
- Historical delivery against planned investment including key steps to improve deliverability.

2.1 Asset management approach

Asset management framework – WDC is committed to providing good quality infrastructure assets that serve the needs of the community. WDC follows good industry practice in its approach to asset management as defined in the IIMM and Āpōpō Guidelines.

WDC's asset management framework is shown in the diagram below. It shows the alignment and strategic linkages between our WDC's Vision, Community Outcomes, Infrastructure Strategy, AMPs, and the activities.



AM Policy and AMPs – The purpose of the Asset Management Policy is to define the principles and responsibilities that WDC applies when managing the infrastructure assets. The policy underpins and gives effect to WDC's Vision and LTP. The policy provides the overarching framework for the 30 Year Infrastructure Strategy and Asset Management Plans (AMP).

WDC's Asset Management Policy was revised and adopted in July 2025. The purpose of the AM Policy is to:

- Record WDC's commitment to asset management as a core business practice.
- Outline the principles WDC will apply to asset management.
- State the determined level of sophistication for asset management activity by asset portfolio.

Separate AMPs are prepared every three years for our water, wastewater, and stormwater supply activities. The AMPs are based on asset needs and inform the Long Term Plan process including the 30 year Infrastructure Strategy.

Asset management maturity – WDC's AM Policy sets the maturity level for the asset activities as shown below. WDC aims for a Core Plus / Intermediate level of asset management practice for three waters, operating at an advanced level as required to meet additional regulator-driven requirements.

Activity / AM Level	Roads and Footpaths	Water, Wastewater and Stormwater	Waste Management and Minimisation	Parks, Reserves and Recreation Services	Property and Facilities
Advanced	*Waka Kotahi driven additional requirements*	*Regulator driven additional requirements*			
Core Plus / Intermediate					
Core					

Waugh Infrastructure (2026) recently completed an assessment of Waitaki DC's asset management maturity. WDC staff first completed a guided self-assessment through a questionnaire and series of workshops and then Waugh completed a review of the results and supporting documents, and interviewed staff through additional workshops.

Overall, the assessment noted the backdrop of WDC's recent Transformation Programme and concluded that:

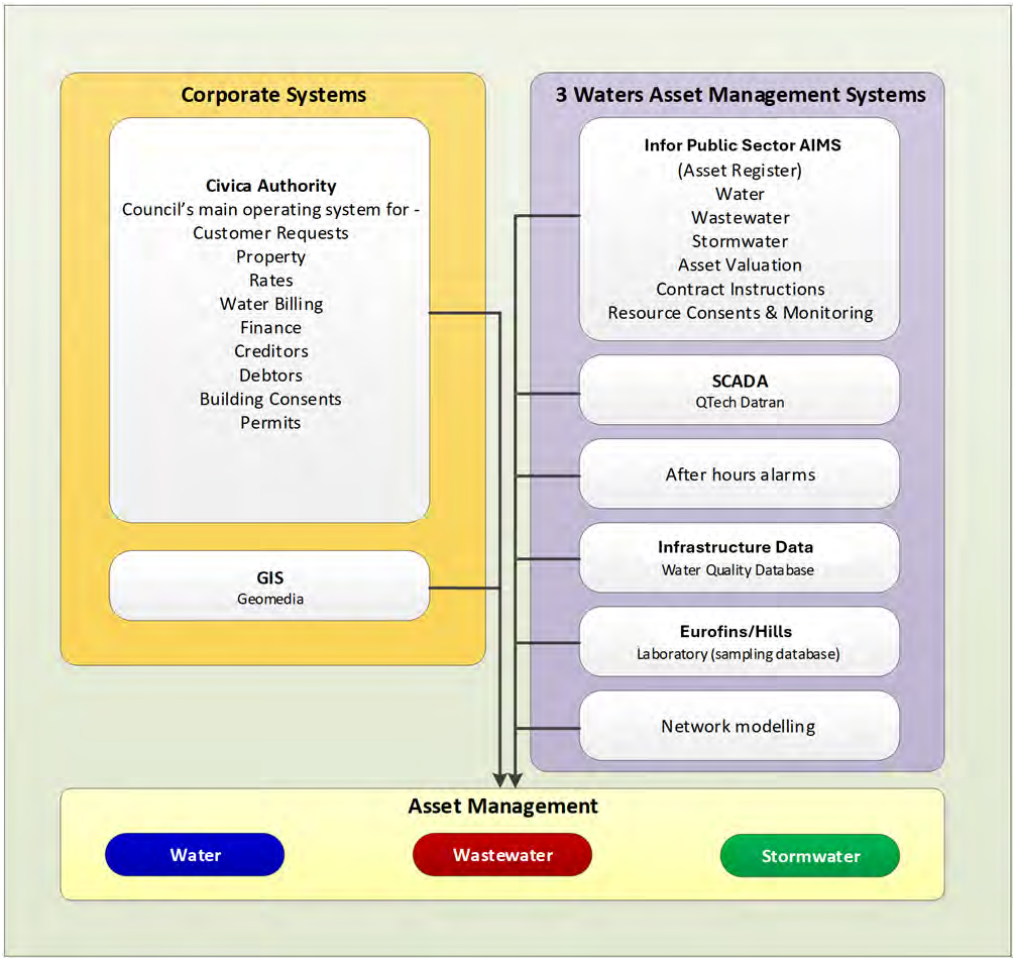
> *In our opinion, WDC's asset management practices for Water, Wastewater and Stormwater activities generally meet the IIMM maturity level of CORE[1]. While the assessed maturity level does not meet WDC's targeted practice level of INTERMEDIATE*, ongoing application of current training and implementation of recommended improvements across AM system components is expected to bring scores to target levels in the shorter term.*
>
> *(*Under WDC's Asset management Policy 2025, advanced practice is targeted for regulator driver additional requirements, although these areas are not specified within the AM Policy.)*

The transition to Southern Waters is expected to bring increased capacity and capability in the asset management planning area. Through this transition, it is expected that the asset management maturity for three waters series delivered within the district will improve.

[1] As defined in the IIMM

Asset management systems – Asset management information and data systems currently used in water services delivery are summarised in the diagram below. Note that the GIS platform has recently switched from GeoMedia to ArcGIS and that network hydraulic models use InfoWorks WSP and ICM software packages.

A review of the asset management systems has been completed, and transition budget costings had previously been allowed for any system changes. This includes the performance of the SCADA and telemetry systems, compliance reporting processes and source data systems and the integration of asset management and financial systems to readily provide reliable compliance reporting information in the future. Investment in system changes has now been deferred to occur after the transition of services to Southern Waters to allow for improved opportunities to integrate across the new entity.



2.2 Water services delivery arrangements

Current water services delivery arrangements

In-house resources – The three waters functions are split across the four WDC directorates, including Strategy, Performance & Design (Asset Planning), Community Engagement & Experience (Customer Experience, Customer Services, Strategic Communications & Engagement), Support Services (Finance, Project Management Office, People and Capability, Digital Services) and Natural & Built Environment (Regulatory and Compliance, Infrastructure).

The restructuring of the water services in 2024 established a dedicated PMO to streamline and increase the WDC's capital programme delivery capacity.

The PMO has been embedding new approaches to ensure more robust planning and delivery of projects with a focus on ensuring projects are well scoped and planned; that procurement is optimized; and that stronger project management arrangements are in place focused on timeliness, working within budget and avoiding scope creep. This is being done at a time when the Council has the largest capital programme ever delivered including three significant "once in a generation" non-water projects: The Network Waitaki Events Centre (the largest capital project delivered by WDC), the Forrester Gallery Extension and the Kakanui Bridge replacement. The new project management arrangements are producing benefits (the three large non-water projects being on time and on budget or under budget), but some aspects are taking time to bed in, highlighting opportunities for improvement including the spend profile of projects (many 18 – 24 month projects being budgeted only for one year) and clarity between PMO and specialist roles.

Building capability – The Assets Planning function brings greater focus on asset planning and upfront investment planning, so the current asset state is better understood. The dedicated asset planning team ensures this focus is not distracted with operational issues. It is recognised that there needs to be a greater focus on:

- Collecting data and using this to inform investment decisions.
- Proactive programmes such as leakage management and wastewater overflow mitigation strategies.

Operational delivery - is currently undertaken by Infrastructure & Operations. This newly formed team bring together operational and technical experts to ensure sound delivery of infrastructure services. One half of the team have a focus on network management, which includes overseeing the reactive response to arising issues on water, wastewater, and stormwater reticulation as well as planning and delivery of proactive maintenance. The other half of the team focus on technical issues relating to infrastructure, but in a waters context, ensure the efficient running of water and wastewater treatment facilities.

This team is focused on meeting compliance deficiencies in the waters area, working with other Council departments to ensure technical issues meet requirements.

Outsourced delivery – Most of the operation and maintenance responsibilities for reticulation, treatment, storage, and pumping facilities across WDC schemes are contracted to SouthRoads Ltd. The SouthRoads contract is due to expire on 30 June 2027 and will need to be retendered or renewed. WDC is working with Southern Waters on this.

WDC has partnered with Corriedale Water Management Limited to ensure the delivery of operations, maintenance, and day to day management of four water supplies (Awamoko, Kauru Hill, Tokarahi and Windsor) is undertaken to the required standard.

The capital programme is largely delivered through tendered contracts to the contracting market.

Future water services delivery arrangements

Following the transition to Southern Waters, the future delivery arrangements for water services will be reviewed. This may include a change to the current approach adopted by WDC.

Until water services are transferred, there will be a continued focus on the following functions to ensure WDC is able to support asset management, capital delivery, and meeting compliance requirements:

- PMO – This function delivers the larger capital investment programmes, with a focus on the three waters capital programmes.
- Asset Planning – This function focusses on asset planning and upfront investment planning so the projects are adequately scoped and considers long term issues. It will also undertake analysis of the current asset issues including asset failure and condition assessments. This analysis will inform the ongoing renewal programmes, so they are risk based.
- Regulatory and Compliance – This team will continue to monitor drinking water and resource consent compliance and provide timely reports to the regulators – Otago and Canterbury Regional Councils, Water Services Authority Taumata Arowai and Commerce Commission. They will continue to work with other internal teams on any non-compliance issues to identify suitable and timely mitigation measures including operational and capital solutions.

It is expected that the current contracted out services will continue and long term service delivery arrangements will be assessed by Southern Waters. This may include consideration on whether treatment of water and wastewater is best to be completed by contractors or through a directly employed workforce.

2.3 Historical delivery against planned investment

Key points on historical capital investment – Overall, there was mixed achievement in delivering the capital programmes from 2018/19 to 2024/25. WDC has recognised that additional resources and capability were required to lift programme deliverability (see notes below).

Key points on historical capex delivery against planned investment are:

- Water supply – Although the overall results were generally reasonable and greater than the planned budget in some financial years, this was related to mainly deferred projects and cost escalation. The fluoridation of Ōamaru water supply was an unbudgeted project. There was a significant increase in projects delivered in 2020/21 when compared to the planned number of projects. This is because WDC was in receipt of significant government funding to enable a number of major capital projects to proceed.
- Wastewater – Similar comments to water supply. Additional capital projects were undertaken in 2020/21 with funding from Government.
- Stormwater – There was no planned investment for stormwater in this period. All stormwater projects were unbudgeted and low level.
- The under-delivery in 24-25 can be explained in part by the uncertainty surrounding some of the larger projects (e.g. upgrades to water treatment in some of the rural schemes) and the disruption through the move away from the 3 Waters reform, the shift from a 24-27 LTP to an enhanced 24-25 Annual Plan, and implementation of the Council Transformation programme. Many of these projects were carried forward (deferred) into the 25-26 financial year and some are still scheduled for delivery in 26-27.

Note that the planned investment figures in the table below reflect the annual plan budgets set at the start of each year and will only reflect the LTP figure in year 1. They do not include any carry forward from previous years or mid-year adjustments.

Water supply

Delivery against planned investment	Renewals investment for water supply				Total investment in water supply			
	FY2024/25	FY21/22 - FY23/24	FY18/19 - FY20/21	Total	FY2024/25	FY21/22 - FY23/24	FY18/19 - FY20/21	Total
Total planned investment (set in the relevant LTP)	22,059	9,950	5,194	**21,944**	26,789	30,359	5,284	49,448
Total actual investment	5,913	19,093	11,497	**30,590**	8,561	30,926	19,582	50,508
Delivery against planned investment (%)	**27%**	**192%**	**221%**	**139%**	**32%**	**102%**	**371%**	**102%**

Wastewater

Delivery against planned investment	Renewals investment for wastewater				Total investment in wastewater			
	FY2024/25	FY21/22 - FY23/24	FY18/19 - FY20/21	Total	FY2024/25	FY21/22 - FY23/24	FY18/19 - FY20/21	Total
Total planned investment (set in the relevant LTP)	1,633	6,369	2,119	**9,403**	4,349	7,397	3,079	12,798
Total actual investment	279	4,551	1,392		1,234	5,943	4,584	10,527
Delivery against planned investment (%)	**17%**	**71%**	**66%**	**0%**	**28%**	**80%**	**149%**	**82%**

Stormwater

Delivery against planned investment	Renewals investment for water services				Total investment in water services			
	FY2024/25	FY21/22 - FY23/24	FY18/19 - FY20/21	Total	FY2024/25	FY21/22 - FY23/24	FY18/19 - FY20/21	Total
Total planned investment (set in the relevant LTP)	108	-	-	**-**	108	-	-	-
Total actual investment	19	182	376	**558**	19	182	376	558
Delivery against planned investment (%)	**18%**	**NA - unbudgeted**	**NA - unbudgeted**	**NA - unbudgeted**	**18%**	**NA - unbudgeted**	**NA - unbudgeted**	**NA - unbudgeted**

Key steps to improve deliverability – WDC has focused on improving its capital works delivery over the last 2 – 3 years. This focus will continue until water services are transferred to Southern Waters. The key steps WDC has undertaken to improve its deliverability of capital works are:

- The establishment of a PMO in 2024 and the restructuring of the delivery of water services internally was designed to improve capital delivery against budgets.
- There are internal project managers to deliver the capital programmes and external support is used as required.
- Introduction of integrated AM planning to inform effective capital investment decisions.
- Planned investment in stormwater renewals and new works for capacity upgrades has been allowed for in this WSDP.

It is expected that further improvements in capital works delivery will be realised following the transition of water service to Southern Waters, as a result of increased project bundling, scales, and predictability of forward capital works programmes.

3. Assets and renewals

Section 3 overview – This section covers:

- Description of current asset state in terms of age and condition, gaps in information and improvement programmes to address this.
- Identification of critical assets.
- Presentation of long term renewal profiles.
- Identification of capital renewal investments.

Note that the capital investment and forward capital works programmes set out in this WSDP reflect WDC's current view of the work required. Southern Waters will review its own capital programme, including consideration of deliverability and prioritisation, as part of its work to develop its first water services strategy.

3.1 Current asset state – age and condition

Asset age and condition – The current state of the three waters assets is shown in the tables below (as per DIA template and a confidence-based assessment), with description on each activity outlined below.

Below ground assets

The below ground asset data is based on a recent desktop and field validation of condition assessment data by ProjectMax in 2025/26, which included:

- Data cleansing to identify and correct anomalies in install dates and material types.
- Reviewing the base life (expected useful life) of pipe assets comparing Waitaki lives against industry norms.
- Assessing the condition of pipe assets by comparing material, diameter, install dates and operating pressures against industry norms using ProjectMax's predictive condition model.
- Validating the base life and condition of pipe assets through an engineering review of CCTV data (wastewater and stormwater) and through field and laboratory testing of a sample of cast iron and AC water pipes.

Parameters	Drinking supply	Wastewater	Stormwater
Average age of Network Assets *Note these values are for all water, wastewater, and stormwater assets, including plant and equipment.*	32.65	54.48	54.24
Above ground assets:			
Treatment plant/s (numbers)	13	8	NA
Percentage or number of above ground assets with a condition rating *	100%	100%	NA
Percentage of above –ground assets in poor or very poor condition *	23%	23%	NA
Below ground assets:			
Total km of reticulation	1,784	203	58
Percentage of network with condition grading	100%	100%	100%
Percentage of network in poor or very poor condition	29%	21%	19%

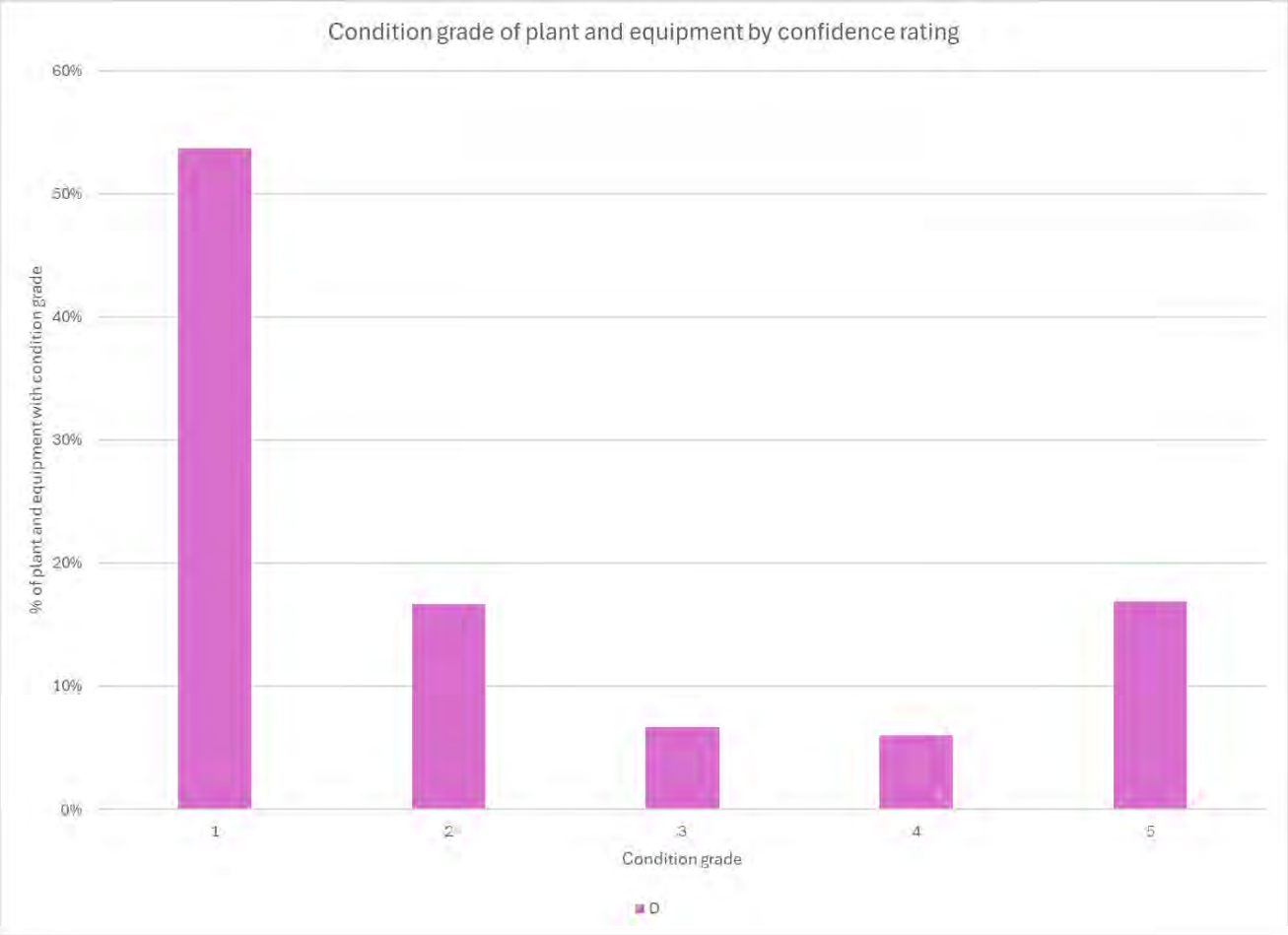
***** The condition grade of the above ground assets is a low confidence level (D) based on the remaining useful life as a percentage of the base life, with a combined score given for both water and wastewater.

Confidence	Count of Structural Condition Grade						% of Structural Condition Grade					Grand Total
	1	2	3	4	5	Grand Total	1	2	3	4	5	
Sewer Main	**768**	**1,075**	**612**	**403**	**232**	**3,090**	**25%**	**35%**	**20%**	**13%**	**8%**	**100%**
A	12	27	14	29	22	**104**	0%	1%	0%	1%	1%	**3%**
C	701	1,022	598	373	206	**2,900**	23%	33%	19%	12%	7%	**94%**
D	55	26	-	1	4	**86**	2%	1%	0%	0%	0%	**3%**
Storm Main	**297**	**462**	**178**	**154**	**65**	**1,156**	**26%**	**40%**	**15%**	**13%**	**6%**	**100%**
A	21	53	5	6	6	**91**	2%	5%	0%	1%	1%	**8%**
B	8	10	4	7	4	**33**	1%	1%	0%	1%	0%	**3%**
C	3	3	1	1	3	**11**	0%	0%	0%	0%	0%	**1%**
D	265	396	168	140	52	**1,021**	23%	34%	15%	12%	4%	**88%**
Water Main	**4,275**	**3,411**	**888**	**2,723**	**843**	**12,140**	**35%**	**28%**	**7%**	**22%**	**7%**	**100%**
B	-	36	2	3	3	**44**	0%	0%	0%	0%	0%	**0%**
D	4,275	3,375	886	2,720	840	**12,096**	35%	28%	7%	22%	7%	**100%**
Plant Equipment	**2,197**	**683**	**274**	**245**	**691**	**4,090**	**54%**	**17%**	**7%**	**6%**	**17%**	**100%**
D	2,197	683	274	245	691	**4,090**	54%	17%	7%	6%	17%	**100%**

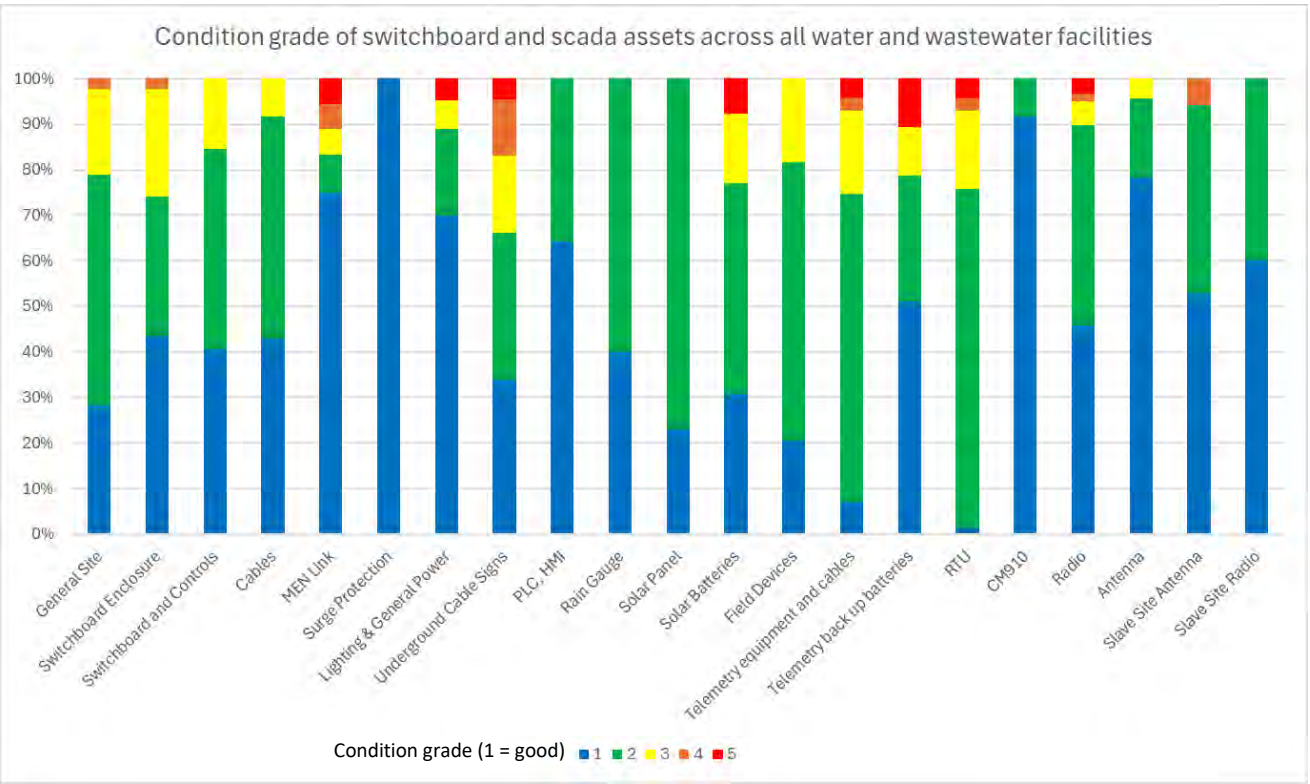
Above ground assets

While some non-invasive testing of water reservoirs has occurred, outside of this, only limited formal assessments have been undertaken on the above ground water supply assets to date. Informal observations by treatment plant operators and network maintenance staff have been used.

The condition of above ground wastewater assets has not been formally assessed for renewals planning. The operations contract is relied on to maintain the plant assets in a functional state.



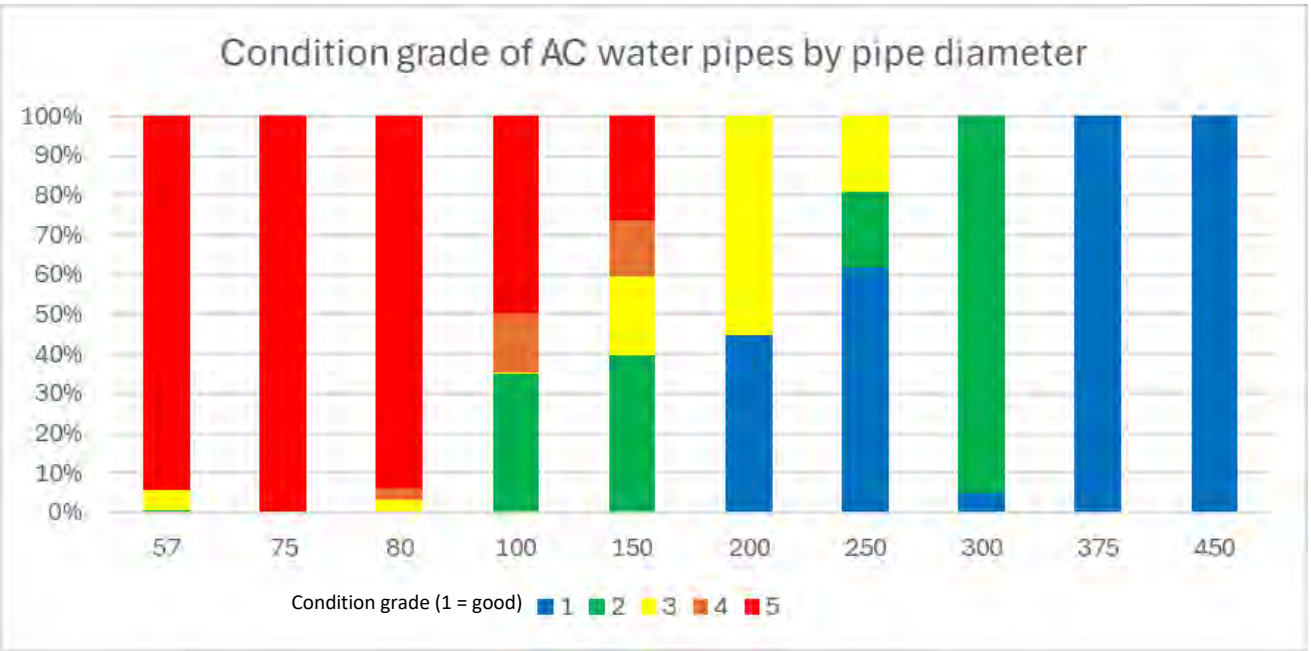
Moving forward, budget has been allocated to implement a more formal condition assessment programme of above ground assets. In early 2026 a comprehensive condition assessment of all water and wastewater switchboard and SCADA assets was completed, with results summarised below (these results are not yet reflected in the overall assessment in the graph above).



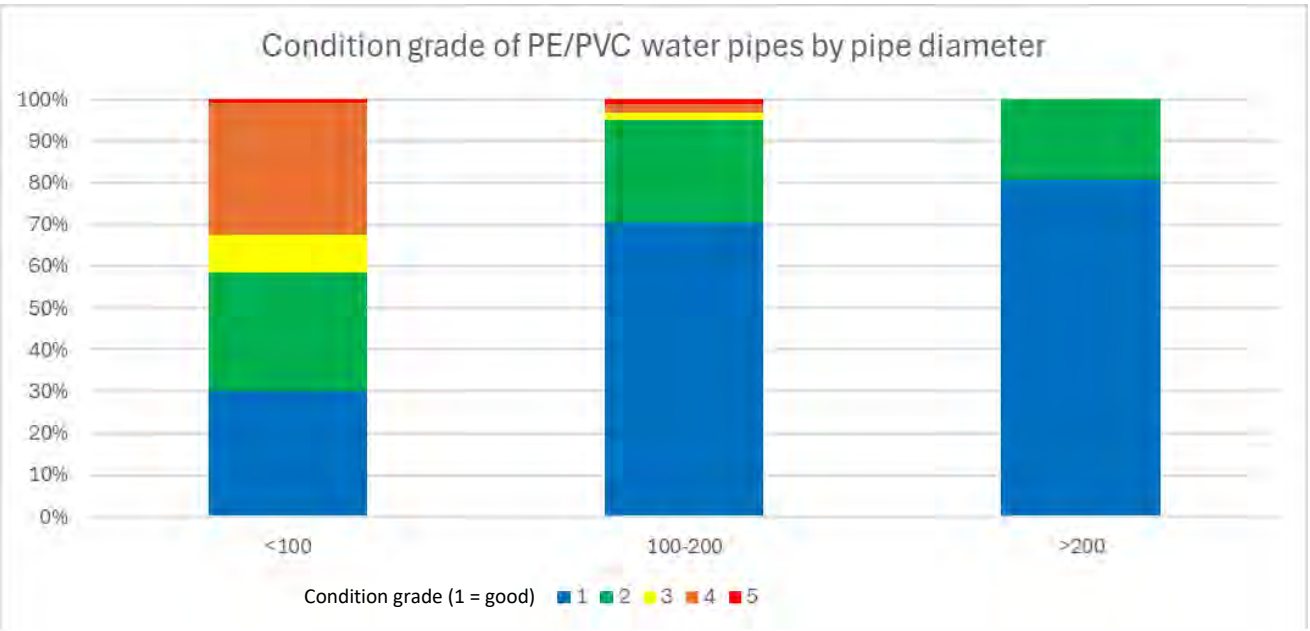
Water supply networks

Generally, the water supply network is relatively young at about 33 years.

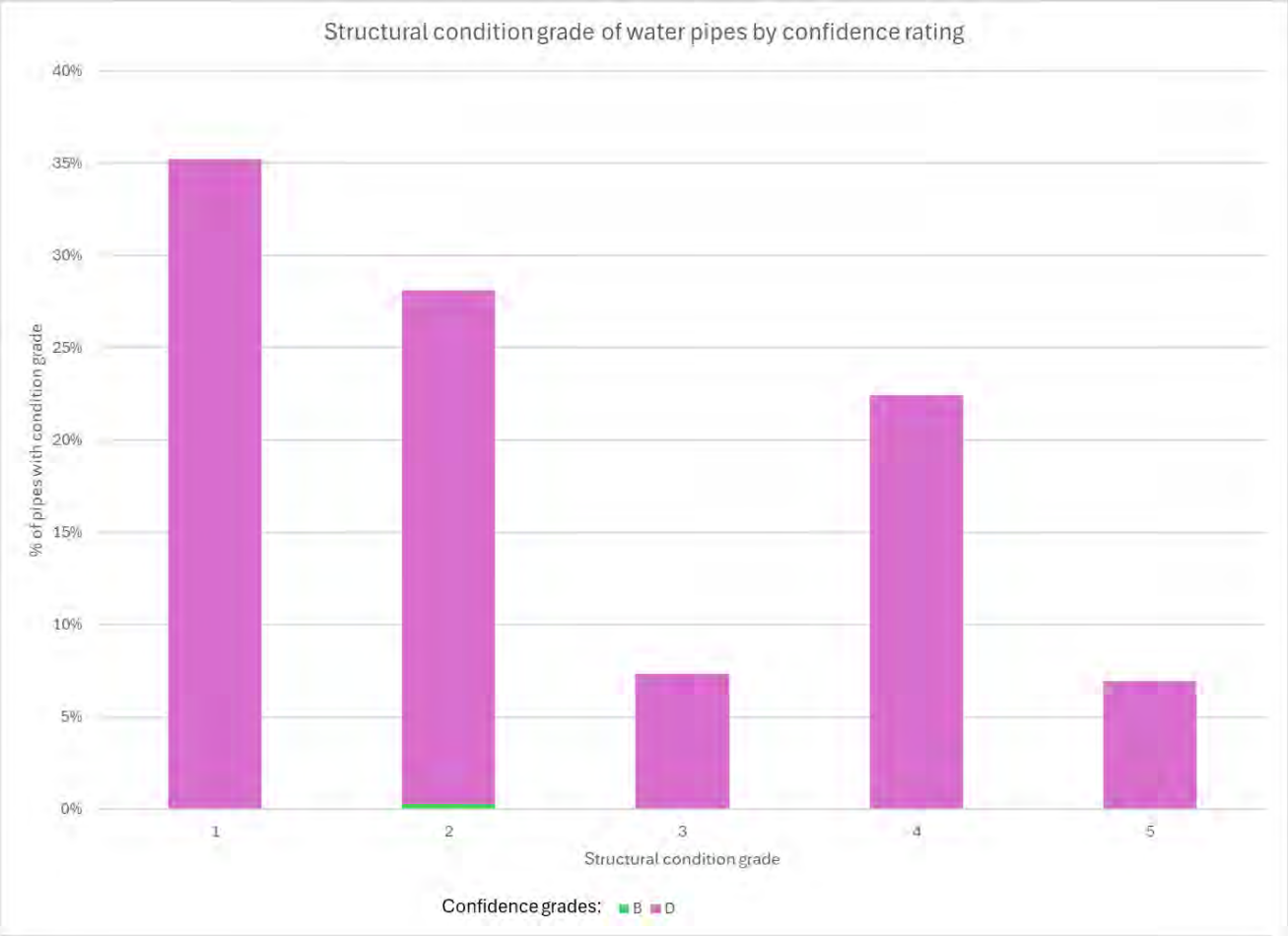
- The oldest pipes are 1880 cast iron gravity mains, and these are performing better than expected. Non-invasive P-CAT investigation by WSP Consultants was reviewed and updated by ProjectMax based on ultrasonic testing of three representative pipes and measurement of existing physical samples and comparing this against network pressures. This confirmed the good condition of the pipes, with all pipes being condition 1 or 2 rating and having remaining lives in excess of 70 years.
- AC pipe samples were tested using phenolphthalein to determine the remaining wall integrity and then assessed against measured transient pressures. Smaller diameter AC pipes were found to be in largely poor condition, while larger newer pipes are in a better condition, as shown in the figure below.



- Older generation PE and PVC pipes were assigned a shorter base life based on industry knowledge and subsequently found to be in poorer condition as shown in the figure below.



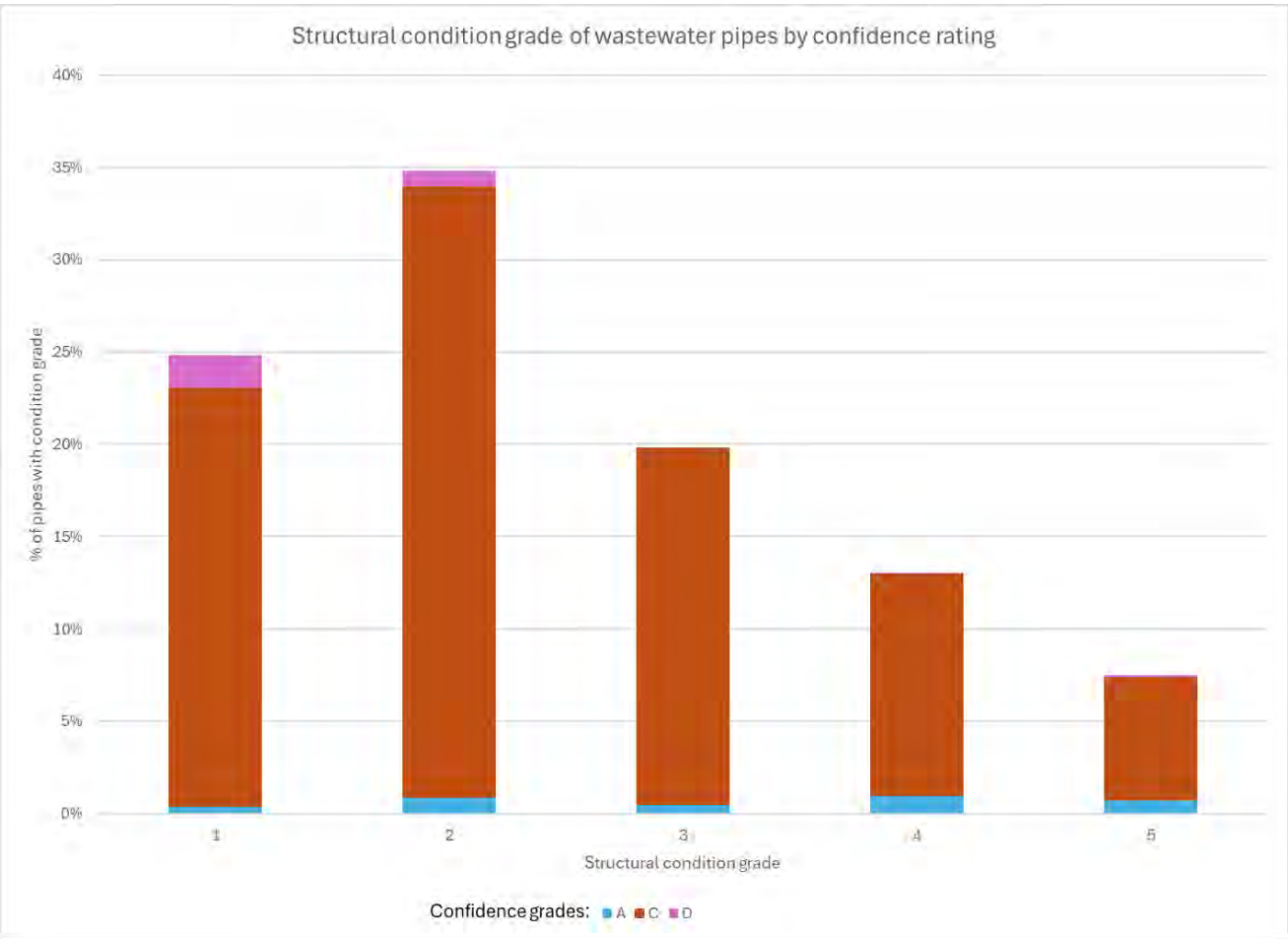
- Overall, 29% of water pipes are in a poor to very poor condition (grade 4-5). Due to the correlation between poorer condition and smaller diameter pipes discussed above, a high percentage of these have a low level of criticality. They are primarily located in rural parts of the network and therefore have less impact on customers.



Wastewater networks

Historical CCTV records, supplemented by approximately 7km of more recent surveys completed over the past five years, have informed the current understanding of the condition of the wastewater pipe networks. However, much of this information is now dated. Recent inspections indicate that a general deterioration of the network condition over the last two decades.

ProjectMax has undertaken an engineering review of 106 CCTV videos and reports taken since 2022. These have confirmed that the 1920/1930 earthenware pipes which make up a large part of central Ōamaru are in a generally poor condition, with 75% of pipes inspected being recommended for renewal. There was a reasonable correlation between the CCTV inspections and ProjectMax's modelled assessment of pipe condition, increasing the level of confidence of network condition.



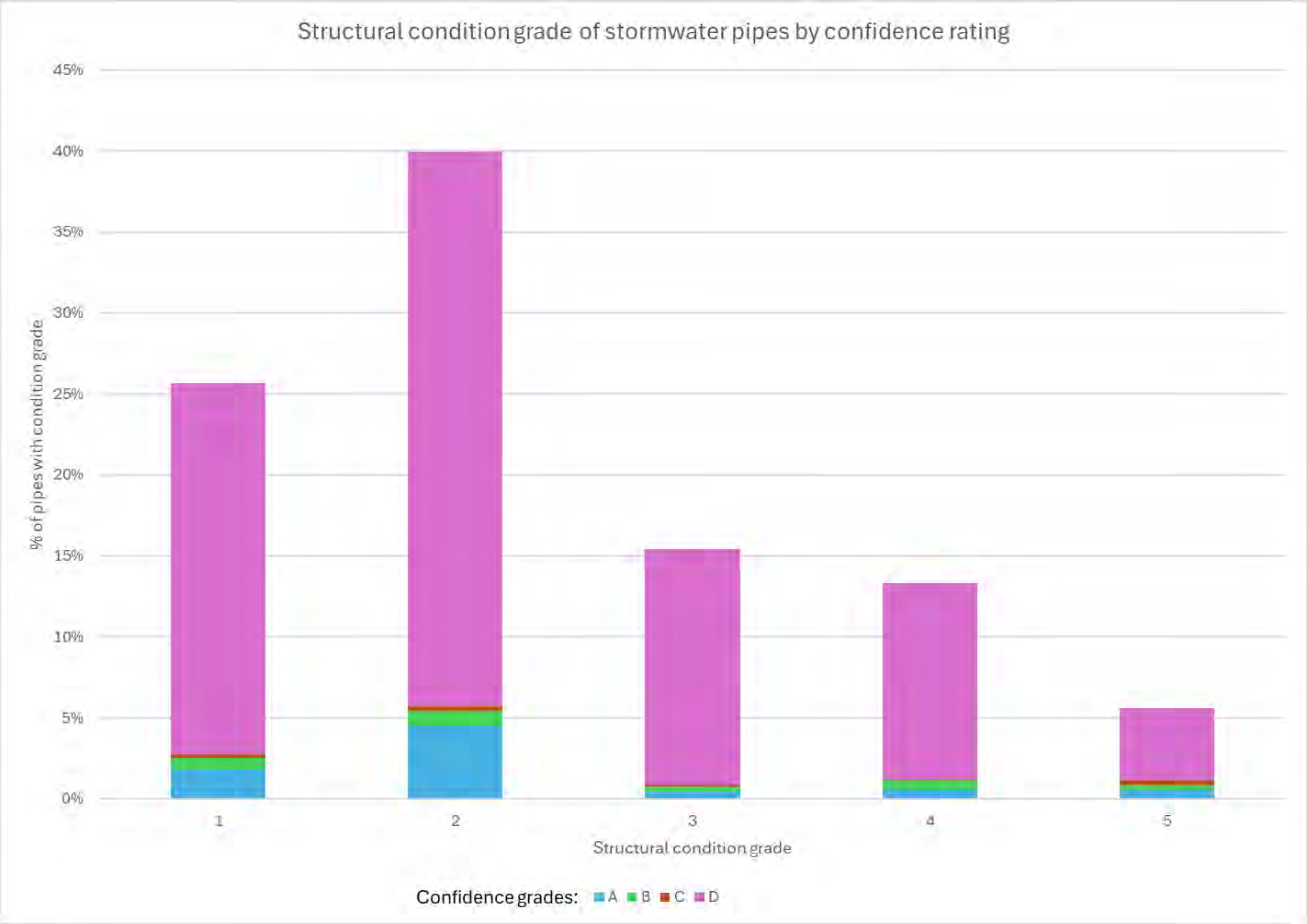
Continued CCTV inspections to enhance the understanding of network condition will enable more effective targeting of the renewals programme, ensuring that higher-cost investments are directed to the assets that are in the poorest condition and are categorised as critical. High inflow and infiltration levels are also an issue across many schemes. Budget has been allocated to support ongoing investigation work.

Some wastewater trunk mains in Ōamaru have been identified as in poor condition and also need upgrading to cater for capacity during wet weather.

Stormwater networks

The stormwater network is not considered old and, with the exception of some older limestone block culverts and concrete pipes, is some way from reaching the end of its useful life. However, the condition of the network is generally poorer than the asset age would indicate. ProjectMax undertook an engineering review of 125 CCTV videos and reports and found a poor correlation between their predictive model and the CCTV data, giving a low level of confidence as to the condition of those assets that have not been inspected.

Budgets for continued CCTV inspection to improve knowledge of stormwater asset condition and identify renewal priorities is allowed for. The renewals investment for stormwater pipes has been increased following the ProjectMax review, and investment is also budgeted for upgrades to ensure sufficient network capacity.



Condition Improvement Programmes

WDC is shifting from historical reactive management of its three waters assets to a proactive management approach. There will be greater focus on the data collected and using this to inform planned investment decisions, rather than reactive renewals. Asset condition information informs the long-term renewal investments.

Key actions for improving asset condition information are:

- Water supply:
    - Condition assessment of water infrastructure initially at $100k in 2026/27 then $200k per annum for remaining years.
    - Note that an additional $300k was allocated in 2025/26 to engage ProjectMax to improve the level of confidence in the condition grade of the piped networks (below ground assets).
- Wastewater:
    - Condition assessment of wastewater infrastructure (excluding mains) at $150k per annum (from 2027/28).
    - Sewer main inspection and cleaning programme increasing from $150k to $250k per annum.
    - Condition assessment of manholes at $0.5m in total (spread over 5 years).
    - Additional wastewater monitoring at $400k (opex).
    - District wide inflow and infiltration programme estimated at $2.35m (10 year opex total).

- Stormwater:
    - Stormwater Main Inspection and Cleaning Programme at $1.15m in total (opex).

3.2 Critical assets

Critical assets are defined as assets that have a high consequence of failure (not necessarily a high probability of failure). WDC undertook a systematic analysis of 3 waters assets in 2023-2024 using a consequence of failure framework to identify critical assets. The criticality assessment of the water assets resulted in compilation of High and Medium criticality assets for further analysis.

Criteria for considering criticality of water assets:

- Financial repair cost, pipe renewal values.
- Damage to property, proximity to adjacent property.
- Impact to transport network, roads, and railways.
- Level of loss of service, extent of connections impacts.
- Key customer impacts, e.g. schools or hospitals.

The identified critical assets and the approach taken are summarised in the table below at activity levels.

Current approach taken	Critical water supply assets	Critical wastewater assets	Critical stormwater assets
Renewal timing is based on conservative base life and actual condition assessments of assets and estimated future deterioration. Our Infrastructure Strategy states that critical assets will be replaced before the end of their design life. Formal criticality assessments were undertaken for water supply in 2024, wastewater in 2023 and stormwater in 2012.	The 2011/12 assessment is that 66% of equipment assets are highly critical. It also found that, based on replacement value, the highest proportion of critical assets is within the water facilities where water is extracted, treated, and stored. Based on the 2024 assessment, asbestos cement (AC), polyethylene (PE), and polyvinyl chloride (PVC) water mains feature across all criticality brackets. Pipes with high criticality (criticality value 5) are made of: • AC (3.8km), PE (6.9km) and cast-iron (10.2km) Pipes with a criticality value of 4) are made of: • AC (4.1km), PE (6.3 km), and cast-iron CI (7.4km) along with PVC (77.8 km) and a small amount of ductile iron (33m)	All wastewater treatment plants and some truck mains are considered critical assets. • 27% of all assets are highly critical • 78% of equipment is highly critical • 8% of mains are highly critical The Otago Lifelines Group's Vulnerability and Interdependency Study – August 2024 identifies three wastewater pump stations in Ōamaru's Orwell Street, Beach Road, and Regina Lane as the most critical for the Waitaki district.	Due to the limited and basic asset set, the stormwater assets were not included in the district wide criticality assessment. However, the review of the 2011/12 criticality assessment needs to be progressed to ensure the criticality assessment is considered in prioritising inspections, investigations, maintenance, and renewal strategies (IP 3W3). This review will consider inclusion of stormwater assets.

3.3 Renewal profiles

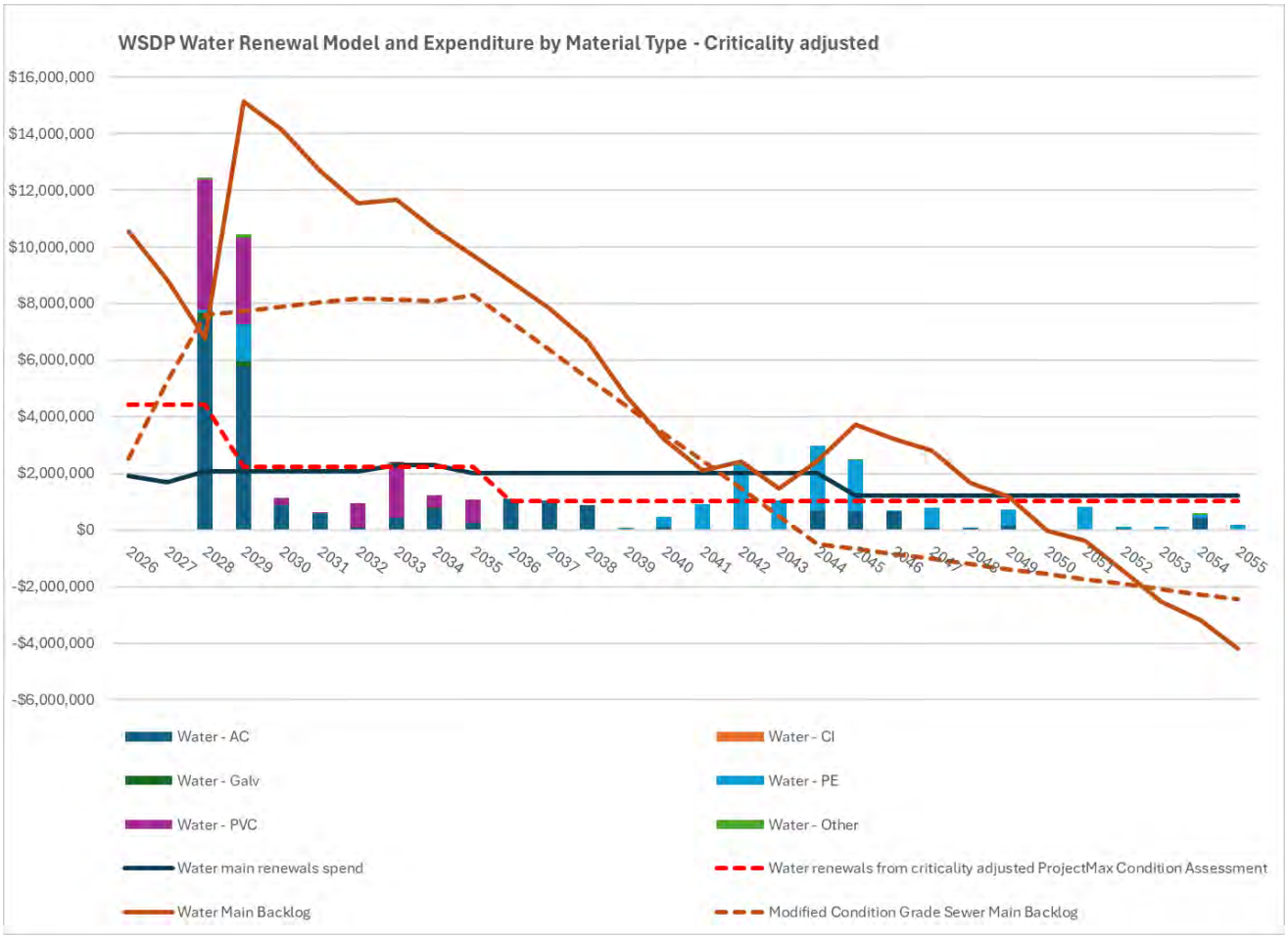
WDC has undertaken long term renewal modelling based on remaining useful life to 2055 to inform the development of the WSDP. The original profiles submitted in the first WSDP have been updated to reflect the changes to base lives and condition grade arising from the ProjectMax review.

The criticality of pipe assets has been considered by applying a modifier to the base lives of each pipe (0.8 for highly critical pipes through to 1.2 for non-critical pipes). The following table then shows how renewals have been targeted over Y1-Y3, Y4-Y10, and Y11-Y30 to prioritise pipes of poor condition AND higher criticality.

	TOTAL PIPE RENEWALS SPEND OVER 30 YEARS								Y 1-3	
		Criticality / consequence of failure							Y4-10	
	Sum of Replacement Cost	Column Labels							Y11-30	50% Y11-30
	Row Labels	1	2	3	4	5			Y31+	
Applied Structural Grade	**Sewer Main**	**35,070,110**	**11,612,745**	**31,829,917**	**23,685,924**	**21,065,854**				
	1	7,746,281	2,843,572	7,996,782	5,741,155	2,801,561				
	2	12,290,220	4,280,491	11,050,774	9,514,602	13,425,240			Total	Annual
	3	7,373,847	2,405,312	6,234,559	3,967,714	1,981,405		Y 11-30	21,334,639	1,066,732
	4	4,605,878	1,376,270	4,299,573	2,734,047	1,516,798		Y 4-10	14,009,676	2,001,382
	5	3,053,884	707,100	2,248,230	1,728,405	1,340,850		Y 1-3	9,568,330	3,189,443
	Storm Main	**6,057,272**	**8,729,629**	**12,410,427**	**10,692,173**	**5,594,874**			**44,912,646**	
	1	1,345,779	2,016,736	2,113,569	1,507,841	698,163				
	2	2,520,596	3,573,642	5,757,525	4,545,284	2,516,111			Total	Annual
	3	691,483	2,086,695	1,976,386	2,126,294	377,052		Y 11-30	7,395,113	369,756
	4	1,090,637	983,340	1,695,968	1,339,266	1,221,878		Y 4-10	4,677,308	668,187
	5	408,777	69,216	866,980	1,173,487	781,670		Y 1-3	5,383,281	1,794,427
	Water Main	**8,229,258**	**37,789,494**	**45,015,131**	**36,589,532**	**16,320,101**			**17,455,702**	
	1	1,434,755	6,071,574	15,609,205	15,489,714	5,508,181				
	2	2,281,851	17,555,934	12,284,339	12,450,305	10,251,306			Total	Annual
	3	822,720	1,407,438	3,557,368	3,420,542	286,934		Y 11-30	20,440,790	1,022,039
	4	3,636,199	6,714,131	5,795,874	2,152,436	9,016		Y 4-10	15,597,499	2,228,214
	5	53,732	6,040,417	7,768,345	3,076,534	264,664		Y 1-3	13,270,995	4,423,665
	Grand Total	**49,356,640**	**58,131,868**	**89,255,475**	**70,967,629**	**42,980,829**			**49,309,285**	

These renewal profiles will continue to be refined as better asset condition data is collected and analysed. We note that the renewals backlog in the first three years is not fully reflective of the actual back log due to accounting procedures which extend the useful life of pipes at the end of life by three years. This means that during this time period, the backlog includes:

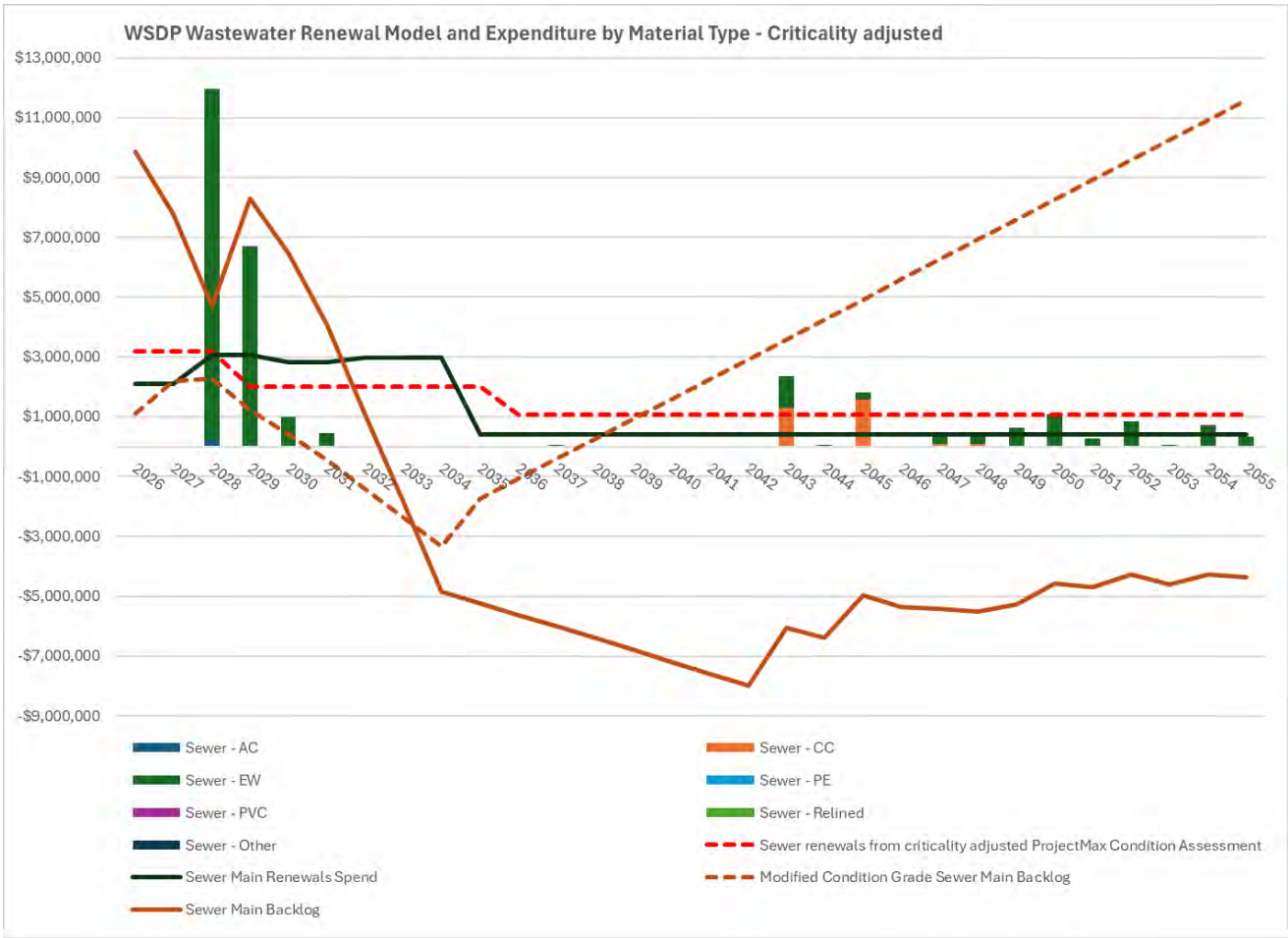
- Assets which reach the end of their designed/original useful life within the next three years; and
- Assets which have exceeded their designed/original useful life and have had their life extended for accounting purposes (to prevent their remaining useful life from being a negative value)



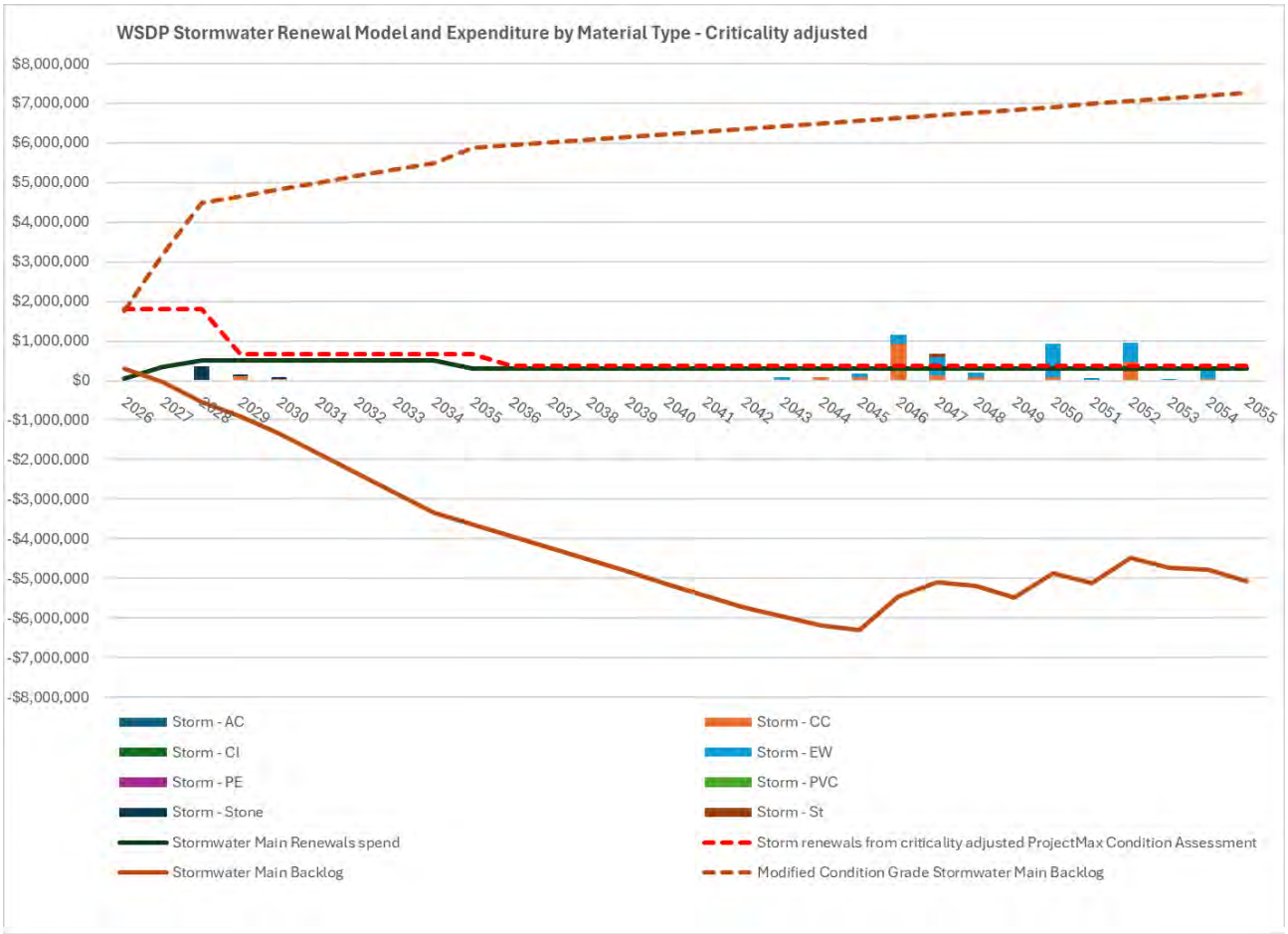
The watermain renewals expenditure is approximately $2 million per year over 20 years, then reducing to $1.2 million. Based on the renewal life (install year + base life), it will take approximately 25 years to clear the backlog.

It will take around 20 years to clear the backlog of watermains at the end of useful life, with renewals prioritising pipes with a higher consequence of failure. Much of the backlog in the first few years is in older and smaller diameter AC pipes and early generation small diameter PVC and PE pipes, all of which are disproportionately located in rural areas and are of lower criticality.

It is worth noting that the total renewals budget is slightly greater than the “prudent investment level” of $1.7 million per year recommended by Infrastructure Decision Support (IDS) in March 2024.



The wastewater main renewals models based on the base life and condition both show that the backlog will be cleared over 10 years with a total renewals budget of around $3 million per year. Beyond the first ten years, however, the models diverge, with an annual expenditure of $400k per year resulting in a growing backlog in the condition model and an over-investment in the base life model. The level of investment is appropriate but will continue to be refined as condition assessments of pipes in the grade 3 category are undertaken.



The stormwater modelling shows a divergence between the base life and condition renewals models. The level of investment over Y3-Y10 has been increased from $350k in the original WSDP to $500k and the investment from Y11-Y30 increased from $100k to $300k. There was a low correlation between the ProjectMax predictive model and the CCTV assessments, and further CCTV as part of an ongoing programme will be used to determine the actual condition of pipes and refine renewals budgets.

3.4 Capital renewal investments

The three waters renewal investments have been prioritised as *must do in* this WSDP and cover multiple asset classes including consent renewal. The resulting 10-year renewals programmes are summarised in the table below with further detail on significant capital projects in Additional Information Section. The renewals programmes are based on asset age and condition information, renewal profiles and WDC's asset managers knowledge, and smoothed over the ten year period.

Activity	Asset class	10 year renewal forecast
Water supply	Watermains – urban	$11.56m
	Watermains – rural	$5.14m
	Facilities (building related) and water supply pump stations	$1.3m
	Treatment plants	$3m
	SCADA	$1.67m

Activity	Asset class	10 year renewal forecast
	Resource consents	$295k
	Reservoirs – concrete tanks	$750k
	Ōamaru Water Strategy Phases One (Build) & Two-Three (Plan)	$4.15m
	Ōtematatā Water Main renewals	$400k
Wastewater	Ōamaru wastewater main renewals	$18.585m
	Ōamaru wastewater relocation / renewal - Orwell Street	$20.5m
	Sewer main renewals – urban, Moeraki Palmerston	$6.34m
	Facilities (building related)	$1.7m
	Treatment plants – Ōamaru	$960k
	Pump stations	$1.4m
	SCADA	$1.67m
	Resource consents	$215k
	Risk management plans	$295k
Stormwater	Stormwater mains	$3.9m
	Ōamaru stormwater structure improvements	$250k
	Otago Stormwater Management Plan & Resource Consent Application	$260k

4. Growth

Section 4 overview – This section covers:

- Serviced population and network connection forecasts at district wide level.
- Proposed growth areas in term of household numbers.
- Identification of infrastructure capacity issues including abstraction / discharge limits.
- Managing demand through metering programme.
- Identification of capital growth investments.

4.1 Serviced population

WDC currently services most of the district's population for water supply at 86%, 66% for wastewater and 69% for stormwater. These percentages are expected to remain fairly consistent over the coming decade. The table below provides the 10 year serviced population forecast at activity level.

Projected serviced population	FY2024/25	FY2025/26	FY2026/27	FY2027/28	FY2028/29	FY2029/30	FY2030/31	FY2031/32	FY2032/33	FY2033/34
Total population[1]	24,934	25,246	25,554	25,855	26,148	26,432	26,706	26,969	27,220	27,458
Total serviced population [2]:										
Water supply	21,351	21,618	21,882	22,140	22,391	22,634	22,868	23,094	23,309	23,512
Wastewater	16,430	16,636	16,839	17,037	17,230	17,417	17,598	17,771	17,936	18,093
Stormwater	17,155	17,370	17,581	17,789	17,990	18,186	18,374	18,555	18,728	18,891
Total Household units[1]	10,618	10,767	10,909	11,043	11,171	11,290	11,401	11,508	11,610	11,706

The 10 year network connections forecast at district wide level is detailed in the table below.

Projected network connections	FY2024/25	FY2025/26	FY2026/27	FY2027/28	FY2028/29	FY2029/30	FY2030/31	FY2031/32	FY2032/33	FY2033/34
Total network residential connections[2]:										
Water supply	9,749	9,871	9,991	10,109	10,224	10,335	10,442	10,545	10,643	10,736
Wastewater	7,688	7,784	7,879	7,972	8,062	8,150	8,234	8,315	8,393	8,466
Stormwater	7,918	8,017	8,115	8,210	8,304	8,394	8,481	8,564	8,644	8,720
Total network non-residential connections[2]										
Water supply	2,226	2,254	2,281	2,308	2,334	2,360	2,384	2,408	2,430	2,451
Wastewater	659	667	675	683	691	699	706	713	719	726
Stormwater	1,449	1,467	1,485	1,503	1,520	1,536	1,552	1,567	1,582	1,596

[1] Data taken from 2025 WDC 3 Waters AMP.

[2] Data taken from WDC Network Environmental Performance Reporting for 2023-2024.

Stormwater data is based on rated properties recorded in WDC's financial system

4.2 Proposed growth areas

The total number of household units in Waitaki District is estimated to increase by:

- 10.2% between 2024/25 and 2034 (1,242 household units).
- 24.5% by 2054 (2,567 household units).

These estimates are based on high growth-rate forecasts prepared for WDC by Infometrics in 2024.

4.3 Infrastructure capacity constraints

Infrastructure capacity constraints have been identified with this plan. Any upgrades consider interrelated factors including population growth, asset renewals, resilience, and compliance requirements. Major infrastructure capacity upgrades in this plan are summarised in the table below.

Activity	Capacity upgrade project	Challenge	Management response
Water supply	Ōamaru Water Strategy Source Resilience	Ōamaru water supply will come under pressure from increasing demand, climate change, changes in land use, and changes to consenting for the Waitaki River water take.	Phase One implements the short term process improvement. Phase Two of the strategy is focused on raw water capacity. Phase Three will explore additional treatment plant capacity and hinterland supply.
	Lower Waitaki Capacity Upgrade	The water has known nitrate contamination at moderately elevated, but compliant levels. The current groundwater bores, pumps, and infrastructure capacity are insufficient to meet the vastly increased 2070-year forecast demand and additional water is required.	It is proposed to connect to the Ōamaru supply to reduce nitrate levels and provide capacity.
Wastewater	Overflow mitigation at Ōamaru and Palmerston (studies and works)	Ōamaru's wastewater network is, at certain times, not able to accommodate current wastewater flows, particularly during heavy rainfall events. There are multiple locations where wastewater overflows are known to occur across the network.	It is necessary to improve the capacity of the Ōamaru wastewater network to meet current volume in addition to accommodating future volume contributions. Works required to support overflow mitigation across the wastewater system. Design and construction of confirmed solution for Palmerston such as overflow storage, larger pumps and / or duplication of rising main.

Activity	Capacity upgrade project	Challenge	Management response
	Ōamaru network upgrades, rising main duplication and additional pump station	Works to reduce the risks of overflows to prevent environmental contamination and protect public health.	Major network capacity includes relocating the Orwell Street Pump Station (a critical assets for the Ōamaru wastewater network), upgrading the Beach Road Pump Station (catchment area), the Ōamaru Creek Syphon upgrade, and duplicating the Ōamaru trunk rising main.

4.4 Managing demand

The key programmes to manage demand are summarised in the table below.

Activity	Programme	Challenge	Management response
Water supply	Universal water metering	Universal water metering reduces high water consumption and helps detect private water leakage that otherwise goes undetected. It promotes efficient water usage by customers and defers costly future investment in capacity upgrades. Nationally, water metering has delayed major infrastructure projects saving millions for ratepayers. Recent successful metering cases include Tauranga City Council and New Plymouth District Council. WDC currently only meters commercial and industrial users and domestic properties with high water use. Water demand was high by industry standards including: • Water consumption at 532 litres per person per day for 2023/24. • High water losses ranging from 31% to 49%. • Multiple water restrictions in the summer period to keep within the water take consent limits. (Refer to Section 5.1 on drinking water quality parameters for meeting regulatory standards on number of water restrictions).	A proactive metering programme is proposed in the capital programme estimated at $12million over three years (categorised as LOS project). The water meters will help to reduce the high-water leakage and customer water consumption.

Activity	Programme	Challenge	Management response
Wastewater	Inflow and infiltration	This is the term used to describe groundwater and stormwater entering into the dedicated wastewater system resulting in the system becoming overloaded and overflows occurring. Inflow is believed to be the most significant contributor to increased flows within the wastewater collection system in Ōamaru. High Inflow and infiltration also impacts wastewater treatment plant capacity.	A district wide inflow and infiltration programme proposed is estimated at $2.35m (10 year opex total). This will ensure the collection systems are maintained to operate at optimum capacity.
	Trade waste	Trade waste is commercial and industrial liquid waste discharged into our wastewater network for treatment. Compared to residential wastewater, trade waste has more associated risks. Trade waste customers contribute around half of all organic load to the Ōamaru WWTP and projected to contribute closer to two thirds by 2070. Opportunities to address trade waste load may yield significant value in improving current WWTP performance but would not be sufficient to address forecast future load on their own. The list of potential customers and water demand patterns provides evidence that there is significant scope to expand the list of trade waste customers. This will ensure a fair allocation of collection, treatment, disposal, and monitoring costs.	A proactive trade waste programme is estimated at $3.2m (ten year total starting in 2026/27). It will address: • Existing treatment capacity constraints. • Identify new trade waste customer so they are paying their fair allocation.

4.5 Growth investment

Water supply and wastewater network extension capital projects have been categorised as *should do* as part of the prioritisation process and consequently been included in this WSDP. Network extensions are required to support growth in a revised district plan in areas not currently connected. This has been estimated at $3 million in total for water supply and wastewater ($1.5 million each). However, there are capital projects that have service level as the primary driver that also include a portion of growth, particularly upgrades. For example, pipe renewals will allow for future design volumes rather than simply replacing like-for-like.

5. Levels of service

Section 5 overview – This section covers:

- Water supply, wastewater, and stormwater performance results for 2023/24.
- Disclosure of the drinking water parameters (based on DIA template table).
- Specific commentary on drinking water compliance, water leakage, and firefighting.
- Identification of capital levels of service (LOS) investments.

5.1 Water LOS

Water service level achievement

The achievement against the water supply performance measures for 2023/24 are shown in the table below.

Level of service statement	Performance measure	2023/24 Target	2023/24 Results
Safety of drinking water	Full compliance with Drinking Water Quality Assurance Rules (2022) for: bacteria and protozoa compliance		
	• bacteria compliance	Achieved for all supplies	Not Achieved
	• protozoa compliance	Achieved for all supplies	Not Achieved
Maintenance of the reticulation network	The percentage of real water loss from WDC's networked reticulation system	Maintain or reduce	Not Achieved Kurow: 49% Ōamaru: 42% Ōmārama: 31% Ōtematatā: 39% Palmerston: 33%)
Fault responses times	Where WDC attends a call-out in response to a fault or unplanned interruption to its networked reticulation system, the following median response times are measured:		
	Attendance for urgent call-outs:	≤1 hr	0.6
	Resolution of urgent call-outs:	≤24 hrs	2.4
	Attendance for non-urgent call-outs:	≤2 days	0.5
	Resolution of non- urgent call-outs:	≤5 days	0.8
Customer satisfaction	The total number of complaints received about (per 1,000 connections): - drinking water clarity - drinking water taste - drinking water odour - drinking water pressure or flow - continuity of supply and WDC's response to any of these issues	<25/1,000 connections	17
Demand management	The average consumption of drinking water per day per resident within Waitaki district	<500 litres per person per day	532

Commentary on specific areas

WDC did not achieve drinking water compliance, water loss, and water consumption measures in 2023/24, with specific commentary as follows:

Drinking water compliance – WDC did not fully achieve drinking water compliance for 2023/24. The key points are:

- Only three of WDC's 15 water supplies were compliant with the Drinking Water Quality Assurance Rules at the end of quarter 2, 2024/25. This is primarily due to the discontinuation of "secure bore water" treatment exemption. Treatment upgrades are currently being progressed at six sites which previously had permanent boil water notices in place. The upgrades were previously put on-hold until the release of the revised Acceptable Solutions for Mixed-Use Rural supplies. The Waihemo water supply has periodically been under "conserve water' notices during times of poor raw water quality or during summer months.
- Four sites that have already been upgraded are non-compliant due to not meeting minimum UV requirements or having no filtration to address source water quality variations.
- The Ōamaru Water Treatment Plant currently experiences significantly reduced membrane lives. Investigations are underway to identify options for improved performance.
- All sites have Drinking Water Safety Plans and Source Water Risk Management Plans. Due to resourcing constraints, implementation of improvement items has been difficult, and many remain outstanding.
- Waitaki has only been required to fluoridate the Ōamaru Water Supply. The treatment is now in place and meeting requirements. It is expected that other larger supplies such as Palmerston will require fluoridation in the future.

Water leakage – WDC's water loss is much greater than acceptable industry levels as shown in the LOS table above particularly for Kurow and Ōamaru at over 40%. WDC has historically allowed high leakage rates as it was more costly to repair pipes than source, treat, and pump water. This was in an effort to maintain affordability.

WDC is shifting its water demand management approach from its historic focus on fixing leaks reactively to a proactive management approach. This shift will require time and in-house capability to undertake the analysis.

Water supply parameters

Disclosure of the drinking water parameters (based on DIA template table) is shown in the table below. The adequacy of the water supply networks to cater for firefighting capability has historically been tested periodically by Fire and Emergency New Zealand for the urban townships. Firefighting capacity will be designed with any network upgrades scheduled in the capital programme.

Parameter	Water supply scheme / achievement
Drinking water supply quality:	
Bacterial compliance (E.coli)	No
Protozoa compliance	No
Chemical compliance	No
Boiling water notices in place	8 in 2023/24 – Ohau, Bushy Creek, Awahokomo, Stoneburn, Lakes Camping Sites, Ōtematatā, Kurow, Omarama supplies
	6 in 2022/23 - Ohau, Bushy Creek, Lakes Camping Sites, Waihemo, Lower Waitaki
Fluoridation	Yes (Ōamaru only)
Average consumption of drinking water	532 l/person/day (2023/24)
Water restrictions in place (last 3 years)	Yes – 14 in 2023/24 – Ōamaru, Kurow, Palmerston, Lower Waitaki, Windsor and Maheno
	8 in 2022/23 – Windsor, Waihemo, Awamoko and Lower Waitaki
Firefighting sufficient	Not measured

Water supply LOS Improvement Programme

Key actions for improving water LOS including drinking water compliance, leakage and firefighting are:

- Drinking water compliance:
  - Undertake various capital upgrade works by 2026/27 to ensure compliance with Drinking Water Standards.
  - This includes UV upgrades at four sites and installing filters at Ōtematatā.
- Water leakage:
  - Continue with the leak detection programmes to identify water leaks proactively.
  - Bring forward the water metering programme. This will provide valuable data to identify high leakage areas and to also prepare the water loss calculation more accurately. It will identify private leaks that currently go undetected.
  - Continue replacing poor performing watermains based on analysis of failure data to ensure unplanned interruptions are minimised for our customers.
- Firefighting – Identify firefighting capacity requirements with any network upgrades scheduled in the capital programme.

5.2 Wastewater LOS

WDC achieved the wastewater performance measures in 2023/24 except for environmental compliance. One infringement notice for breach of an abatement notice issued in August 2023, relating to the Palmerston WWTP. There were also abatement notices for Ōamaru WWTP, but this was not captured in the 2023/24 Annual Report. Refer to Section 6 for detail on compliance.

Level of service statement	Performance measure	2023/24 Target	2023/24 Results
Systems and adequacy	The number of dry weather wastewater overflows from WDC's wastewater system, expressed per 1,000 sewerage connections to that wastewater system	<4/1,000 connections	2.2
Discharge compliance	Compliance with WDC's resource consents for discharge from its wastewater system. Measured by the number of: - abatement notices - infringement notices - enforcement orders - convictions received by WDC in relation those resource consents	0	1 (Palmerston WWTP)
Fault response times	Median response time for attendance from the time that WDC receives notification of a fault or blockage to the time that service personnel reach the site	<1 hr	0.9
	Median response time for a resolution from the time WDC receives notification to the time that service personnel confirm resolution of the blockage or other fault	<24 hrs	3.3
Customer satisfaction	The total number of complaints received about (per 1,000 connections): - wastewater odour - wastewater system faults - wastewater system blockages WDC's response to issues with its wastewater system	<12/ 1,000 connections	9

5.3 Stormwater LOS

WDC achieved all stormwater performance measures in 2023/24.

Level of service statement	Performance measure	2023/24 Target	2023/24 Results
System adequacy	The number of flooding events that occur in the Waitaki District	0	0
	For each flooding event, the number of habitable floors affected (Expressed per 1,000 properties connected to the territorial authority's stormwater system)	0/1,000 connections	0
	Compliance with WDC's resource consents for discharge from its stormwater system. Measured by the number of: - abatement notices - infringement notices - enforcement orders - convictions received by WDC in relation those resource consents	0	0
	The median response time to attend a flooding event, measured from the time that WDC receives notification to the time that service personnel reach the site	≤2 hrs	0
	The number of complaints received by WDC about the performance of its stormwater system (per 1,000 connections to WDC's stormwater system)	<8/1,000 connections	6

5.4 Capital LOS investment

The three waters LOS investments have been prioritised as *must do or should do in* this WSDP and cover drinking water compliance, leakage, metering, and meeting consent requirements. The wastewater LOS are mainly driven by meeting consent requirements and reducing impacts on the environment i.e. overflow mitigation.

The resulting 10-year LOS programmes are summarised in the table below with further detail on significant capital projects in Additional Information Section. The commentary on the consent driven projects is detailed in Section 6.

Activity	Investment driver / sub programmes	10-year LOS forecast
Water supply	Awamoko Drinking Water Supply Upgrade	$1.5m
	Tokarahi Drinking Water Supply Upgrade	$2.1m
	Kurow Water Supply Compliance & Resilience Improvements	$1.5m
	Supply upgrades other sites	$5.7m
	Ōamaru Water Strategy Source Resilience (Build)	$19m
	Lower Waitaki Capacity Upgrade	$2.67m
	Ardgowan Dam Upgrades	$1m
	Watermain upgrades – district wide, Ōamaru North End Falling and Waihemo Urban & Rural Watermain Upgrades	$12.9m
	District wide water resilience reservoirs	$5m
	Backflow Prevention Plan	$1.85m
	Universal water metering	$12m
Wastewater	Overflow mitigation at Ōamaru and Waitaki Valley	$2.7m
	Beach road catchment upgrade	$3m
	Ōamaru network upgrades, rising main duplication and additional pump station	$21m
	Treatment plant upgrades to meet consent requirements	$8.63m
	Trade waste district wide	$3.2m
Stormwater	Ōamaru stormwater upgrades	$10m
	Stormwater main inspection and cleaning	$1.15m
	Palmerston stormwater upgrade	$150k

6. Regulatory Standards

Section 6 overview – This section covers:

- Disclosure of the consent compliance parameters (based on DIA template table).
- Status of current consents and expiry dates.
- Commentary on consent non-compliance.
- Summary of consent applications underway.

Drinking water compliance with quality standards is detailed in Section 5.

6.1 Consent compliance disclosure

Disclosure of the resource consent compliance with resource management parameters stated in the DIA template is shown in the table below.

Resource Management Parameters	Drinking supply schemes	Wastewater schemes	Stormwater Schemes/catchments
Significant consents (note if consent is expired and operating on S124	Water supply take 14 Water discharge 0	Wastewater discharge water/land/air 13 Network 0	Stormwater discharge 1 Network 0
Expire in the next 10 years	6	5	0
Non-compliance:			
Significant risk non-compliance	2 – for Palmerston Water Take – abatement notice; Waihemo water take – abatement notice	3 – for Palmerston WWTP – infringement notice; Ōamaru WWTP abatement notices	0
Moderate risk non-compliance	0	9	0
Low risk non-compliance	0	20	0
Active resource consent applications	0	5	0
Compliance actions (last 24 months):			
Warning	0	0	0
Abatement notice	1	3	0
Infringement notice	0	2	0
Enforcement order	0	0	0
Convictions	0	0	0

6.2 Current consents and expiry dates

WDC holds a number of water take and wastewater discharge permits for its drinking-water and wastewater treatment facilities. Due to Waitaki covering both Canterbury and Otago Regions, these have been issued, and are monitored by, both ECan and ORC. The status of current resource consents is detailed in Appendix 1.

Two consents are due to expire next year for the Duntroon wastewater treatment system. A new short-term consent has been obtained through to 2035. WDC is currently working though measures to ensure compliance with consent conditions, including a new downstream monitoring bore and effluent bio filter. A concept design and programme for upgrading the waste treatment system and dispersal field will be prepared in 26-27.

6.3 Consent non-compliances

WDC received the following significant non-compliance in 2023/24 and summarised in the template table above:

- Palmerston Water Take – An abatement notice was issued for breaching consent limits during the 2023/24 summer. It is still active, but WDC will be applying to cancel it soon, as it was not breached this past summer.
- Palmerston Wastewater Treatment Plant – Abatement Notice was issued in October 2021. Infringement Notices were issued in March 2023 and September 2024. The original abatement has now been replaced and has a compliance date of 25 October 2025.
- Ōamaru Wastewater Treatment Plant – Abatement Notices (two in total) were issued on 30 June 2022 and are still active. The compliance date has been extended to 1 October 2025.

A number of sites are currently not meeting consent requirements for the following reasons:

- Ōamaru and Palmerston Wastewater Treatment Plants:
    - Ongoing significant non-compliances have occurred at Waitaki's largest wastewater treatment facilities, Ōamaru and Palmerston Wastewater Treatment Plants. This has resulted in abatement notices for both sites and infringement notices for Palmerston.
    - While effluent quality has significantly improved following numerous small-moderate upgrades, some parameters are still non-compliant. Funding is in place for aeration and chemical dosing upgrades at Ōamaru, and ongoing operational improvements are underway at Palmerston to address faecal coliform levels.
    - However, additional UV treatment may still be required at Palmerston WWTP.
- Palmerston water take:
    - An abatement notice was also received for the Palmerston water take due to breaching the weekly volume limit in the late summer months of 2024.
    - Restrictions were put in place over the 2024/25 summer period and no further breaches occurred. WDC will be applying to have the abatement notice lifted. It is expected that restrictions will be required every summer to maintain consent compliance.

6.4 Consent applications

Thirteen other consent applications are currently being prepared which are all for wastewater. These range from new consents (ECan identified that four of WDC's wastewater facilities do not have land use and discharge to air consents and some do not have consents for pond seepage) to consent variations (change to condition parameters to bring the sites back into compliance).

WDC is in the process of preparing applications to apply for:

- Palmerston Wastewater Treatment Plant – standalone trade waste consent.
- Lake Ohau Wastewater Treatment Plant – land use, discharge to air and seepage consents.
- Omarama Wastewater Treatment Plant – land use and discharge to air consents.
- Ōtematatā Wastewater Treatment Plant – land use and discharge to air consents.
- Kurow Wastewater Treatment Plant - land use, discharge to air and seepage consents.

6.5 Other consent considerations

Water quality monitoring bores are also required at the Kurow and Ōhau Wastewater Treatment plant disposal fields to assess potential impacts on groundwater quality.

The management of trade waste discharges and septage receival requires an overhaul to strengthen chain of custody systems and processes, and to enable more equitable allocation of costs to dischargers. While there are a variety of trade waste customers across the district, BX Foods Redcastle Road abattoir accounts for most of the trade waste discharged to Waitaki's wastewater treatment plants. It represents approximately 25% of total inflows to the Ōamaru Wastewater Treatment Plant.

Going forward, it is likely that significant treatment upgrades will be needed for many wastewater facilities as consents expire and new ones are applied for. A lot of the smaller sites rely on oxidation pond treatment. Mechanical treatment may be needed to meet future consent limits at sites such as the Ōamaru Wastewater Treatment Plant.

For drinking-water, more demand management will be required such as universal metering, leak detection, and renewals to ensure volumes remain within consent limits (refer to Section 4.4 Managing Demand). While the Kurow water supply scheme and commercial customers are currently metered and charged for water use volumetrically, the balance of the water connections is not.

The water take consent for the Lower Waitaki Irrigation Company (LWIC) scheme, which supplies Ōamaru with raw water, is currently undergoing renewal. Additional investment in the scheme is expected to be required as part of this process. WDC has made provision to cover its potential share of any upgrade costs associated with the scheme. Additional investment may also be required for raw water storage ponds. However, this is subject to the outcome of the reconsenting process. This process and exact arrangements are still evolving.

7. Capital investment summary

Section 7 overview – This section covers:

- Provides linkages to other Part B sections that describe the infrastructure issues and management responses to these.
- Outlines the prioritisation process to identify a financially sustainable capital programme.
- Identifies the key capital investment strategies.
- Presents the ten-year capital forecast for water supply, wastewater, and stormwater activities by investment driver.

7.1 Capital investment overview

WDC reviewed its 10-year capital programme following its previous decision not to join Southern Water CCO and continue with in-house service delivery model. The 2025 LTP assumed that the three waters assets will likely transfer at the beginning of year 3 and significantly reduced the proposed programme with balancing against district affordability issues. The updated capita programme has now been included in the financial and capital investment information included in this plan.

WDC's projected 10-year capital investment forecast is summarised in the table below in Section 7.4. WDC's planned capital investment during this period is to address the identified network performance issues described in Sections 1 to 6 in Part B of this plan. This includes aging and poor condition assets, reducing water leakage, meeting levels of service, meeting drinking water and resource consent compliance and strengthening infrastructure resilience.

WDC is shifting from historical reactive management of its 3 water assets to a proactive management approach. There will be greater focus on the data collected and using this to inform planned investment decisions. For example, asset condition information informs the development of the long term renewal investments.

WDC recognises the **importance of upfront planning** to make cost-effective investment decisions i.e. **spend to save.** WDC is improving its integrated AM planning, including through the establishment of a standalone asset management team. Additionally, a suitable allowance for investigations and monitoring programmes such as leak detection and condition assessments has been included in budgets. This will provide evidence to inform effective capital investment programmes.

7.2 Prioritisation process

A robust capital prioritisation process has been undertaken to identify the optimal investment scenario that address the various infrastructure issues that are affordable for Waitaki's community and meets the financial sustainability requirements for the WSDP to be acceptable to DIA.

The three investment options tested were:

1. Option 1 – base case level of investment (current 2025 LTP as a basis).
2. Option 2 – minimum level of investment that includes necessary compliance related costs but excludes growth related network extensions.
3. Option 3 – required investment scenario that includes some additional compliance, best practice, and growth-related costs.

Option 3 was adopted for this plan. Refer to Parts D and E for further details.

Additional capex and further programme refinement was completed following the condition assessment work completed by ProjectMax.

7.3 Key capital investment strategies

This plan signals WDC lift in capital investment as part of its shift from reactive to proactive management of its three waters assets. The key capital investment strategies include:

- Water supply investment strategies to address:
  - Awamoko and Tokarahi Drinking Water Supply Upgrades at $3.6m.
  - Reducing high water loss with universal water metering at $12 million, urban, and rural watermain renewals at $16.7m and continuing with leak detection (opex).
  - Ōamaru Water Strategy Source Resilience (Build) at $19m.
  - Watermain upgrades to provide firefighting capacity and strengthening resilience at $12.9m.
- Wastewater investment strategies to address:
  - Ōamaru wastewater main renewals at $18.585m.
  - Sewer main renewals at $6.34 million to ensure service continuity.
  - Ōamaru wastewater relocation / renewal - Orwell Street at $20.5m to ensure service continuity and protect the environment.
  - Ōamaru network upgrades, rising main duplication and additional pump station at $21 million to protect the environment.
  - Treatment plant upgrades to meet consent requirements at $8.6m.
- Stormwater investment strategies to address:
  - Ōamaru stormwater upgrades to provide network capacity and improve flood protection at $10m.

7.4 Capital 10 year forecast

Projected investment in water services ($000s)	FY2024/25	FY2025/26	FY2026/27	FY2027/28	FY2028/29	FY2029/30	FY2030/31	FY2031/32	FY2032/33	FY2033/34
Drinking Water										
Capital expenditure - to meet additional demand	-	-	-	-	305	318	329	339	347	355
Capital expenditure - to improve levels of services	7,005	9,110	8,495	14,244	11,993	7,954	6,908	7,341	7,517	5,845
Capital expenditure - to replace existing assets	6,800	3,660	1,901	8,080	3,682	3,080	3,099	3,260	4,566	3,535
Total projected investment for drinking water	**13,805**	**12,770**	**10,397**	**22,324**	**15,980**	**11,351**	**10,336**	**10,940**	**12,430**	**9,735**
Wastewater										
Capital expenditure - to meet additional demand	-	-	-	-	305	318	329	339	347	355
Capital expenditure - to improve levels of services	1,407	1,420	2,118	3,917	2,015	1,336	5,790	4,608	15,821	14,765
Capital expenditure - to replace existing assets	915	2,165	5,171	4,834	5,618	4,569	4,790	5,282	16,415	18,677
Total projected investment for wastewater	**2,322**	**3,585**	**7,289**	**8,751**	**7,938**	**6,223**	**10,908**	**10,229**	**32,584**	**33,797**
Stormwater										
Capital expenditure - to meet additional demand	-	-	-		-	-	-	-	-	-
Capital expenditure - to improve levels of services	-	-	167	234	244	2,736	2,829	2,914	2,984	3,052
Capital expenditure - to replace existing assets	-	50	389	1,027	611	802	658	678	694	710
Total projected investment for stormwater	**-**	**50**	**556**	**1,261**	**855**	**3,538**	**3,487**	**3,592**	**3,678**	**3,762**
Total projected investment in water services	**16,128**	**16,405**	**18,242**	**32,336**	**24,774**	**21,112**	**24,731**	**24,760**	**48,692**	**47,295**

Part C: Revenue and financing arrangements

Revenue and charging arrangements

Charging and billing arrangements

The following arrangements currently apply to charges for water, wastewater, and stormwater:

- Development contributions, based on WDC's development contributions policy, are charged on new growth to recover the costs of growth investment
- Water:
    - A fixed targeted rate is charged for connected (or serviceable 50% charge) rating units, which differs by scheme.
    - A unit charge is levied on connections to rural water schemes, depending on the scheme. Units represent daily water entitlements, and some connections will purchase multiple units.
    - High water users in Ōamaru, Waihemo, Kurow, Lake Ōhau, Ōmārama and Ōtematatā pay a volumetric water charge per cubic metre of water use.
- Wastewater:
    - Fixed targeted rates are charged for sewerage based on the number of pans that are connected. Residential properties are considered to have only one pan.
- Stormwater rates are part of the roading targeted rate. This is a capital value-based rate.

Following the transfer of its three waters services to Southern Waters on 1 July 2027, charging and billing arrangements will be determined by Southern Waters. Decisions regarding the future tariff structure for Southern Waters have not yet been made and will be part of Southern Waters establishment and transition work programme.

Southern Waters will continue to set charges at a local level, including different charges at a scheme level on transition date. Decisions about the approach, minimum, or maximum, time period that will apply to local charging are yet to be formalized and will be decided through the development of the shareholders agreement, transfer agreement, and constitution of Southern Waters.

The ability to set prices and charges will be fully transferred to Southern Waters on the transfer date, and the establishment of Southern Waters will ensure financial separation of revenues and expenses.

Water services revenue requirements and sources

Current revenue requirements for the years covered by this plan are outlined in Parts D and E of this plan.

Revenue is expected to be primarily derived through targeted rates on properties to maintain ringfencing. Additional revenue is assumed to be received from fees and charges (mainly connection fees), and development contributions. Following the transition to Southern Waters, it is expected that targeted rates will be replaced with water charges.

Development contribution revenue is currently assumed to be in line with projections in WDC's 2025- 2034 LTP and existing development contributions policy. It is expected that Southern Waters will undertake a review of its Development Contributions policy following its establishment.

It is anticipated that Southern Waters will also consider alternative tools to fund investment in growth infrastructure, including development levies and targeted rates, when these tools are introduced.

Existing and projected commercial and industrial users' charges

Details on projected charges for three waters are presented in Part D of this document. That shows an increase in three waters charges of 124% from $1,295 (2024/25) to $2,897 (2033/34). No analysis has been completed for the impact of price increases on commercial customers as commercial customers typically pay a volumetric charge based on their water usage, meaning charges vary significantly within this consumer group.

Billing arrangements for commercial and industrial users are outlined in the "charging and billing arrangements section" above. Based on assessment of the rates database, the following proportions of current rates funding are derived from residential consumers, with the remainder from commercial and industrial users:

- Water is 63% residential
- Wastewater is 75% residential
- Stormwater is 72% residential.

The introduction of volumetric charging is likely to alter the proportions of revenue derived from different customer sectors. However, the financial modelling included within this report includes no change in the proportion of revenue assumed to come from different customer segments.

The affordability of projected water services charges for communities

Affordability of water charges is a key concern for WDC. Based on 2023 census data, 31% of households in the Waitaki District have only one person and therefore have only a single income. The median household income in the Waitaki District was $68,900 in 2023 according to census data.

This plan shows water charges for consumers in Waitaki increasing as a percentage of median household income from 1.7% in 2026 to 3.1% in 2034. At 3.3% an increasing proportion of ratepayers will face affordability challenges.

Notwithstanding these increases, WDC believes that the Southern Waters model provides the greatest opportunity to address these affordability charges, and it is estimated that:

- Southern Waters provides the most affordable option for water consumers in its serviced area. It is estimated to require $25 million less revenue over the period from 2027/28 to 2033/34 than the alternative in-house models, and these savings will be passed directly to water consumers.
- From 1 July 2027 through 30 June 2054 Southern Waters is estimated to require a cumulative $621 million less revenue than in-house delivery models for each of the shareholding councils.

The actual extent of savings, and impacts on specific consumer groups or districts will be influenced by the financial strategy and performance of Southern Waters.

WDC will seek to ensure that water charges continue to be included in eligibility assessments for rates rebates (per revisions to the Rates Rebates Act 1973) and will advocate for the promotion and adoption of the Ratepayer Assistance Scheme to support relief from water charges for its community.

This plan makes use of increased debt leveraging to balance affordability with the long term nature of capital investment and infrastructure assets used for the delivery of three waters services.

A future shift to volumetric pricing is also likely to result in a shift in terms of overall affordability and may result in improved affordability outcomes for single person households, although it is recognised that this will also result in increased charges for higher water users.

Funding and financing arrangements

Water services financing requirements and sources

The projected borrowing requirements and conformance with lending covenants and borrowing limits are set out in Part D of this plan. That shows Southern Waters' three waters borrowing increasing from $186 million in 2025 to $588 million by 2034. Borrowing will be managed through:

- An appropriate mixture of fixed and floating rate stock
- An appropriate mixture of short and long term debenture stock
- Interest rate swap arrangements to provide an appropriate level of hedging to manage interest rate risk
- The majority of fixed term lending being acquired from LGFA
- Commercial paper where necessary

The financial strategy underpinning the financial information included in this plan includes:

- Depreciation is fully funded
- Consequential operating cash surpluses are applied toward the renewal of assets in the first instance
- Growth and level of service investment is funded with debt to match the future beneficiaries with payment obligations
- Development contributions are collected where, and to the extent, possible
- Local pricing will be maintained. Local price modelling has distributed any cost savings from the establishment of Southern Waters evenly across all councils. However Southern Waters may adopt its own approach to setting local prices.
- Additional revenue will be levied where necessary to maintain lending covenants. Any additional revenue will be applied towards debt management through debt repayment or through funding of capital works which would have otherwise been funded through borrowings.
- Debenture stock is renewed at the end of its term unless sufficient cash reserves are held to repay some or all of that debt prior to its renewal.

The ultimate financial strategy, including approach to debt management, covenant compliance, insurance arrangements, and financial risk management for Southern Waters remains under development.

Internal borrowing arrangements

WDC borrows externally at a whole of council level, with an internal treasury management function which allocate debt to relevant activities. All debt is backed with external borrowing.

WDC has no internal lending arrangements between activities and does not propose to introduce any such arrangements.

Lending will transfer to Southern Waters, and precise treasury arrangements for Southern Waters are yet to be determined. Southern Waters will only provide water services so there will be no lending to or from "non-waters" activities.

Determination of debt attributed to water services

WDC's three waters debt balance was agreed with the National Transition Unit (NTU) for the year ending 30 June 2023.

Debt is allocated directly to three waters activities at a cost centre level and is fully traceable at a cost centre level, with no internal lending currently in place. Movement in debt balances, and the current assumed level of three waters debt, are based on these cost centre allocations and the opening position agreed with the NTU.

WDC will transfer all of its three waters debt balance to Southern Waters on 1 July 2027.

Waitaki is expected to transfer approximately $78 million of three waters debt on 1 July 2027.

Insurance arrangements

The total carrying value of three waters infrastructure was $377,168,392 in the 2023/24 financial year (2023: 263,892,611).

Individual assets valued in excess of $1,000,000 and other items deemed critical are insured, the combined value of these assets for insurance purposes is $162,547,668 (2023: $105,411,533).

WDC mitigates the risk related to the remaining assets through its membership of the Local Authority Protection Programme (LAPP), use of depreciation reserves and the Disaster Fund. Estimated cost of full replacement of the assets is $612,341,794, based on the latest valuation at 30 June 2024, and subsequent additions at cost or valuation, and can be analysed as follows:

- Water Supply schemes $272,042,498
- Wastewater (sewerage) schemes $282,749,279
- Stormwater (drainage) schemes $57,550,017

WDC also relies on the Government's established risk sharing approach under the essential infrastructure recovery programme (and as documented in the guide to the National CDEM Plan) which assumes that 60% of the cost of horizontal infrastructure that is damaged in a natural disaster will be covered by Central Government.

WDC has specific reserves to enable it to provide a rapid response to significant and damaging events and to meet uninsured losses that may arise. At 30 June 2024, the Disaster Fund stood at $2,025,805 (2023: $1,905,805), and the Insurance Excess Fund $203,094 (2023: $203,094). WDC maintains committed cash facilities with its bankers to provide additional and immediate funding to meet any shortfall.

Southern Waters approach to insurance and risk management has yet to be formally agreed.

Part D: Financial sustainability assessment

Confirmation of financially sustainable delivery of water services

This section provides information on the revenue sufficiency, financing sufficiency, and investment sufficiency tests for the sustainable future delivery of three waters services. It highlights that Southern Waters:

- Generates sufficient revenue to provide operating surpluses and cash surpluses that ensure all operating costs are fully funded and the renewal of infrastructure is supported through depreciation recoveries.
- Generates sufficient revenue to support financing costs and meet lending covenants for the level of debt that is required by Southern Waters.
- Has planned for a level of investment in the network that is sufficient to meet known and anticipated regulatory compliance requirements and future growth.
- Can borrow sufficient funds to support delivery of that programme of work.

Actions required to achieve financially sustainable delivery of water services

WDC recognises that joining Southern Waters is the best path towards financial sustainability. This is mainly due to the large investment needed in water services. Without a change, WDC would need to take on significant debt, which could either break existing lending rules or require a major increase in revenue.

Notwithstanding this, Southern Waters still presents affordability challenges that will need to be addressed. In particular:

- Water charges in Waitaki are still expected to need to increase by 124% between 2024/25 and 2033/34.
- Affordability, when measured through total water charges as a percentage of household income, will deteriorate from 1.8% to 3.1% over the ten-year modelling period.
- Southern Waters will be immediately compliant with LGFA's lending covenants but may seek to utilise LGFA's transitional arrangements to smooth price increases for the first 4 – 5 years following its establishment. This will improve affordability at the cost of increasing credit risk.

Achieving financial sustainability, and affordability for water consumers in the serviced area, will require Southern Waters to:

- Place a dedicated emphasis and focus on efficiency and effectiveness.
- Consider the tariff structure and effective use of development contributions (or development levies) to determine the appropriate balance of charges between future growth, existing water consumers, and non-residential users of water.
- Consider the prioritisation of capital works, and opportunities to take advantage of changes to the wastewater standards.
- Consider the development of a hardship policy as part of its waiver policy or any other mechanisms that may be available to address acute affordability issues in the serviced area.
- Seek external funding and grants wherever these are available.

- Seek to increase scale through allowing and encouraging other councils to join the model at a future date.

Modelling includes a capital programme that addresses all known and expected compliance standards and full funding of that programme through an appropriate use of debt. Modelling indicates that the total borrowing for Southern Waters will be compliant with relevant lending covenants through to 2054.

Risks and constraints to achieving financially sustainable delivery of water services

This plan relies on a number of core assumptions and risks which may impact the future financial sustainability of three waters services. These are outlined below, including an assessment of the level of risk or any mitigations that are in place.

- Unable to achieve efficiencies. If Southern Waters is unable to achieve the modelled capital and operating efficiencies, charges to households will be higher than otherwise set out in this plan. The efficiency assumptions included in the underlying modelling are conservative, at 1.04% per annum (after inflation) for capital and 1.10% per annum (after inflation) for operating costs. This risk is considered low.
- The risk that the capital programme is inadequate or under costed. This will increase overall lending requirements and consequently will likely result in the need to generate additional revenue to manage overall borrowing requirements and conformance with lending covenants. The capital programme included within this plan has been thoroughly reviewed to ensure that investment responses to address compliance issues are included, however no independent cost estimation of capital projects has been completed. Cost estimates include contingency as appropriate depending on the scope, risk, and timing of projects.
- Interest rate and inflation assumptions. Inflation is modelled using the BERL local government cost index inflators for water services. Interest is modelled based on an average cost of borrowing of 5.52% for the duration of the plan. This is higher than current borrowing rates. Changes (particularly increases) to either of these assumptions would require Southern Waters to further increase three waters charges if it is unable to find additional operational efficiencies to offset the increase in costs.
- Affordability constraints. Modelling indicates that affordability constraints will likely increase over time. If Southern Waters needs to adopt a hardship policy as part of its waiver policy that includes remissions or postponements, its overall cashflow may be impacted, and operating revenue shortfalls will need to be funded from elsewhere. This will need to be managed in financial forecasts and revenue policies for Southern Waters, which will need to be developed in conjunction with any waiver policy adopted by Southern Waters.
- Implementation risk. If Southern Waters is not successfully implemented and operational by 1 July 2027, there will be significant risks to future delivery, financing, revenue, and investment. A detailed implementation plan is being developed, and implementation will be managed through a transition team. Implementation will focus on a minimum viable change proposition to reduce risk of implementation.

Financial sustainability assessment - revenue sufficiency

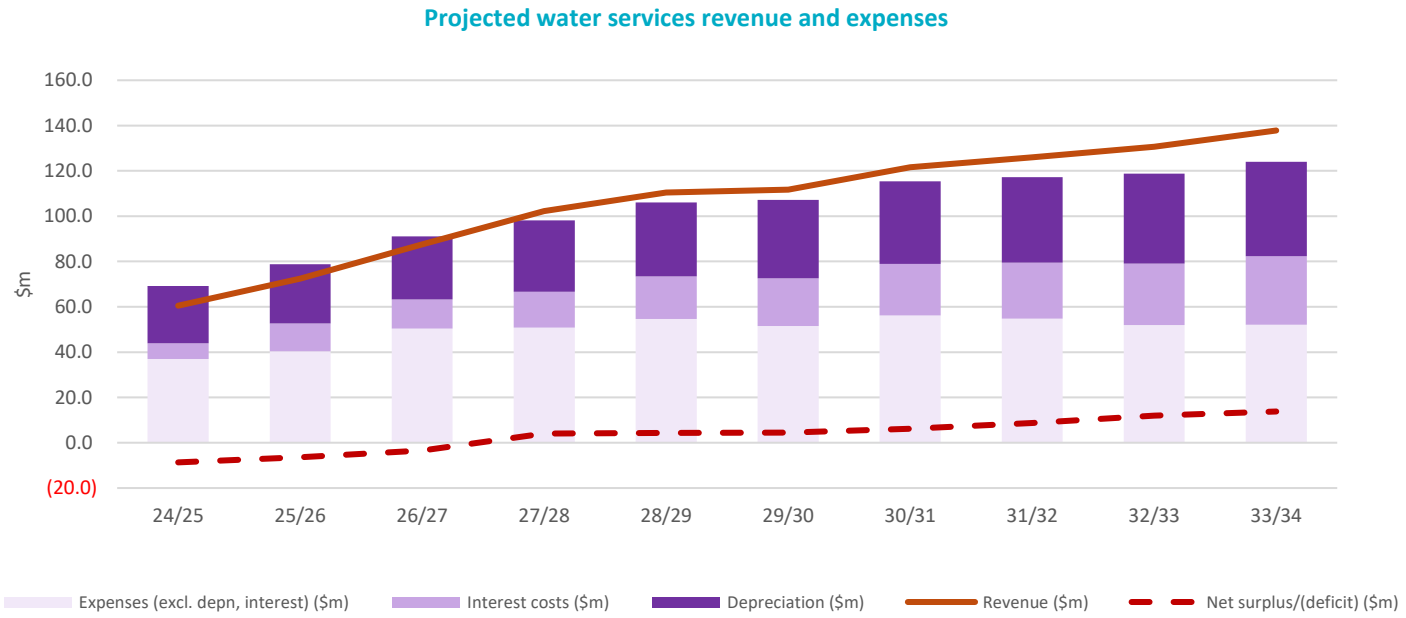
Projected water services revenues cover the projected costs of delivering water services

This section demonstrates that:

- Operating revenue is intended to fully cover operating costs including depreciation and finance costs from 2027/28
- Southern Waters is not intended to generate an operating surplus, but will generate cash surpluses
- The increased revenue requirements will result in increased residential three waters charges, equating to 124% for Waitaki water consumers by 2034 (compared to 2024/25).

The chart below shows total revenue for Southern Waters being sufficient to cover three waters operating costs from the 2027 financial year, where the three waters activity is expected to have a balanced budget.

This information has been presented at a total Southern Waters level as that is the most appropriate level to consider overall financial performance of the proposed delivery model.



Average projected charges for water services over FY2024/25 to FY2033/34

Average projected household charges have been determined based on current estimates of the proportion of total revenue received from household from each service, divided by the number of residential connections. The estimates assume no change in the approach to setting charges between residential and non-residential users, and no change in underlying consumption of water for either group. They assume connection growth continues to occur based on current proportions of residential to non-residential connections.

Waitaki District

Charges also represent the average charge across and within the Waitaki District, based on the assumption that local pricing will be maintained. For the purposes of this plan, local modelling has distributed any cost savings from the establishment of Southern Waters evenly across all councils. However Southern Waters may adopt its own approach to setting local prices (for example by setting prices based on each district maintaining compliance with the FFO to debt covenants[2]). Southern Waters has yet to make a formal decision on its approach to local pricing, or the duration of any such arrangement.

Actual prices paid by consumers will depend on their geographic location, the level of local non-residential activity, and the approach adopted to development of a local price. The precise approach to price setting will be determined by Southern Waters in accordance with the water services strategy and the principles set out in the shareholders agreement, constitution, transfer agreement, and statement of expectations.

The table below shows the average projected household charge for each of the three waters services under the proposed Southern Waters delivery model for consumers in Waitaki. It shows:

- Projected charges increasing by 40% between 2026/27 and 2027/28 and 124% by 2034 (compared to 2024/25). Southern Waters may look to utilise the LGFA's transitional lending covenants to smooth steep price rises and mitigate immediate affordability impacts on all of its water consumers.
- A one year spike in prices in 2031. This relates to a sludge disposal projects which has been treated as an operating cost in the model and fully funded in the financial year in which it is incurred. As this occurs during a year in which LGFA has indicated transitional arrangements may be available, and that it has distortionary impacts on the proposed price path, it is likely that some price smoothing or debt funding will be utilised to address this.
- Charges reach 3.1% of median household income in 2034.

[2] Such an approach would result in more gradual price increases for Waitaki through to 2034, with a slightly higher price in 2034.

Not all ratepayers within Waitaki District will receive all three services. Those ratepayers are expected to only pay for the services that they receive (subject to the application of availability charges for properties that are able to be connected). A detailed discussion on affordability is included within Part C of this plan.

Projected average charge per connection / rating unit (including GST) – Waitaki District	FY2024/25	FY2025/26	FY2026/27	FY2027/28	FY2028/29	FY2029/30	FY2030/31	FY2031/32	FY2032/33	FY2033/34
Drinking water	840	759	961	1,250	1,324	1,383	1,420	1,422	1,468	1,488
Wastewater	414	445	663	954	965	966	1,253	1,008	1,056	1,209
Stormwater	40	34	47	132	133	128	147	162	183	200
Average charge per connection / rating unit	1,295	1,238	1,671	2,336	2,421	2,478	2,820	2,591	2,706	2,897
Increase in average charge	7.7%	-4.4%	35.0%	39.8%	3.6%	2.3%	13.8%	-8.1%	4.4%	7.0%
Water services charges as % of median household income	1.7%	1.6%	2.1%	2.8%	2.9%	2.9%	3.2%	2.9%	2.9%	3.1%

WDC has already started discussions on potential methods of more targeted rates assistance, including consideration of wider sector initiatives such as the Ratepayer Assistance Scheme currently being investigated by the Local Government Funding Agency.

Southern Waters

For completeness, the average household charges across the entirety of the Southern Waters service area are presented in the table below. It shows the aggregated results for individual shareholding councils prior to the 2027/28 financial year.

That shows:

- Charges will increase by105% between 2025 and 2034
- Charges as a percentage of household income will increase from 1.9% to 3.1% over the same time period indicating increasing affordability issues.

Projected average charge per connection / rating unit (including GST) – Waitaki District	FY2024/25	FY2025/26	FY2026/27	FY2027/28	FY2028/29	FY2029/30	FY2030/31	FY2031/32	FY2032/33	FY2033/34
Drinking water	882	935	1,142	1,352	1,412	1,409	1,472	1,511	1,532	1,560
Wastewater	666	751	901	1,102	1,209	1,199	1,343	1,343	1,397	1,500
Stormwater	99	130	190	234	249	250	276	303	306	323
Average charge per connection / rating unit	1,647	1,816	2,234	2,688	2,871	2,859	3,091	3,157	3,236	3,384
Increase in average charge	36.9%	10.3%	23.0%	20.3%	6.8%	-0.4%	8.1%	2.1%	2.5%	4.6%
Water services charges as % of median household income	1.9%	2.1%	2.5%	2.9%	3.0%	2.9%	3.1%	3.1%	3.1%	3.1%

Projected operating surpluses/(deficits) for water services

The projected operating surplus and deficit information for Southern Waters is presented in the table below from the 2027/28 financial year onwards. Prior to this date the information presented is the combined forecasts of each of the constituent councils.

The information shows Southern Waters maintaining an operating surplus throughout the modelling period. By 2034 this operating surplus equates to 8% of total operating income, driven by the need to maintain a 9% FFO to debt ratio and to provide sufficient headroom to deal with large capital investment that is anticipated to be required beyond 2034.

The operating surpluses also provide some financial resilience for Southern Waters, allowing for Southern Waters to manage higher than expected operating costs, or to provide additional relief to consumers suffering hardship.

Operating surpluses are applied towards the funding of capital works in the first instance, and where these surpluses exceed the value of capital works, they are applied toward the repayment of debt.

Operating surplus ratio	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	Total
Operating surplus/(deficit) excluding capital revenues	(10,803)	(12,496)	(8,745)	501	536	582	2,087	4,595	7,591	9,324	(6,828)
Total operating revenue	58,371	66,368	82,346	98,723	106,619	107,777	117,533	121,846	126,384	133,383	1,019,350
Operating surplus ratio	(18.5%)	(18.8%)	(10.6%)	0.5%	0.5%	0.5%	1.8%	3.8%	6.0%	7.0%	(0.7%)

Projected operating cash surpluses for water services

Operating cash surpluses for Southern Waters are presented in the table below from the 2027/28 financial year onwards. Prior to that, the financial information presented represents the combined projections for the constituent councils.

The data shows Southern Waters returning cash surpluses upwards of 50% of its operating revenue, reflecting the need to manage a large capital programme. From 2031 to 2034, Southern Waters generates a modest amount of borrowing headroom, meaning cash surpluses generated during this time are surplus to capital funding requirements. However, this borrowing headroom is required to address anticipated investment needs beyond 2034 and provides a level of resilience to respond to increased costs for capital works, or an increased programme of work.

Cash surpluses are generated, in part, as a result of the need to maintain an FFO to debt ratio of 9%. Cash surpluses are applied toward the funding of the capital programme preferentially. If cash surpluses remain after funding the capital programme, these are used to repay debt.

Financial projections do not include specific provision for the regular repayment of debt. Debt is managed within lending covenants and is assumed to be leveraged in such a way as to balance long and short term affordability for ratepayers. Underlying borrowings are through a mixture of long and short term debenture stock, including a range of fixed and floating interest rates to manage exposure to interest rate risk.

Operating cash ratio	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	Total
Operating surplus/(deficit) + depreciation + interest costs - capital revenue	21,337	25,969	31,917	47,953	51,967	56,285	61,399	67,108	74,485	81,270	519,692
Total operating revenue	58,371	66,368	82,346	98,723	106,619	107,777	117,533	121,846	126,384	133,383	1,019,350
Operating cash ratio	36.6%	39.1%	38.8%	48.6%	48.7%	52.2%	52.2%	55.1%	58.9%	60.9%	51.0%

Financial sustainability assessment - investment sufficiency

Assessment of investment sufficiency

This section demonstrates that:

- Proposed investment in the network in total exceeds depreciation.
- Renewals investment exceeds depreciation and renewals backlogs are being effectively managed during the period and will be resolved by 2041.
- While growth investment appears low, a number of level of service projects also address growth issues, including:
    - The installation of water meters in the 2027/28 through 2029/30 financial years to assist in demand management and leak detection.
    - Capacity upgrades for the Lower Waitaki scheme
    - Ōamaru Water Source Strategy investment, to improve security of water supply and manage future capacity and demand constraints.
    - Leak detection and mains renewals programmes which will reduce water loss.
- The planned investment will result in a reduction in the average age of assets in the network.

Full details about existing compliance issues, expiring consents, and network growth is provided in Part B, which sets out the planned investment response to address the requirements of the Local Government (Water Services Preliminary Arrangements) Act 2024.

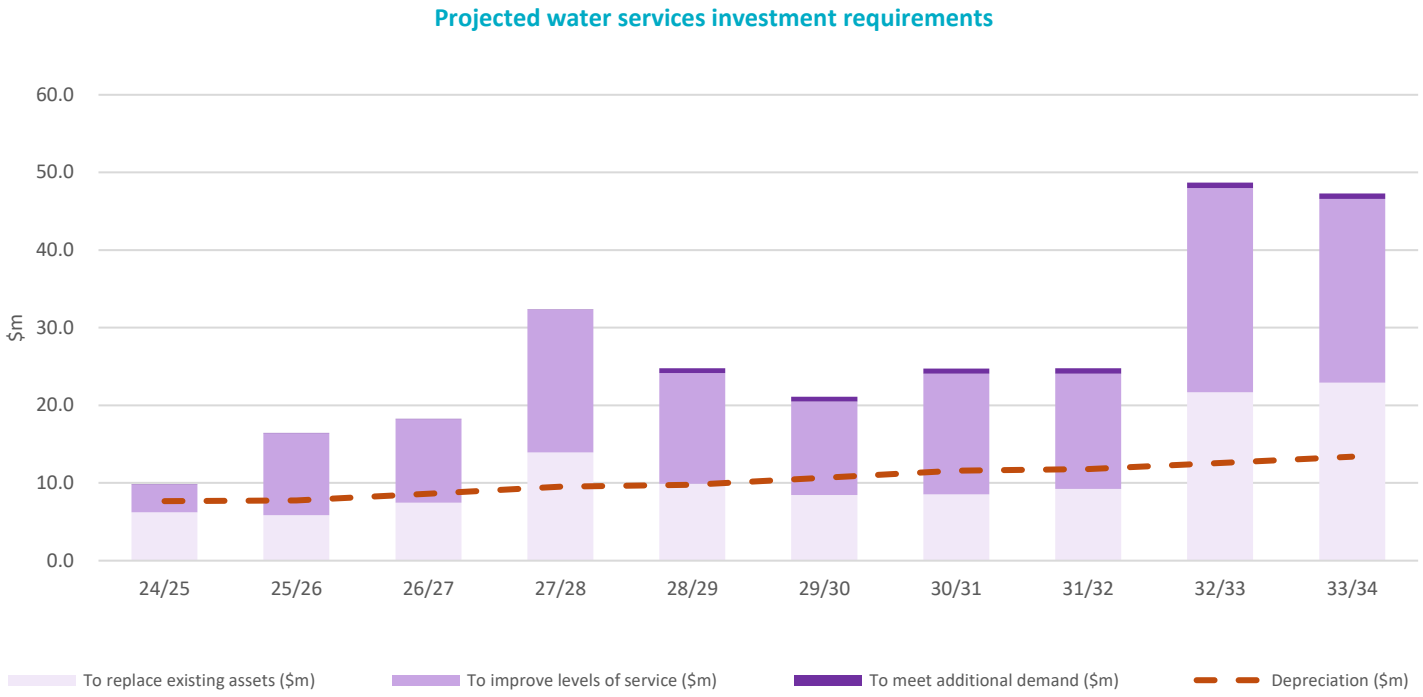
All investment included in this section of the WSDP is funded through increased borrowing and operating cash surpluses.

Note that the capital investment and forward capital works programmes set out in this WSDP reflect WDC's current view of the work required. Southern Waters will review its own capital programme, including consideration of deliverability and prioritisation, as part of its work to develop its first water services strategy.

The investment sufficiency information presented both at a Southern Waters and WDC level. There are no proposed changes to the investment programme for other districts within the Southern Waters service area.

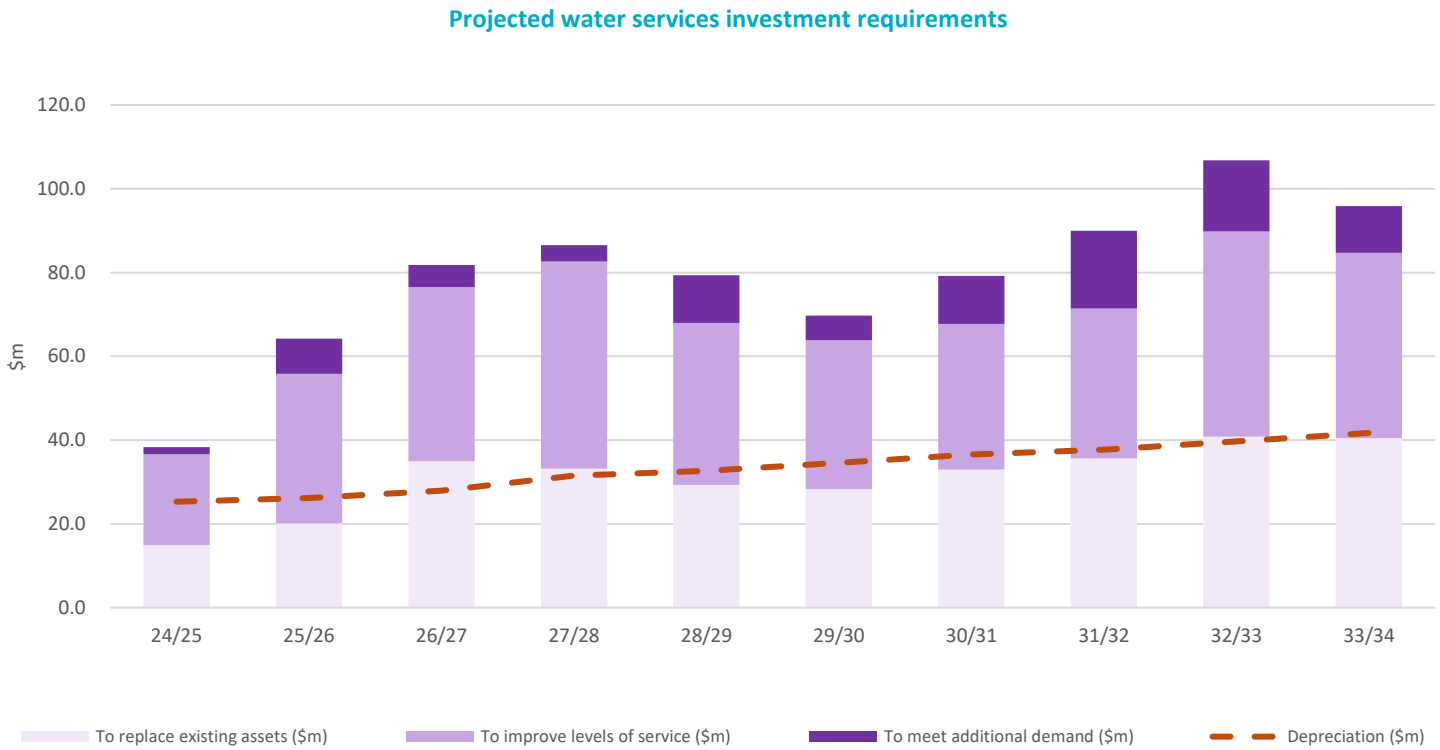
Waitaki District

The chart below shows that, for Waitaki District, total investment in water services infrastructure exceeds depreciation in all periods. Planned renewals investment exceeds depreciation in 2028, 2033 and 2034.



Southern Waters

The chart below shows that, for the entire Southern Waters service area, total investment in water services infrastructure exceeds depreciation in all periods. Planned renewals investment exceeds depreciation in 2028, and 2033. It shows the aggregated results for individual shareholding councils prior to the 2027/28 financial year.



Renewals requirements for water services – Waitaki District

The table below shows planned investment in infrastructure renewals against forecast depreciation for WDC's three waters services. It shows:

- Investment in renewals is 10% higher than depreciation of the network.
- At an activity level, wastewater is 100% more than depreciation, while water is 35% lower than depreciation and stormwater is 11% lower than depreciation.
- The stormwater network is comparatively young, and the geology, topography and geographic location of the stormwater network means that the network is not under significant pressure, and flooding events are rare/limited.
- The water network includes a large percentage of cast iron watermains that are reaching or exceeding their estimated useful lives. Sampling and performance information indicates that the cast iron watermains are currently exceeding useful life expectations and may not need to be replaced as early as originally anticipated. This was confirmed in the asset condition work completed by ProjectMax, which highlight that Cast Iron mains have a significant amount of remaining useful life.

Planned renewals is advised through review of the ages, criticality, and performance of each network.

The renewals profile of water, wastewater, and stormwater assets in Waitaki is shown in Part B, section 3.3, of this plan. It shows that the renewals backlog for wastewater mains is fully resolved by 2032 and by 2041 the watermains renewals backlog is roughly equivalent to the annual planned renewals spend. There is no existing renewals backlog for stormwater mains.

Asset sustainability ratio	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	Total
Capital expenditure on renewals	6,211	5,875	7,461	13,941	9,911	8,450	8,546	9,219	21,675	22,922	114,211
Depreciation	7,663	7,768	8,622	9,530	9,773	10,683	11,581	11,777	12,563	13,386	103,346
Asset sustainability ratio	(18.9%)	(24.4%)	(13.5%)	46.3%	1.4%	(20.9%)	(26.2%)	(21.7%)	72.5%	71.2%	10.5%

Renewals requirements for water services – Southern Waters

For completeness, the table below shows annual renewals capital expenditure and depreciation for the entire Southern Waters service area. It shows the aggregated results for individual shareholding councils prior to the 2027/28 financial year. It demonstrates that:

- Renewals investment slightly lower than depreciation over the ten year period. Over this time the average age of Southern Waters' assets continues to improve however, as shown in the asset consumption ratio.
- At an activity level, wastewater is 100% more than depreciation, while water is 16% lower than depreciation and stormwater is 31% lower than depreciation.

Asset sustainability ratio	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	Total
Capital expenditure on renewals	14,955	20,110	34,935	33,231	29,295	28,326	32,975	35,624	40,848	40,424	310,724
Depreciation	25,287	26,150	27,893	31,516	32,677	34,608	36,528	37,711	39,690	41,694	333,753
Asset sustainability ratio	(40.9%)	(23.1%)	25.2%	5.4%	(10.3%)	(18.2%)	(9.7%)	(5.5%)	2.9%	(3.0%)	(6.9%)

Total water services investment required over 10 years – Waitaki District

The table below shows the planned investment in water services infrastructure in the Waitaki district over the 10 year period from 2024/25 to 2033/34. The data shows planned investment at 160% of depreciation over the period.

While there is significant investment included in the 2032/33 and 2033/34 financial years, this relates to two closely related projects that involve the duplication and relocation of a wastewater rising main in Ōamaru. The project is intended to address resilience and capacity issues within the network and is not required during the early years of this plan.

Detailed investment requirements to meet compliance obligations are set out in Part B of this plan (Sections 5.1 and 6) and demonstrate that all known compliance issues have planned investment interventions.

Asset investment ratio	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	Total
Capital expenditure	9,816	16,407	18,245	32,339	24,775	21,113	24,732	24,761	48,693	47,296	268,175
Depreciation	7,663	7,768	8,622	9,530	9,773	10,683	11,581	11,777	12,563	13,386	103,346
Asset investment ratio	28.1%	111.2%	111.6%	239.4%	153.5%	97.6%	113.6%	110.2%	287.6%	253.3%	159.5%

Total water services investment required over 10 years – Southern Waters

For completeness, the table below shows total three waters capital expenditure and depreciation for the entire Southern Waters service area. It shows the aggregated results for individual shareholding councils prior to the 2027/28 financial year. The data shows planned investment at 137% of depreciation over the period.

Asset investment ratio	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	Total
Capital expenditure	38,315	64,195	81,782	86,574	79,389	69,723	79,188	89,992	106,811	95,829	791,798
Depreciation	25,287	26,150	27,893	31,516	32,677	34,608	36,528	37,711	39,690	41,694	333,753
Asset investment ratio	51.5%	145.5%	193.2%	174.7%	142.9%	101.5%	116.8%	138.6%	169.1%	129.8%	137.2%

Average remaining useful life of network assets – Waitaki District

The asset consumption ratio presented below shows the cumulative impact of investment in Waitaki's three waters infrastructure over time. Typically, an increasing asset consumption ratio shows that the average age of assets in the network is decreasing, and the asset base is getting younger.

The ratio should be considered alongside other data outlined in this plan to assist in identifying the adequacy of investment in the network. Under this plan, WDC's planned investment will result in an overall improvement in the asset consumption ratio.

Combined with planned level of service investment and management of the renewals backlog, performance against this ratio would indicate that the investment sufficiency test is being met. With assets having an estimated 63% of their life remaining on average, renewals investment is not expected to fully match depreciation in any given year.

Asset consumption ratio ($000s)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Book value of infrastructure assets	388,621	397,260	477,299	500,108	515,110	599,936	613,087	626,070	718,910	752,819
Total estimated replacement value of infrastructure assets	625,247	635,779	759,257	777,655	792,519	919,645	935,831	951,373	1,064,566	1,088,939
Asset consumption ratio	62.2%	62.5%	62.9%	64.3%	65.0%	65.2%	65.5%	65.8%	67.5%	69.1%

Average remaining useful life of network assets – Southern Waters

For completeness, the table below shows the asset consumption ratio across the entire Southern Waters service area. It shows the aggregated results for individual shareholding councils prior to the 2027/28 financial year. The increasing asset consumption ratio shows that the average age of assets in the network is decreasing, and the asset base is getting younger.

Asset consumption ratio ($000s)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Book value of infrastructure assets	1,009,289	1,059,748	1,197,303	1,266,472	1,328,112	1,453,527	1,512,964	1,583,030	1,725,896	1,800,212
Total estimated replacement value of infrastructure assets	1,844,173	1,912,637	2,097,715	2,177,535	2,255,184	2,439,854	2,516,038	2,601,596	2,786,361	2,875,882
Asset consumption ratio	54.7%	55.4%	57.1%	58.2%	58.9%	59.6%	60.1%	60.8%	61.9%	62.6%

Financial sustainability assessment - financing sufficiency

Information within this section relates to the newly combined Southern Waters, as financial sustainability measures and lending will be managed at an entity wide level.

Confirmation that sufficient funding and financing can be secured to deliver water services

Financial analysis of Southern Waters indicates that the model can deliver financially sustainable water services to all of its communities at a lower cost than would otherwise be able to be achieved by its constituent councils through an in-house delivery model. Modelling indicates that, based on the modelled capital programme and revenue projections:

- Debt will remain within lending limits that are likely to be set by LGFA based on its guidance of April 2025
- There will only be modest additional borrowing headroom over the modelled period. This headroom will be necessary to support anticipated investment needs beyond 2034. This creates financing risk for the entity, particularly in relation to natural disaster recovery, and will require careful consideration regarding insurance cover and further review of Southern Waters' revenue setting and pricing strategies. It is noted that establishing a 1% FFO to debt "buffer" in the proposed model would increase three waters revenue requirements by 2.5% in 2034 and would result in further affordability issues.
- A total of $588 million of total borrowings by 2034.
- Given compliance with LGFA's April guidance, there are no expected barriers for Southern Waters to obtain the required borrowing. For additional context, it is noted that:
    - Southern Waters will be established with approximately $289 million of external debt. Specific transfer agreements have yet to be determined but will involve a transfer of existing debt from councils to the new water entity. In this regard, there is no increased demand for debt from the credit market.
    - Annual projected increases in borrowings for Southern Waters are broadly consistent with existing increases in borrowing across the four councils. To date the constituent councils have not faced barriers in accessing debt from the market.
    - Total council borrowing, post formation of Southern Waters, remains within lending limits for the constituent councils.

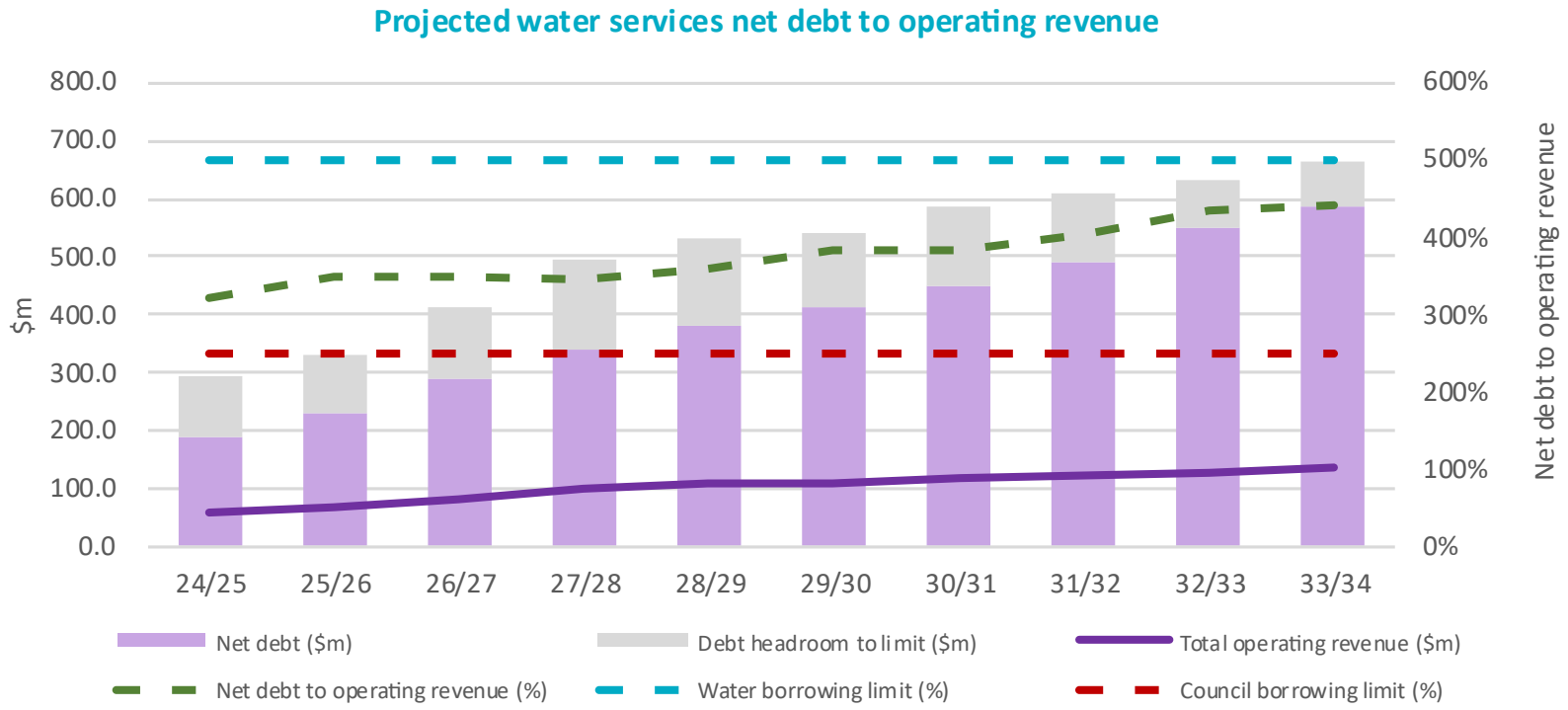
The risks associated with low levels of borrowing headroom would be able to be partially mitigated through further aggregation, which would minimise the impact of capital cost escalation and provide access to debt on more favourable terms.

Projected water services borrowings against borrowing limits

Projected three waters debt to revenue performance is shown in the chart below. It includes the combined financial results for each of the Southern Waters shareholding councils in the 2024/25 – 2026/27 financial years, and the debt and revenue profiles for Southern Waters from the 2027/28 financial year onwards.

It shows three waters debt to revenue peaking at around 441% through the Southern Waters model in 2034. While a 500% debt to revenue limit is highlighted in the chart below, modelling has been completed for conformance to the LGFA's advised FFO to Debt ratios. This results in a debt to revenue ratio less than 500%, and modelled revenue only provides for modest amounts of headroom throughout the modelling period.

If additional borrowing headroom is required, this would have the likely impact of increasing overall charges to water consumers.



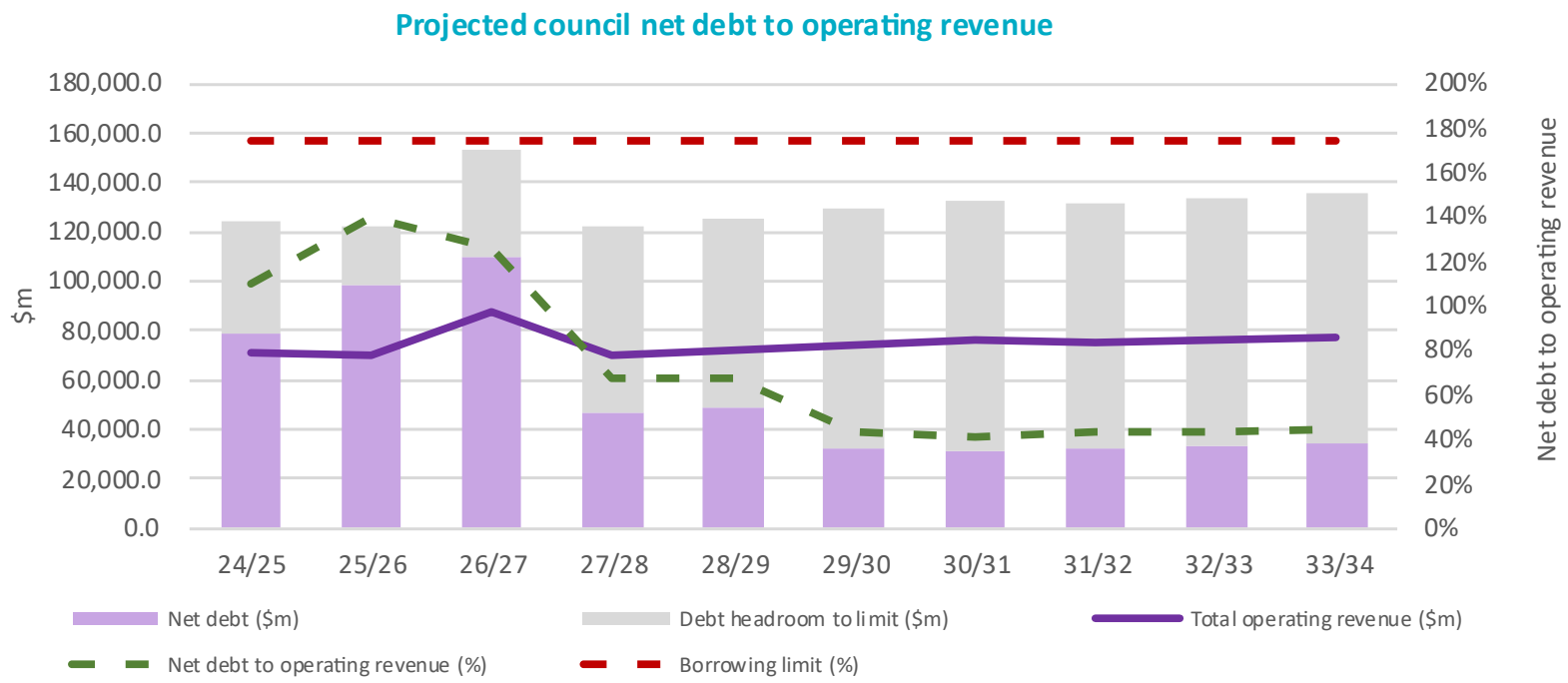
Projected council borrowings against borrowing limits

The chart below shows projected council borrowings against borrowing limits for the period covered by the WSDP. It includes three waters debt and revenue prior to the 2027/28 financial year. Please note that:

- WDC's 2026/27 annual plan was in the process of being finalised at the time that this WSDP was being prepared. The total council revenue for the 2026/27 year should be viewed as being provisional only.
- The debt limit used in this chart reflects that WDC does not currently have a credit rating. As noted, WDC will seek a credit rating in the future if required to support future borrowing (or to support lending for Southern Waters).

The chart shows:

- Headroom for the 2026/27 year of $42 million- demonstrating the water service delivery plan in the 2026/27 year will not be constrained by access to finance.
- Ongoing headroom improving to $75 million following transfer of WDC's three waters debt to Southern Waters.



Projected borrowings for water services

Projected borrowings for three waters services are shown in the table below. They include the combined financial results for each of the Southern Waters shareholding councils in the 2024/25 – 2026/27 financial years, and the debt and revenue profiles for Southern Waters from the 2027/28 financial year onwards. Over the ten years shown in the plan, debt increases by 214%, reflective of a significant programme of capital works. Growth in debt is broadly consistent throughout the modelling period, reflective of a relatively stable programme of capital works.

Despite compliance with a 9% FFO to debt ratio, total lending for three waters activities remains below 450% of three waters revenue. While lending does not exceed earlier government guidance of 500%.

Southern Waters may opt to make use of LGFA's transitional lending covenants to smooth revenue increases and improve affordability for consumers.

Net debt to operating revenue ($000s)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Total net debt (gross debt less cash)	186,812	231,305	288,691	339,721	382,135	412,738	449,296	492,804	548,023	588,372
Operating revenue	58,371	66,368	82,346	98,723	106,619	107,777	117,533	121,846	126,384	133,383
Net debt to operating revenue	320%	349%	351%	344%	358%	383%	382%	404%	434%	441%

Borrowing headroom/(shortfall) for water services

The table below shows three waters debt and three waters revenue for the shareholding councils of Southern Waters. For the financial years 2024/25 – 2026/27 it shows the aggregated three waters revenue and debt of the constituent councils. From the 2027/28 financial year onwards this shows the debt and revenue position of Southern Waters.

The data shows a significant (20%) increase in three waters revenue requirements in 2027/28. This uplift in required revenue, while significant, is lower than the alternative scenario of councils continuing to deliver three waters services through an in-house delivery model (which would have required the combined three waters revenue across the councils to increase by 21% in the same year).

Revenue uplifts may be managed by adopting LGFA's transitional approach to lending covenant compliance.

Borrowing headroom, when measured against a 500% debt to revenue ratio, exists throughout the modelling period. However, per LGFA guidance released in April 2025, the relevant lending covenants for Southern Waters will be an FFO to debt metric. Under an FFO metric, Southern Waters will have modest amounts of borrowing headroom available from 2030/31.

Performance against the FFO to debt metric is outlined in the following section.

Borrowings headroom/(shortfall) against limit ($000s)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Operating revenue	58,371	66,368	82,346	98,723	106,619	107,777	117,533	121,846	126,384	133,383
Debt to revenue limit	500%	500%	500%	500%	500%	500%	500%	500%	500%	500%
Maximum allowable net debt	291,854	331,839	411,732	493,615	533,096	538,887	587,665	609,229	631,920	666,913
Total net debt	186,812	231,305	288,691	339,721	382,135	412,738	449,296	492,804	548,023	588,372
Borrowing headroom/ (shortfall) against limit	105,042	100,534	123,041	153,894	150,961	126,148	138,369	116,425	83,897	78,541

Free funds from operations

The table below shows projected Free Funds From Operations (FFO) to Net Debt ratio for Southern Waters and the aggregated position of the four councils through to the end of the 2026/27 financial year.

Based on LGFA's letter to councils of April 2025, Southern Waters would be required to comply with an FFO to debt ratio of 9% and would be entitled to consider 50% of its development contributions receipts as part of that assessment. The results presented in the table below therefore include 50% of development contributions receipts and show conformance with the FFO requirements from its transfer date.

Revenue and debt have been modelled for compliance with the LGFA lending requirements, with modest provision of additional lending headroom. This creates risk particularly in the event of capital cost escalation or expansion of the capital work programme. This additional lending capacity is necessary to manage large projected capital expenditure in years beyond 2034 without significant immediate increased to charges.

Southern Waters will make its own determination on the precise level of borrowing headroom that it will require as part of its establishment process and having full regard to its risk appetite and proposed approach to insuring its assets.

Free funds from operations (FFO) to debt ratio (000s)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Total net debt	186,812	231,305	288,691	339,721	382,135	412,738	449,296	492,804	548,023	588,372
Funds from operations	15,543	16,678	21,772	33,780	35,094	37,155	40,623	44,395	49,436	53,249
FFO to debt ratio	8.3%	7.2%	7.5%	9.9%	9.2%	9.0%	9.0%	9.0%	9.0%	9.1%
Borrowing headroom ($000s)	(14,117)	(45,993)	(46,779)	35,610	7,801	95	2,065	472	1,269	3,283

Part E: Projected financial statements for water services

The financial statements presented in this part include:

- The aggregated statements of each of the four participating councils for financial years 2024/25 through 2026/27.
- The financial statements of Southern Waters from 2027/28 to 2033/34

The statements incorporate the joint investment needs for the four councils, as well as projected debt and revenue requirements for Southern Waters over the ten-year period. The statements also reflect the impact of operating and capital efficiencies that are expected to be derived from the improved operating model, increased scale, and financial independence of Southern Waters.

Efficiencies are assumed to commence from (and including) Southern Waters' third year of operation (2029/30) and have been modelled at 1.1% of operating costs and 1.04% of capital costs (after inflation) per year, compounding. Efficiencies are assumed to be fully realised by the end of Southern Waters' 12th year of operation (2038/39). Advice obtained from Concept Consulting indicates that these efficiencies are conservative.

Efficiencies, and ongoing operating cost estimates used in the financial modelling are estimates only and may differ from the actual cost structure adopted by the Southern Waters board.

In reviewing the financial statements presented in this section, the Southern Waters model will include the separation of mixed-use rural water schemes from drinking water schemes at a management and governance level. The financial information for mixed use rural water supply schemes has not been separated from drinking water schemes for the purposes of this WSDP. However, it is anticipated that Southern Waters will maintain financial separation of mixed-use rural schemes and drinking water schemes when it is established.

Combined water services

Funding impact statement

Funding impact statement ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Sources of operating funding										
General rates	1	112	162	0	0	0	0	0	0	0
Targeted rates	54,535	61,530	78,214	0	0	0	0	0	0	0
Subsidies and grants for operating purposes	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tax, fines, infringement fees, and other receipts	0	0	0	0	0	0	0	0	0	0
Fees and charges	3,835	4,727	3,970	98,723	106,619	107,777	117,533	121,846	126,384	133,383
Total operating funding	58,371	66,368	82,346	98,723	106,619	107,777	117,533	121,846	126,384	133,383
Applications of operating funding										
Payments to staff and suppliers	30,439	34,024	41,613	50,770	54,652	51,492	56,134	54,738	51,899	52,112
Finance costs	6,853	12,315	12,769	15,937	18,754	21,095	22,785	24,803	27,204	30,253
Internal charges and overheads applied	6,595	6,375	8,817	0	0	0	0	0	0	0
Other operating funding applications	0	0	0	0	0	0	0	0	0	0
Total applications of operating funding	43,887	52,714	63,198	66,707	73,406	72,587	78,918	79,541	79,103	82,365
Surplus/(deficit) of operating funding	14,484	13,654	19,148	32,016	33,214	35,190	38,615	42,305	47,281	51,018
Sources of capital funding										
Subsidies and grants for capital expenditure	6	0	0	0	0	0	0	0	0	0
Development and financial contributions	2,117	6,048	5,248	3,527	3,761	3,929	4,015	4,179	4,312	4,463
Increase/(decrease) in debt	21,708	44,493	57,386	51,030	42,414	30,603	36,558	43,508	55,219	40,349
Gross proceeds from sales of assets	0	0	0	0	0	0	0	0	0	0
Other dedicated capital funding	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding	23,831	50,541	62,633	54,557	46,175	34,533	40,573	47,687	59,531	44,812

Applications of capital funding										
Capital expenditure - to meet additional demand	1,645	8,414	5,274	3,963	11,414	5,881	11,489	18,606	17,013	11,105
Capital expenditure - to improve levels of services	21,715	35,671	41,572	49,380	38,680	35,516	34,725	35,762	48,951	44,300
Capital expenditure - to replace existing assets	14,955	20,110	34,935	33,231	29,295	28,326	32,975	35,624	40,848	40,424
Increase/(decrease) in reserves	0	0	0	0	0	0	0	0	0	0
Increase/(decrease) in investments	0	0	0	0	0	0	0	0	0	0
Total applications of capital funding	38,315	64,195	81,782	86,574	79,389	69,723	79,188	89,992	106,811	95,829

Surplus/(deficit) of capital funding	(14,484)	(13,654)	(19,148)	(32,016)	(33,214)	(35,190)	(38,615)	(42,305)	(47,281)	(51,018)

Funding balance	0	0	0	0	0	0	0	0	0	0

Statement of comprehensive revenue and expense

Statement of comprehensive revenue and expense ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Operating revenue	58,371	66,368	82,346	98,723	106,619	107,777	117,533	121,846	126,384	133,383
Other revenue	2,123	6,048	5,248	3,527	3,761	3,929	4,015	4,179	4,312	4,463
Total revenue	60,494	72,416	87,594	102,250	110,381	111,707	121,549	126,025	130,695	137,845
Operating expenses	30,439	34,024	41,613	50,770	54,652	51,492	56,134	54,738	51,899	52,112
Finance costs	6,853	12,315	12,769	15,937	18,754	21,095	22,785	24,803	27,204	30,253
Overheads and support costs	6,595	6,375	8,817	0	0	0	0	0	0	0
Depreciation & amortisation	25,287	26,150	27,893	31,516	32,677	34,608	36,528	37,711	39,690	41,694
Total expenses	69,174	78,864	91,091	98,222	106,083	107,195	115,446	117,251	118,793	124,059
Net surplus / (deficit)	(8,680)	(6,448)	(3,497)	4,028	4,298	4,511	6,102	8,774	11,902	13,786
Revaluation of infrastructure assets	11,957	12,413	83,666	14,111	14,928	90,301	16,776	17,785	75,744	20,181
Total comprehensive income	3,277	5,966	80,169	18,139	19,226	94,812	22,879	26,558	87,646	33,968
Cash surplus / (deficit) from operations (excl. depreciation)	16,607	19,702	24,396	35,543	36,975	39,120	42,630	46,484	51,592	55,480

Statement of cashflows

Statement of cashflows ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Cashflows from operating activities										
Cash surplus / (deficit) from operations	16,607	19,702	24,396	35,543	36,975	39,120	42,630	46,484	51,592	55,480
[other items]										
Net cashflows from operating activities	16,607	19,702	24,396	35,543	36,975	39,120	42,630	46,484	51,592	55,480
Cashflows from investment activities										
[other items]										
Capital expenditure	(38,315)	(64,195)	(81,782)	(86,574)	(79,389)	(69,723)	(79,188)	(89,992)	(106,811)	(95,829)
Net cashflows from investment activities	(38,315)	(64,195)	(81,782)	(86,574)	(79,389)	(69,723)	(79,188)	(89,992)	(106,811)	(95,829)
Cashflows from financing activities										
New borrowings	21,708	44,493	57,386	51,030	42,414	30,603	36,558	43,508	55,219	40,349
Repayment of borrowings										
Net cashflows from financing activities	21,708	44,493	57,386	51,030	42,414	30,603	36,558	43,508	55,219	40,349
Net increase/(decrease) in cash and cash equivalents	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents at beginning of year	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents at end of year	0	0	0	0	0	0	0	0	0	0

Statement of financial position

Statement of financial position ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Assets										
Cash and cash equivalents	0	0	0	0	0	0	0	0	0	0
Other current assets	0	0	0	0	0	0	0	0	0	0
Infrastructure assets	1,009,289	1,059,748	1,197,303	1,266,472	1,328,112	1,453,527	1,512,964	1,583,030	1,725,896	1,800,212
Other non-current assets	0	0	0	0	0	0	0	0	0	0
Total assets	1,009,289	1,059,748	1,197,303	1,266,472	1,328,112	1,453,527	1,512,964	1,583,030	1,725,896	1,800,212
Liabilities										
Borrowings - current portion	186,812	231,305	288,691	339,721	382,135	412,738	449,296	492,804	548,023	588,372
Other current liabilities	0	0	0	0	0	0	0	0	0	0
Borrowings - non-current portion	0	0	0	0	0	0	0	0	0	0
Other non-current liabilities	0	0	0	0	0	0	0	0	0	0
Total liabilities	186,812	231,305	288,691	339,721	382,135	412,738	449,296	492,804	548,023	588,372
Net assets	822,477	828,443	908,612	926,750	945,977	1,040,789	1,063,668	1,090,226	1,177,873	1,211,840
Equity										
Revaluation reserve	11,957	24,370	108,036	122,147	137,075	227,376	244,152	261,937	337,681	357,862
Other reserves	810,521	804,073	800,576	804,604	808,902	813,413	819,515	828,289	840,191	853,978
Total equity	822,477	828,443	908,612	926,750	945,977	1,040,789	1,063,668	1,090,226	1,177,873	1,211,840

Drinking water

Funding impact statement

Funding impact statement ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Sources of operating funding										
General rates	1	112	162	0	0	0	0	0	0	0
Targeted rates	34,319	37,880	48,283	0	0	0	0	0	0	0
Subsidies and grants for operating purposes	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tax, fines, infringement fees, and other receipts	0	0	0	0	0	0	0	0	0	0
Fees and charges	1,845	2,092	1,496	58,316	61,852	62,639	66,390	69,098	71,042	73,337
Total operating funding	36,165	40,084	49,942	58,316	61,852	62,639	66,390	69,098	71,042	73,337
Applications of operating funding										
Payments to staff and suppliers	20,505	21,711	24,173	30,750	32,134	31,217	32,455	32,589	31,055	31,238
Finance costs	4,291	8,540	9,990	11,543	13,083	13,815	14,523	15,062	15,892	16,161
Internal charges and overheads applied	3,928	2,794	4,258	0	0	0	0	0	0	0
Other operating funding applications	0	0	0	0	0	0	0	0	0	0
Total applications of operating funding	28,724	33,046	38,421	42,294	45,217	45,031	46,979	47,651	46,947	47,399
Surplus/(deficit) of operating funding	7,441	7,039	11,521	16,023	16,635	17,608	19,411	21,447	24,094	25,938
Sources of capital funding										
Subsidies and grants for capital expenditure	0	0	0	0	0	0	0	0	0	0
Development and financial contributions	1,280	3,672	3,700	2,059	2,180	2,266	2,317	2,407	2,480	2,564
Increase/(decrease) in debt	22,561	36,443	28,130	27,897	13,247	12,843	9,747	15,044	4,866	(516)
Gross proceeds from sales of assets	0	0	0	0	0	0	0	0	0	0
Other dedicated capital funding	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding	23,841	40,115	31,830	29,956	15,426	15,109	12,064	17,451	7,346	2,048

Applications of capital funding										
Capital expenditure - to meet additional demand	830	6,248	3,482	1,324	3,829	3,010	7,866	7,734	5,389	3,510
Capital expenditure - to improve levels of services	18,244	29,197	24,234	27,082	16,953	16,979	10,501	12,366	12,320	11,251
Capital expenditure - to replace existing assets	12,208	11,708	15,635	17,572	11,280	12,729	13,108	18,798	13,732	13,226
Increase/(decrease) in reserves	0	0	0	0	0	0	0	0	0	0
Increase/(decrease) in investments	0	0	0	0	0	0	0	0	0	0
Total applications of capital funding	31,282	47,154	43,351	45,978	32,062	32,717	31,475	38,898	31,440	27,987
Surplus/(deficit) of capital funding	(7,441)	(7,039)	(11,521)	(16,023)	(16,635)	(17,608)	(19,411)	(21,447)	(24,094)	(25,938)
Funding balance	0	(0)	0	0	0	0	0	0	0	0

Statement of comprehensive revenue and expense

Statement of comprehensive revenue and expense ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Operating revenue	36,165	40,084	49,942	58,316	61,852	62,639	66,390	69,098	71,042	73,337
Other revenue	1,280	3,672	3,700	2,059	2,180	2,266	2,317	2,407	2,480	2,564
Total revenue	37,445	43,756	53,642	60,375	64,032	64,905	68,707	71,505	73,521	75,901
Operating expenses	20,505	21,711	24,173	30,750	32,134	31,217	32,455	32,589	31,055	31,238
Finance costs	4,291	8,540	9,990	11,543	13,083	13,815	14,523	15,062	15,892	16,161
Overheads and support costs	3,928	2,794	4,258	0	0	0	0	0	0	0
Depreciation & amortisation	13,233	13,832	14,924	15,764	16,345	17,290	18,223	18,743	19,586	20,396
Total expenses	41,957	46,878	53,345	58,057	61,562	62,321	65,202	66,394	66,533	67,795
Net surplus / (deficit)	(4,512)	(3,121)	297	2,317	2,470	2,584	3,505	5,111	6,988	8,106
Revaluation of infrastructure assets	5,617	6,010	39,324	7,066	7,394	43,610	8,028	8,402	35,785	9,270
Total comprehensive income	1,105	2,888	39,621	9,384	9,865	46,194	11,533	13,512	42,773	17,376
Cash surplus / (deficit) from operations (excl. depreciation)	8,721	10,711	15,221	18,081	18,815	19,874	21,728	23,854	26,574	28,502

Statement of cashflows

Statement of cashflows ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Cashflows from operating activities										
Cash surplus / (deficit) from operations	8,721	10,711	15,221	18,081	18,815	19,874	21,728	23,854	26,574	28,502
[other items]										
Net cashflows from operating activities	8,721	10,711	15,221	18,081	18,815	19,874	21,728	23,854	26,574	28,502
Cashflows from investment activities										
[other items]										
Capital expenditure	(31,282)	(47,154)	(43,351)	(45,978)	(32,062)	(32,717)	(31,475)	(38,898)	(31,440)	(27,987)
Net cashflows from investment activities	(31,282)	(47,154)	(43,351)	(45,978)	(32,062)	(32,717)	(31,475)	(38,898)	(31,440)	(27,987)
Cashflows from financing activities										
New borrowings	22,561	36,443	28,130	27,897	13,247	12,843	9,747	15,044	4,866	(516)
Repayment of borrowings										
Net cashflows from financing activities	22,561	36,443	28,130	27,897	13,247	12,843	9,747	15,044	4,866	(516)
Net increase/(decrease) in cash and cash equivalents	0	0	0	0	0	0	0	0	0	(0)
Cash and cash equivalents at beginning of year	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents at end of year	0	0	0	0	0	0	0	0	0	0

Statement of financial position

Statement of financial position ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Assets										
Cash and cash equivalents	0	0	0	0	0	0	0	0	0	0
Other current assets	0	0	0	0	0	0	0	0	0	0
Infrastructure assets	476,745	516,076	583,828	621,108	644,220	703,257	724,537	753,093	800,732	817,592
Other non-current assets	0	0	0	0	0	0	0	0	0	0
Total assets	476,745	516,076	583,828	621,108	644,220	703,257	724,537	753,093	800,732	817,592
Liabilities										
Borrowings - current portion	144,530	180,973	209,103	237,000	250,247	263,090	272,837	287,881	292,747	292,231
Other current liabilities	0	0	0	0	0	0	0	0	0	0
Borrowings - non-current portion	0	0	0	0	0	0	0	0	0	0
Other non-current liabilities	0	0	0	0	0	0	0	0	0	0
Total liabilities	144,530	180,973	209,103	237,000	250,247	263,090	272,837	287,881	292,747	292,231
Net assets	332,215	335,103	374,724	384,108	393,973	440,167	451,700	465,212	507,985	525,361
Equity										
Revaluation reserve	5,617	11,627	50,951	58,017	65,412	109,022	117,050	125,451	161,236	170,506
Other reserves	326,598	323,476	323,773	326,091	328,561	331,146	334,650	339,761	346,749	354,855
Total equity	332,215	335,103	374,724	384,108	393,973	440,167	451,700	465,212	507,985	525,361

Wastewater

Funding impact statement

Funding impact statement ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Sources of operating funding										
General rates	0	0	0	0	0	0	0	0	0	0
Targeted rates	17,420	19,955	24,293	0	0	0	0	0	0	0
Subsidies and grants for operating purposes	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tax, fines, infringement fees, and other receipts	0	0	0	0	0	0	0	0	0	0
Fees and charges	1,968	2,426	2,474	33,301	37,079	37,309	42,389	43,011	45,356	49,372
Total operating funding	19,388	22,381	26,767	33,301	37,079	37,309	42,389	43,011	45,356	49,372
Applications of operating funding										
Payments to staff and suppliers	9,023	11,071	15,273	17,069	19,222	17,374	20,498	18,731	18,027	18,032
Finance costs	1,824	3,163	2,187	3,461	4,612	5,896	6,527	7,601	8,685	11,141
Internal charges and overheads applied	2,374	2,957	3,614	0	0	0	0	0	0	0
Other operating funding applications	0	0	0	0	0	0	0	0	0	0
Total applications of operating funding	13,221	17,191	21,074	20,530	23,834	23,269	27,025	26,332	26,712	29,174
Surplus/(deficit) of operating funding	6,167	5,190	5,694	12,771	13,245	14,040	15,364	16,679	18,644	20,199
Sources of capital funding										
Subsidies and grants for capital expenditure	6	0	0	0	0	0	0	0	0	0
Development and financial contributions	837	2,376	1,548	1,469	1,582	1,663	1,698	1,772	1,832	1,899
Increase/(decrease) in debt	(1,044)	7,278	23,081	20,848	23,256	11,439	19,456	19,635	44,492	31,464
Gross proceeds from sales of assets	0	0	0	0	0	0	0	0	0	0
Other dedicated capital funding	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding	(201)	9,654	24,629	22,317	24,838	13,102	21,154	21,407	46,324	33,362

Applications of capital funding										
Capital expenditure - to meet additional demand	811	2,119	1,745	2,635	7,581	2,867	3,619	10,868	11,620	7,591
Capital expenditure - to improve levels of services	3,307	5,515	13,345	19,961	14,404	11,656	16,036	12,676	28,262	20,821
Capital expenditure - to replace existing assets	1,848	7,209	15,233	12,492	16,098	12,618	16,863	14,543	25,086	25,150
Increase/(decrease) in reserves	0	0	0	0	0	0	0	0	0	0
Increase/(decrease) in investments	0	0	0	0	0	0	0	0	0	0
Total applications of capital funding	5,966	14,844	30,323	35,088	38,083	27,142	36,518	38,086	64,968	53,561

Surplus/(deficit) of capital funding	(6,167)	(5,190)	(5,694)	(12,771)	(13,245)	(14,040)	(15,364)	(16,679)	(18,644)	(20,199)

Funding balance	0	0	0	0	0	0	0	0	0	0

Statement of comprehensive revenue and expense

Statement of comprehensive revenue and expense ($000)	**FY24/25**	**FY25/26**	**FY26/27**	**FY27/28**	**FY28/29**	**FY29/30**	**FY30/31**	**FY31/32**	**FY32/33**	**FY33/34**
Operating revenue	19,388	22,381	26,767	33,301	37,079	37,309	42,389	43,011	45,356	49,372
Other revenue	843	2,376	1,548	1,469	1,582	1,663	1,698	1,772	1,832	1,899
Total revenue	20,231	24,757	28,315	34,770	38,661	38,972	44,087	44,783	47,188	51,271
Operating expenses	9,023	11,071	15,273	17,069	19,222	17,374	20,498	18,731	18,027	18,032
Finance costs	1,824	3,163	2,187	3,461	4,612	5,896	6,527	7,601	8,685	11,141
Overheads and support costs	2,374	2,957	3,614	0	0	0	0	0	0	0
Depreciation & amortisation	9,463	9,677	10,208	12,529	12,999	13,776	14,544	15,027	15,927	16,872
Total expenses	22,684	26,868	31,282	33,060	36,833	37,045	41,569	41,359	42,640	46,046
Net surplus / (deficit)	(2,453)	(2,111)	(2,967)	1,710	1,828	1,927	2,518	3,424	4,548	5,225
Revaluation of infrastructure assets	4,914	4,971	37,746	5,465	5,894	39,832	6,841	7,332	33,315	8,548
Total comprehensive income	2,461	2,860	34,779	7,176	7,721	41,759	9,360	10,756	37,863	13,773
Cash surplus / (deficit) from operations (excl. depreciation)	7,010	7,566	7,241	14,240	14,827	15,703	17,062	18,451	20,476	22,098

Statement of cashflows

Statement of cashflows ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Cashflows from operating activities										
Cash surplus / (deficit) from operations	7,010	7,566	7,241	14,240	14,827	15,703	17,062	18,451	20,476	22,098
[other items]										
Net cashflows from operating activities	7,010	7,566	7,241	14,240	14,827	15,703	17,062	18,451	20,476	22,098
Cashflows from investment activities										
[other items]										
Capital expenditure	(5,966)	(14,844)	(30,323)	(35,088)	(38,083)	(27,142)	(36,518)	(38,086)	(64,968)	(53,561)
Net cashflows from investment activities	(5,966)	(14,844)	(30,323)	(35,088)	(38,083)	(27,142)	(36,518)	(38,086)	(64,968)	(53,561)
Cashflows from financing activities										
New borrowings	(1,044)	7,278	23,081	20,848	23,256	11,439	19,456	19,635	44,492	31,464
Repayment of borrowings										
Net cashflows from financing activities	(1,044)	7,278	23,081	20,848	23,256	11,439	19,456	19,635	44,492	31,464
Net increase/(decrease) in cash and cash equivalents	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents at beginning of year	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents at end of year	0	0	0	0	0	0	0	0	0	0

Statement of financial position

Statement of financial position ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Assets										
Cash and cash equivalents	0	0	0	0	0	0	0	0	0	0
Other current assets	0	0	0	0	0	0	0	0	0	0
Infrastructure assets	431,503	441,640	499,501	527,525	558,502	611,699	640,515	670,906	753,261	798,498
Other non-current assets	0	0	0	0	0	0	0	0	0	0
Total assets	431,503	441,640	499,501	527,525	558,502	611,699	640,515	670,906	753,261	798,498
Liabilities										
Borrowings - current portion	32,336	39,613	62,695	83,543	106,798	118,237	137,693	157,328	201,821	233,284
Other current liabilities	0	0	0	0	0	0	0	0	0	0
Borrowings - non-current portion	0	0	0	0	0	0	0	0	0	0
Other non-current liabilities	0	0	0	0	0	0	0	0	0	0
Total liabilities	32,336	39,613	62,695	83,543	106,798	118,237	137,693	157,328	201,821	233,284
Net assets	399,167	402,027	436,806	443,982	451,703	493,462	502,822	513,577	551,440	565,214
Equity										
Revaluation reserve	4,914	9,885	47,632	53,097	58,990	98,822	105,664	112,995	146,310	154,858
Other reserves	394,253	392,142	389,175	390,885	392,713	394,640	397,158	400,582	405,130	410,355

Stormwater

Funding impact statement

Funding impact statement ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Sources of operating funding										
General rates	0	0	0	0	0	0	0	0	0	0
Targeted rates	2,796	3,694	5,637							
Subsidies and grants for operating purposes	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tax, fines, infringement fees, and other receipts	0	0	0	0	0	0	0	0	0	0
Fees and charges	22	208	0	7,105	7,688	7,829	8,754	9,737	9,986	10,673
Total operating funding	2,818	3,902	5,637	7,105	7,688	7,829	8,754	9,737	9,986	10,673
Applications of operating funding										
Payments to staff and suppliers	911	1,242	2,167	2,950	3,296	2,902	3,180	3,418	2,816	2,842
Finance costs	738	612	592	933	1,059	1,385	1,734	2,140	2,627	2,951
Internal charges and overheads applied	293	624	944	0	0	0	0	0	0	0
Other operating funding applications	0	0	0	0	0	0	0	0	0	0
Total applications of operating funding	1,942	2,477	3,703	3,883	4,355	4,287	4,914	5,558	5,444	5,793
Surplus/(deficit) of operating funding	876	1,425	1,934	3,223	3,333	3,543	3,840	4,179	4,542	4,880
Sources of capital funding										
Subsidies and grants for capital expenditure	0	0	0	0	0	0	0	0	0	0
Development and financial contributions	0	0	0	0	0	0	0	0	0	0
Increase/(decrease) in debt	191	773	6,175	2,285	5,911	6,321	7,355	8,829	5,861	9,401
Gross proceeds from sales of assets	0	0	0	0	0	0	0	0	0	0
Other dedicated capital funding	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding	191	773	6,175	2,285	5,911	6,321	7,355	8,829	5,861	9,401

Applications of capital funding										
Capital expenditure - to meet additional demand	4	46	47	4	4	4	4	4	4	4
Capital expenditure - to improve levels of services	164	959	3,993	2,337	7,323	6,882	8,188	10,721	8,368	12,229
Capital expenditure - to replace existing assets	899	1,193	4,068	3,167	1,917	2,978	3,003	2,283	2,031	2,049
Increase/(decrease) in reserves	0	0	0	0	0	0	0	0	0	0
Increase/(decrease) in investments	0	0	0	0	0	0	0	0	0	0
Total applications of capital funding	1,067	2,198	8,108	5,508	9,245	9,864	11,195	13,008	10,403	14,282
Surplus/(deficit) of capital funding	(876)	(1,425)	(1,934)	(3,223)	(3,333)	(3,543)	(3,840)	(4,179)	(4,542)	(4,880)
Funding balance	0	0	0	0	0	0	0	0	0	0

Statement of comprehensive revenue and expense

Statement of comprehensive revenue and expense ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Operating revenue	2,818	3,902	5,637	7,105	7,688	7,829	8,754	9,737	9,986	10,673
Other revenue	0	0	0	0	0	0	0	0	0	0
Total revenue	2,818	3,902	5,637	7,105	7,688	7,829	8,754	9,737	9,986	10,673
Operating expenses	911	1,242	2,167	2,950	3,296	2,902	3,180	3,418	2,816	2,842
Finance costs	738	612	592	933	1,059	1,385	1,734	2,140	2,627	2,951
Overheads and support costs	293	624	944	0	0	0	0	0	0	0
Depreciation & amortisation	2,591	2,641	2,761	3,223	3,333	3,543	3,760	3,940	4,176	4,426
Total expenses	4,533	5,118	6,464	7,105	7,688	7,829	8,675	9,498	9,620	10,219
Net surplus / (deficit)	(1,715)	(1,215)	(827)	0	0	0	80	239	366	455
Revaluation of infrastructure assets	1,425	1,433	6,595	1,579	1,641	6,859	1,907	2,051	6,644	2,363
Total comprehensive income	(290)	217	5,768	1,579	1,641	6,859	1,987	2,291	7,011	2,818
Cash surplus / (deficit) from operations (excl. depreciation)	876	1,425	1,934	3,223	3,333	3,543	3,840	4,179	4,542	4,880

Statement of cashflows

Statement of cashflows ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Cashflows from operating activities										
Cash surplus / (deficit) from operations	876	1,425	1,934	3,223	3,333	3,543	3,840	4,179	4,542	4,880
[other items]										
Net cashflows from operating activities	876	1,425	1,934	3,223	3,333	3,543	3,840	4,179	4,542	4,880
Cashflows from investment activities										
[other items]										
Capital expenditure	(1,067)	(2,198)	(8,108)	(5,508)	(9,245)	(9,864)	(11,195)	(13,008)	(10,403)	(14,282)
Net cashflows from investment activities	(1,067)	(2,198)	(8,108)	(5,508)	(9,245)	(9,864)	(11,195)	(13,008)	(10,403)	(14,282)
Cashflows from financing activities										
New borrowings	191	773	6,175	2,285	5,911	6,321	7,355	8,829	5,861	9,401
Repayment of borrowings										
Net cashflows from financing activities	191	773	6,175	2,285	5,911	6,321	7,355	8,829	5,861	9,401
Net increase/(decrease) in cash and cash equivalents	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents at beginning of year	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents at end of year	0	0	0	0	0	0	0	0	0	0

Statement of financial position

Statement of financial position ($000)	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Assets										
Cash and cash equivalents	0	0	0	0	0	0	0	0	0	0
Other current assets	0	0	0	0	0	0	0	0	0	0
Infrastructure assets	101,041	102,031	113,974	117,839	125,390	138,571	147,913	159,032	171,903	184,122
Other non-current assets	0	0	0	0	0	0	0	0	0	0
Total assets	101,041	102,031	113,974	117,839	125,390	138,571	147,913	159,032	171,903	184,122
Liabilities										
Borrowings - current portion	9,946	10,719	16,893	19,178	25,090	31,411	38,766	47,595	53,455	62,857
Other current liabilities	0	0	0	0	0	0	0	0	0	0
Borrowings - non-current portion	0	0	0	0	0	0	0	0	0	0
Other non-current liabilities	0	0	0	0	0	0	0	0	0	0
Total liabilities	9,946	10,719	16,893	19,178	25,090	31,411	38,766	47,595	53,455	62,857
Net assets	91,095	91,313	97,081	98,660	100,301	107,160	109,146	111,437	118,448	121,265
Equity										
Revaluation reserve	1,425	2,858	9,453	11,032	12,673	19,532	21,439	23,490	30,135	32,498
Other reserves	89,670	88,455	87,628	87,628	87,628	87,628	87,707	87,947	88,313	88,767
Total equity	91,095	91,313	97,081	98,660	100,301	107,160	109,146	111,437	118,448	121,265

Water Services Delivery Plan: additional information

Significant capital projects

The significant capital projects outlined below are expressed in current dollars (uninflated). They include all projects over $1 million, and any projects identified elsewhere in this plan as being necessary to meet compliance, growth, or consent renewal requirements.

These tables will not reconcile perfectly with other tables in this plan that set out capital requirements due to the exclusion of inflation (in this table) and the exclusion of projects which do not meet the significance threshold.

Significant capital projects - drinking water	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Projects to meet additional demand									
Network extensions				250,000	250,000	250,000	250,000	250,000	250,000
Total investment to meet additional demand	0	0	0	250,000	250,000	250,000	250,000	250,000	250,000
Projects to improve levels of services									
Awamoko Drinking Water Supply Upgrade	1,500,000								
Tokarahi Drinking Water Supply Upgrade	2,100,000								
Bushy Creek Drinking Water Supply Upgrade	600,000								
Kauru Hill Drinking Water Supply Upgrade	860,000								
Windsor Drinking Water Supply Upgrade	800,000								
Stoneburn Drinking Water Supply Upgrade	500,000								
Backflow Prevention Plan	150,000	750,000	950,000						
Lower Waitaki Capacity Upgrade		100,000	2,000,000	570,000					
Waihemo Urban & Rural Water Main Upgrades	1,000,000	750,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Ōamaru North End Falling Water Main Upgrade		100,000	3,000,000	3,000,000					
Ōamaru Water Strategy Source Resilience (Build)		2,000,000	5,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Water Main Upgrades							1,500,000	1,500,000	200,000
Ōtematatā DWS Upgrade - Install Filters		2,300,000							
UV upgrades at 4 supplies		400,000							
Ardgowan Dam Upgrades	100,000	900,000							
Kurow Water Supply Compliance & Resilience Improvements	1,500,000								

Significant capital projects - drinking water	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Universal Water Metering	0	0	1,000,000	4,000,000	4,000,000	3,000,000	0	0	
District Wide water resilience reservoirs							1,666,667	1,666,667	1,666,667
Total investment to improve levels of services	9,110,000	7,300,000	12,200,000	9,820,000	6,250,000	5,250,000	5,416,667	5,416,667	4,116,667
Projects to replace existing assets									
Ōamaru Water Facilities Renewals (building related)	100,000	500,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Ōamaru Urban Water Main Renewals (pipes etc)	500,000	500,000	1,280,000	1,280,000	1,280,000	1,280,000	1,280,000	1,280,000	1,280,000
Rural Water Main Renewals (district wide)	200,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
SCADA Renewals (Water)	0	0	650,000	825,000	65,000	65,000	65,000		
Ōamaru Rural Water Main Renewals	860,000	260,000	260,000	260,000	260,000	260,000	260,000	260,000	260,000
Ōamaru Water Strategy Phases One (Build) & Two-Three (Plan)	200,000		3,950,000						
Ōamaru Water Treatment Plant Renewals	1,700,000	100,000	100,000	100,000	200,000	200,000	200,000	200,000	200,000
Urban Water Main Renewals (Valley townships)	100,000	100,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Total investment to replace existing assets	3,660,000	1,710,000	6,790,000	3,015,000	2,355,000	2,355,000	2,355,000	2,290,000	2,290,000
Total investment in drinking water assets	12,770,000	9,010,000	18,990,000	13,085,000	8,855,000	7,855,000	8,021,667	7,956,667	6,656,667

Significant capital projects - wastewater	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Projects to meet additional demand									
Network extensions	0	0	0	250,000	250,000	250,000	250,000	250,000	250,000
Total investment to meet additional demand	0	0	0	250,000	250,000	250,000	250,000	250,000	250,000
Projects to improve levels of services									
Duntroon Wastewater Treatment Plant Upgrade		200,000	2,400,000						
Ōamaru Wastewater Overflow Mitigation					500,000	1,000,000	1,000,000		
Ōamaru Wastewater Treatment Plant Interim Improvements	1,000,000	1,000,000							
Beach Road Catchment Upgrade						3,000,000			
Kurow Wastewater Treatment Plant Upgrade				1,000,000					
Ōamaru Additional Wastewater Pump Station								1,000,000	
Palmerston Wastewater Overflow Mitigation			150,000	150,000	150,000				
Ōamaru Creek - Wastewater Syphon Capacity Upgrade							2,000,000		
Ōamaru Duplicate Wastewater Rising Main								10,000,000	10,000,000
Tradewaste		400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Total investment to improve levels of services	1,000,000	1,600,000	2,950,000	1,550,000	1,050,000	4,400,000	3,400,000	11,400,000	10,400,000
Projects to replace existing assets									
Ōamaru Wastewater Main Renewals	2,100,000	2,035,000	2,000,000	2,000,000	2,000,000	2,000,000	2,150,000	2,150,000	2,150,000
Urban Wastewater Mains Renewals/Upgrades			260,000	260,000	260,000	260,000	260,000	260,000	260,000
SCADA Renewals (Wastewater)	0		650,000	825,000	65,000	65,000	65,000	0	0
Palmerston Wastewater Main Renewals			750,000	750,000	500,000	500,000	500,000	500,000	500,000
Ōamaru Wastewater Pumpstation Renewals			200,000	200,000	200,000	200,000	200,000	200,000	200,000
Ōamaru Wastewater Relocation/Renewal - Orwell St	0	2,500,000	0	500,000	500,000	500,000	500,000	8,000,000	8,000,000
Wastewater Facilities Renewals							100,000	100,000	1,500,000
Total investment to replace existing assets	2,100,000	4,535,000	3,860,000	4,535,000	3,525,000	3,525,000	3,775,000	11,210,000	12,610,000
Total investment in wastewater assets	3,100,000	6,135,000	6,810,000	6,335,000	4,825,000	8,175,000	7,425,000	22,860,000	23,260,000

Significant capital projects - stormwater	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34
Projects to meet additional demand									
Total investment to meet additional demand	0	0	0	0	0	0	0	0	0
Projects to improve levels of services									
Ōamaru Stormwater Upgrades				0	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Stormwater Main Inspection & Cleaning Programme	0	0	200,000	200,000	150,000	150,000	150,000	150,000	150,000
Total investment to improve levels of services	0	0	200,000	200,000	2,150,000	2,150,000	2,150,000	2,150,000	2,150,000
Projects to replace existing assets									
Stormwater Main Renewals	50,000	350,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Total investment to replace existing assets	50,000	350,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Total investment in stormwater assets	50,000	350,000	700,000	700,000	2,650,000	2,650,000	2,650,000	2,650,000	2,650,000

Risks and assumptions

The following risks and assumptions relate specifically to the delivery of the proposed capital works and water services within the Waitaki District. Specific risks relating to the establishment of Southern Waters is set out in the Southern Waters Done Well WSDP.

Parameters	Drinking supply	Wastewater	Stormwater
Key Risks • Future water service delivery • Network performance • Regulatory compliance • Delivery of Capital Programme • Organisational capacity • Long term issues e.g. providing for growth, climate change • Sludge removal	Palmerston water demand has exceeded permitted abstraction limits and whilst restrictions have temporarily resolved compliance without further water demand management interventions exceedances are likely to reoccur. The removal of funding for reticulating water supplies to small settlements leaves them vulnerable to poor water quality from onsite systems. The removal of many growth-related projects mean growth may not be able to be accommodated if it occurs outside of the assumed rate and locations Unfunded pre-treatment and raw water storage may be required on the Omaru Scheme depending on the outcome of the supplying irrigation scheme consent requirements. High water demand and estimated losses may lead to schemes exceeding their water abstraction limits. The lack of robust asset condition information will impact the ability to programme renewals efficiently and potentially lead to critical asset or network runaway failures. And under recovery of costs. If the estimated life of the assets is over estimated insufficient depreciation will be recovered from current users leaving inequitable intergenerational costs for future users and insufficient borrowing capacity for needed future renewals	The removal of many growth-related projects mean growth may not be able to be accommodated if it occurs outside of the assumed rate and locations Trade waste discharge costs may not be being fully recovered from users and septage and trade waste present a risk to the stable operation of treatment processes if not well controlled. The lack of robust asset condition information will impact the ability to programme renewals efficiently and potentially lead to critical asset or network runaway failures. And under recovery of costs. If the estimated life of the assets is over estimated insufficient depreciation will be recovered from current users leaving inequitable intergenerational costs for future users and insufficient borrowing capacity for needed future renewals. The WSDP plan includes funding to remove sludge from the Ōamaru WWTP oxidation ponds. There is no allowance for the disposal of this sludge, and it is assumed that this will be allowed to be spread over land at the WWTP. If consent is not granted to do this from Otago Regional Council, then WDC will need to dispose of this sludge at a landfill. Ōamaru landfill is not consented to receive sludge, and Palmerston landfill will be closed. This means sludge will need to be disposed of out of district at a significant cost.	The lack of robust asset condition information will impact the ability to programme renewals efficiently and potentially lead to critical asset or network runaway failures. And under recovery of costs. If the estimated life of the assets is over estimated insufficient depreciation will be recovered from current users leaving inequitable intergenerational costs for future users and insufficient borrowing capacity for needed future renewals. If condition is better than assumed, or useful lives longer than assumed, there is a risk of over recovery from current water consumers, and over investment in the network. As these risks are better understood, financial projections are likely to need revision.

Parameters	Drinking supply	Wastewater	Stormwater
Significant assumptions • Future water service delivery • Network performance • Regulatory compliance • Delivery of Capital Programme • Organisational capacity • Long term issues e.g. providing for growth, climate change	Minimal growth is expected in the district, and the current infrastructure can accommodate it. Networks will continue to perform at the required levels with the planned level of investment. No significant investment will be required in asset management systems and processes to meet future regulatory requirements. The combination of water metering and the active leakage control programme will be sufficient to address the water losses from the networks. The Ōamaru water strategy covers multiple interlinked capital projects. It is still being refined and capex projects and timing will likely change. The Lower Waitaki is the best water source and the reconsenting process by LW Irrigation Company is still active.	Minimal growth is expected in the district, and the current infrastructure can accommodate it. Networks will continue to perform at the required levels with the planned level of investment. No significant investment will be required in asset management systems and processes to meet future regulatory requirements. The Ōamaru wastewater strategy covers multiple interlinked capital projects. It is still being refined and capex projects and timing will likely change.	Minimal growth is expected in the district, and the current infrastructure can accommodate what it. Networks will continue to perform at the required levels with the planned level of investment. No significant investment will be required in asset management systems and processes to meet future regulatory requirements.

Appendix 1 – Resource consents

Water supply

Region	Location	Consent No.	Expiry Date	Allowable Take (m³/day)	Comments
Canterbury	**Alamodome**	CRC 940476	10-Nov-2028	225	Infiltration Gallery in Awahokomo Stream Bed
	Awamoko	Sand Filter - Water from Lower Waitaki Irrigation Race			
	Duntroon	CRC 982133	9-Sep-2033	306	Groundwater Via Bore
	Kurow	CRC 940477	10-Nov-2028	2419	Groundwater Via Bore - (3 Bores)
	Ōhau	CRC 001915	21 June 2035	2.2 l/s	Groundwater Via Infiltration Gallery
	Ōmārama	CRC194088	10 Sep 2034	345	To take water from Old Man Creek
		CRC213794	23-Dec-2032	3,240	Infiltration Gallery adjacent to Ōmārama Stream
	Bushy Creek	CRC084382	18 Apr-2046	1,512m³/ consecutive 7 days	Take and use water for Bushy Creek
	Ōtematatā	CRC185065	8 May 2044	4,380	Take surface water from Ōtematatā Stream bed
	Tokarahi	CRC 960857	13-Dec-2030	1750	Infiltration Gallery adjacent to Maerewhenua
Otago	**Kauru Hill**	RM15.240.01	1-May-2051	611	Infiltration Gallery in the Kauru River
	Lower Waitaki	RM11.019.1	01 Mar-2046	1,728	Take groundwater from Lower Waitaki Plains aquifer for community supply
	Ōamaru	CRC224708	2 Mar-2030	Varies depending on river flow	Surface water – This is not a council consent. WDC buy shares off LWIC, but have additional volume allocated/held/guaranteed through LW Zone Committee
	Stoneburn	RM17.121.01	1-Sep-2052	360	Surface Water Intake from North Branch of Waikouaiti River – Primary Allocation
		RM17.121.02	1-Sep-2052	40	Surface Water Intake from North Branch of Waikouaiti River – Supplementary Allocation
	Waihemo	RM11.025.1	21 Mar-2046	11,427 m³/week	Take water from Shag Alluvium aquifer for community supply
	Windsor	RM15.240.02	1-May-2051	569	River Intake on Kakanui River

Wastewater

Region	Location	Consent No.	Expiry Date	Allowable Discharge	Comments
Canterbury	Ōhau	CRC 000426	1-Nov-2034	160m3/day	Discharge 160m3/day of oxidation pond effluent to ground via soakage trench
	Ōmārama	CRC200183	4 Dec 2044		To discharge contaminants into land.
	Ōtematatā	CRC 012181	19-Dec-2038	22 l/s	Discharge contaminants into water during extreme rainfall events
		CRC 094041	1 June 2038		Discharge contaminants to land
	Kurow	CRC 062249	31 May 2030	15 l/s maximum	Discharge contaminants to land
	Duntroon	CRC213039	24 Feb 2026	Septic tank	To use land for a community wastewater treatment system
		CRC201709	24 Feb 2026	8,800 Litres per day	To discharge domestic wastewater to land from a community wastewater treatment system
Otago	Ōamaru	ORC 2002.656	30-Apr-2038	Not applicable	Discharge to air, odours, and aerosols from the Ōamaru Treatment Plant
		ORC 2002.655	30-Apr-2038	7500m3/day	Discharge of 7500m3/day of treated effluent to Landon Creek
		ORC 2002.704	30-Apr-2038	7500m3/day	Discharge of 7500m3/day of treated effluent to Land
		ORC 2004.163	1 Apr 2028	Not applicable	Discharge to air odours resulting from the removal of sludge
	Moeraki	RM 16.008.01	20 Jan 2053		To discharge contaminants to air
		RM 16.008.02	20 Jan 2053	25 l/s 225 m^3/day	To discharge contaminants to land
	Palmerston	RM11.096.01.V2	23 March 2046	350 m^3/day	Discharge treated wastewater to land from the Palmerston wastewater treatment plant
	Otago Region	ORC 98255	1-June-2018	Not applicable	Discharge chemically inert, non-toxic, non-radioactive tracer dye to natural water

Stormwater

Record number	CRC186252
Consent location	Lake Ohau Village, Omarama, Ōtematatā, Kurow, & Duntroon, Waitaki District
Comments	To discharge contaminants to land and water.
Commencement date	05 Dec 2019
Date this record number was issued	05 Dec 2019
Permit type	Discharge Permit (s15)
Record type	New Consent
Expiry date	05 Dec 2044

Appendix 2 – Council resolution

Waitaki District Council | TE KAUNIHERA Ā ROHE O WAITAKI

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Minute of Extraordinary Council Meeting held on Tuesday, June 9, 2026
Item 4.1: Adoption of Water Services Delivery Plan

RESOLVED WDC 2026/135
Moved: Cr Frans Schlack
Seconded: Cr Brent Cowles
That Council:

1. **Approves** the key changes as summarised in attachment 2 to the previously rejected Water Services Delivery Plan to address matters raised in the 6 October 2025, letter from the Secretary of Local Government including:

   a. Updating disclosures in relation to asset condition.

   b. Undertaking and including an asset management maturity assessment.

   c. Updating financial information for the 2026/27 rating and other decisions.

2. **Approves** the attached Water Services Delivery Plan, subject to any minor adjustments required, for resubmission to the Department of Internal Affairs as soon as practical.

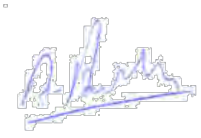
3. **Notes** that in accordance with section 18 of the Local Government (Water Services Preliminary Arrangements) Act 2024, the Chief Executive must provide certification to the Department of Internal Affairs in respect of the information provided by Waitaki District Council that the Water Services Delivery Plan complies with above Act and that the information contained in the plan is true and accurate.

4. **Delegates** to the Chief Executive the authority to finalise the Water Services Delivery Plan, including making minor amendments to the plan if required in advance of submission to the Department of Internal Affairs.

CARRIED UNANIMOUSLY

For: Mayor Mel Tavendale, Deputy Mayor Rebecca Ryan, Cr Brent Cowles, Cr Courtney Linwood, Cr Dan Lewis, Cr Frans Schlack, Cr Jeremy Holding, Cr Jim Hopkins, Cr John McCone, Cr Mata'aga Hana Fanene-Taiti and Cr Sven Thelning
Against: Nil
Abstained: Nil

Signed:



Alex Parmley
Chief Executive

Appendix 3 – Network asset condition grading assessment report

WAITAKI DISTRICT COUNCIL

NETWORK ASSET CONDITION GRADING

November 2025

projectmax.co.nz

ProjectMax
Optimising Pipeline Renewals

Table of Contents

Document Control

Revision	Date	Description	Author(s)	Reviewed by	Approved by	Issued to
Draft Rev0	21 November 2025	20251121 WDC Network Asset Condition Grading Assessment Report	Steve Apeldoorn, Nicolette Voskuilen & Eric Skowron	Steve Apeldoorn	Steve Apeldoorn	Paul Hayes
Draft Rev1	24 November 2025	20251121 WDC Network Asset Condition Grading Assessment Report	Steve Apeldoorn, Nicolette Voskuilen & Eric Skowron	Steve Apeldoorn	Steve Apeldoorn	Paul Hayes
Final Rev 2	28 November 2025	20251121 WDC Network Asset Condition Grading Assessment Report	Steve Apeldoorn, Nicolette Voskuilen & Eric Skowron	Steve Apeldoorn	Steve Apeldoorn	Paul Hayes

Project Name:	Network Asset Condition Grading Support
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Project Manager:	Ian Garside
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Executive Summary

Waitaki District Council (WDC) engaged ProjectMax Limited to perform a desktop assessment of all wastewater, stormwater and drinking water network assets.

The WDC 3 waters networks, across all townships, consist of a total of 1,883km of pipelines including 1,622km of water pipes, 203km of wastewater pipes (including rising mains) and 58.6km of stormwater pipes.

For the assessment, WDC provided information for each wastewater, stormwater and drinking water network assets including unique identifiers for each asset (COMPKEY), pipe installation date, diameter and material, criticality grading and other attributes.

For assets that were previously inspected, collected condition grading information has been incorporated into the desktop assessment including approximately 70km of gravity wastewater and stormwater CCTV inspections, and approximately 6.3km of p-CAT inspections to determine wall thickness on pressure drinking water pipes.

This information was reviewed and integrated into a detailed model to establish condition grading and populate confidence grading for all assets.

Condition Grades applied in the assessment follow current Water New Zealand standards, ranging between 1 (very good) and 5 (very poor).

Confidence in asset condition is described be a grade range between A (highly reliable) and D (very uncertain). Assets where some previous inspections have occurred have been populated with Confidence Grade B. Assets with Condition Grades determined from the desktop assessment have been populated with Confidence Grade D (which is typical for asset Condition Grades determined from desktop assessment where no physical screening or inspection has occurred).

The most common pipe materials include polyethylene, PVC and asbestos cement (AC) for drinking water pipes, concrete, earthenware and PVC for gravity wastewater pipes, polyethylene, PVC and cement lined steel for wastewater rising mains and concrete, earthenware and PVC for stormwater pipes.

A model was developed to incorporate condition information from previous inspections and asset attribute information to establish Condition Grades and assign Confidence Grades. The model referenced a library of 20+ years of pipe condition data from New Zealand and other information to apply the Monte Carlo methodology for statistical distribution of Condition Grades to assets where no previous inspection data was available.

The assessment determined that of 1,883km of network pipelines, approximately 658km are of Condition Grade 4 or 5 (poor or very poor) including 42.9km of gravity wastewater, 0.5km of wastewater rising mains (including all AC and cast iron rising mains), 13.9km of stormwater and 600.8km of drinking water assets.

Approximately 9% of wastewater assets, 8% of stormwater assets and 7% of drinking water assets are Condition Grade 5 (very poor condition).

The assessment compared Condition Grades from the desktop assessment with previously determined Likelihood of Failure (LoF) data provided by WDC. The desktop assessment determined that approximately 23% of wastewater pipes, 22% of stormwater pipes and 31% of drinking water pipes are Condition Grade 4 or 5 (poor or very poor) compared to 19% of wastewater, 1.9% of stormwater and 5% of drinking water pipes from the previous LoF assessment.

The comparison of previous LoF Condition Grades and this desktop assessment generally show a reduction in the proportion of the assets in all three waters for Grades 1 and 2 (very good and good condition) and an increase in the number of assets with Grades 3 to 5 indicating a greater level of network deterioration than was previously assessed. The proportion of all 3-waters pipes in very poor condition (Grade 5) has increased from an average of 0.5% to 7.4%.

Recommendations have been made for some actions to be taken prior to April 2026 that would improve confidence in the assessed condition of pipes that are expected to impact on the quantum of assets requiring renewal within the short-term renewal planning horizon and the information needed to update the WSDP. These actions include extending the analysis of existing investigation data to better understand and justify the condition of pipes believed to be in poor condition and likely requiring renewal. Recommended actions also include undertaking a limited investigation of some pipe materials where there is a high number of pipes that are predicted to have a Condition Grade 5 (like AC pipe) that, based on low rates of reported failure, were not expected to be in such a deteriorated condition. These inspections are to determine if those pipe materials are actually performing at or worse than national averages for the asset condition. Based on these investigations and assessment the desktop assessments may require adjusts to reflect and inform renewal funding.

Longer term recommendations include development of prioritised annual inspection programmes focused on assets with a predicted Condition Grade of 4 or 5 that have not been previously inspected based on high and very high criticality scores.

Some opportunities for data improvement are recommended including collection of asset information through ‘opportunistic’ BAU to resolve pipe attribute anomalies with installation

dates and pipe material (where installation dates are inconsistent availability of pipe materials). Further recommendations have also been made to adjust base lives of some pressure pipeline material.

This desktop assessment has prepared Condition Grades and Confidence Grades for all WDC wastewater, stormwater and drinking water network assets. Outcomes are expected to be informative for responding to DIA queries on the WDC Water Services Delivery Plan.

1 Introduction

1.1 Background

Waitaki District Council (WDC) is comprised of several townships including Dunback, Duntroon, Herbert, Hampden, Kakanui, Kurow, Macraes, Maheno, Moeraki, Ngapara, Omarama, Oamaru, Otematata, Palmerston, Pukeuri, Reidston, Waitaki Bridge and Weston. WDC is responsible for provision of wastewater, stormwater and drinking water for these communities.

The Water Services Delivery Plan (the Plan) for WDC was submitted to the Department of Internal Affairs (DIA) on August 27, 2025.

The Plan was not approved because a condition assessment of wastewater, stormwater and drinking water networks presented in the Plan was considered insufficient. As a result, WDC requested a desktop condition assessment of linear water, wastewater, and stormwater network assets.

ProjectMax recommended a three-stage approach: Stage 1: Develop initial condition grading (desktop), Stage 2: Physical Inspection Prioritisation, Scoping (Stage 2a) and Technical Support (Stage 2b, if required) and Stage 3: Inspection outcomes review, analysis, reporting, and revised condition and confidence grading for inspected assets.

This report outlines the methodology, analysis, results and recommendations from Stage 1.

1.2 Department of Internal Affairs Review

On 6 October 2025, DIA provided a response to WDC informing that the Plan was not considered in compliance with the Local Government Water Services Preliminary Arrangements Act of 2024 (the Act).

Following financial, technical and legislative assessments, the DIA concluded that the WSDP did not satisfy requirements for the assessment of the current condition, lifespan and value of the drinking water, wastewater and stormwater networks under Section 12(1)(h) of the Act.

The DIA response noted that condition grading information for drinking water and stormwater networks was missing and reliance of dated information on wastewater network grading was noted.

An amended Plan was requested by the DIA, noting it should include an assessment of the current condition, lifespan and value of the drinking water, wastewater and stormwater networks.

1.3 Project Stages

1.3.1 Stage 1: Desktop Assessment

The desktop assessment scope includes data request, data review and desktop assessment of network condition.

1.3.2 Stage 2: Asset Inspection

Stage 2 scope includes prioritisation, scoping and technical support (if required) for physical asset condition inspection. Stage 2 scope is not included in this report but is recommended for completion in FY25-26 to enable commencement of a condition inspection programme in FY26-27.

1.3.3 Stage 3: Assessment of Inspected Assets & Condition Grade Update

Following completion of inspections in Stage 2, inspection data should be audited, reviewed, and analysed to establish final structural (and service) condition grades and confidence grades.

2 Methodology

2.1 Approach

2.1.1 Structural Condition Grading

Standard definitions for the condition grades are presented in Table 1. The definitions are aligned with the New Zealand Gravity Pipe Inspection Manual (4th Edition) (Section E1.2 Table E1.1), the New Zealand Pressure Pipe Inspection Manual (Section C2.3 and Section C3 through Section C9) and the International Infrastructure Management Manual (IIMM) condition grading descriptions.

Table 1 Structural Condition Grades

Structural Condition Grade	Structural Definitions		
	Gravity WW & SW Pipes	Pressure WW Pipes	Pressure DW Pipes
1 (Very Good)	As new condition. No structural defects or evidence of internal deterioration.	As new condition. Exceeds 2x minimum design factor of safety of 2. No structural defects or evidence of internal deterioration.	As new condition. No structural defects or evidence of internal deterioration. Exceeds 2x minimum design factor of safety of 2. No structural defects or evidence of internal deterioration.
2 (Good)	Some structural defects are evident, causing minor deterioration. If defects worsened it would not result in structural failure.	Some minor deterioration evident but still exceeding minimum design factors of safety (>2). If defects worsened it would not result in structural failure.	Some structural defects evident, causing minor deterioration. If defects worsened it would not result in structural failure. Still exceeding minimum design factors of safety (>2). If defects worsened it would not result in structural failure.
3 (Moderate)	Structural defects present with moderate deterioration that is beginning to affect structural performance. If the defects worsened it could lead to structural failure	Generally sound although with evidence of some external or internal deterioration. Current condition meets minimum design factors of safety (2). If the defects worsened it could lead to structural failure	Structural defects present with moderate deterioration that is beginning to affect structural performance. If the defects worsened it could lead to structural failure. Current condition meets minimum design factors of safety (2).
4 (Poor)	Significant defects present with serious deterioration evident affecting the structural integrity. If defects worsened it would lead to structural failure.	Significant level of external or internal deterioration. Current condition factor of safety is less than 2 which is below minimum design factors of safety. Pipe is at risk of failure if subject to pressure surges.	Significant level of external or internal deterioration. Current condition does not meet design factor of safety of 2. At risk of failure due to pressure surges.

Structural Condition Grade	Structural Definitions		
	Gravity WW & SW Pipes	Pressure WW Pipes	Pressure DW Pipes
		Further deterioration would lead to failure	
5 (Very Poor)	Deterioration has extended to a point where structural failure is imminent or has already occurred.	Deterioration has extended to a point where there are no reliable structural capacity and failure is imminent or has already occurred. The remaining factor of safety is <1.	Deterioration has extended to a point where there are no reliable structural capacity and failure is imminent or has already occurred.

2.1.2 Confidence Grading

Data confidence grading applies a letter grade of A through D for highly reliable asset condition information through to very uncertain asset condition data, respectively. This method for grading asset condition confidence has been referenced in New Zealand water industry standards as far back as the NZWWA Infrastructure Asset Grading Guidelines in 1999. More recently, this approach to tracking asset condition data confidence has been referenced in the New Zealand Gravity Pipe Inspection Manual (4th Edition) published in 2019 and the New Zealand Pressure Pipe Inspection Manual published in December 2024.

Confidence grading for condition grading from desktop assessments are Confidence Grade D.

A summary of confidence grading is presented in Table 2.

Table 2 Confidence Grades

Confidence Grade	General Meaning	Type of Information
A	**Highly Reliable:** Data based on sound records, procedures, investigations and analysis which is properly documented and quality assured. Recognised as the best method of assessment including verification on site.	Medium/High Resolution screening inspection plus NDT/DT testing. Known pipe attributes including duty range, pipe class/wall thickness
B	**Reliable:** Data based on sound records, procedures, investigations and analysis, which is properly documented and quality assured. Has minor shortcomings; for example, the data is old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.	Medium/High resolution screening inspections only Known pipe attributes including duty range, pipe class/wall thickness

Confidence Grade	General Meaning	Type of Information
C	**Uncertain:** Data based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolation from a limited sample for which grade A or B data is available.	Discrete sampling (NDT/DT) only Or Low-resolution screening. Limited known (verified) pipe attributes
D	**Very Uncertain:** Data based on incomplete information or of uncertain quality. May include unconfirmed verbal reports and/or cursory inspection and analysis and are not verified by site checks.	Visual or desktop review Historical test result (where data confidence is not known) Low Resolution analysis/probability of failure assessments.

2.2 Input Data

2.2.1 Pipe Attributes

Attribute data for assessed wastewater, stormwater and drinking water pipes was provided by WDC. Asset ID (COMPKEY), installation date, pipe material and pipe diameter and modelled pressure (Drinking Water only) were the key attribute fields referenced in this assessment.

2.2.2 Existing Condition Grading

The desktop assessment of the WDC pipe networks includes prediction of asset conditions, and where available the assessed condition grades from completed investigations. Where physical inspection data is available this would supersede predicted condition grades. WDC provided the following inspection data for inclusion with the overall assessment data:

CCTV Inspections of Wastewater and Stormwater Gravity Pipes

In total WDC has completed 70.4km CCTV inspections of wastewater and stormwater pipes over a 24-year period from 2001 to 2025. Because of the 'age' of some of the inspections, it was anticipated that not all of the inspections supplied could be used for the assessment of the current pipe condition as it could be expected that the condition of the pipe may have changed since the inspection was completed. An evaluation was undertaken to determine which inspections could, with reason, be used for the desktop assessment.

This evaluation considered what expected change in pipe condition could reasonably be expected to have occurred to the pipe condition (i.e., increase in the pipe condition grade) from the time of the inspection to the present day.

Table 3 and Table 4 shows the outcomes of this evaluation based on amount of time since the inspection (expressed as percentage of the base life that has passed). The evaluation was conducted as two separate evaluations based on two different base life scenarios applicable to the pipe materials that have been inspected. The tables show the scenarios where no change is expected to have occurred (shown as '"0" and highlighted green) as well as where the change is expected to have occurred and by how much (shown as "+1" grade change or "+2" grade changes).

The scenarios where no grade change is expected to have occurred identified the inspections that could reasonably be used for assessment of the current pipe condition.

Table 3 Inspections of Gravity Pipes with Base Life of 120 years

			Base Life of 120 years				
			% of Base Life since inspection (to 2025)				
			24	18	13	6	4
		Original	20%	15%	11%	5%	3%
% of Expected Base Life	10%	1	+1	+1	+1	0	0
	15%	1	+1	+1	+1	+1	+1
	30%	2	0	0	0	0	0
	40%	2	0	0	0	0	0
	45%	2	0	0	0	0	0
	50%	2	+1	+1	0	0	0
	55%	2	+1	+1	+1	0	0
	65%	2	+1	+1	+1	+1	+1
	70%	3	+1	0	0	0	0
	80%	3	+2	+1	+1	0	0
	85%	3	+2	+2	+1	+1	+1
	90%	4	+1	+1	+1	0	0
	98%	4	+1	+1	+1	+1	+1
	100%	5	0	0	0	0	0

Table 4 Inspections of Gravity Pipes with Base Life of 100 years

			Base Life of 100 years				
			% of Base Life since inspection (to 2025)				
			24	18	13	6	4
		Original	24%	18%	13%	6%	4%
% of Expected Base Life	10%	1	+1	+1	+1	+1	+1
	15%	1	+1	+1	+1	+1	+1
	30%	2	0	0	0	0	0
	40%	2	0	0	0	0	0
	45%	2	0	0	0	0	0
	50%	2	+1	0	0	0	0
	55%	2	+1	+1	+1	0	0
	65%	2	+1	+1	+1	0	0
	70%	3	+1	0	0	+1	+1
	80%	3	+2	+1	+1	0	0
	85%	3	+2	+2	+1	+1	+1
	90%	4	+1	+1	+1	0	0
	98%	4	+1	+1	+1	+1	+1
	100%	5	0	0	0	0	0

Both tables show similar outcomes with the only difference being where the age of the pipe at the time of the inspection 70% of the base life of the pipe.

Some exceptions to the above evaluation were made to further enhance the use of assessed condition from inspections. These included:

1. Inspections where the assessed grade was between 1 and 3 where the inspections were completed between 2021 and 2025
2. All pipe inspections where the assessed grade was a 4. These were accepted because while some grade 4 pipes may have deteriorated to a grade 5, the likelihood of failure was significant and excluding inspections with a grade of 4 would be detrimental to a fair assessment process.

As a result of the evaluation process 32.9km of inspections were accepted for use within the desktop assessment.

Confidence in the condition assessment from the CCTV inspections.

The assessed condition grades from the CCTV inspection are generated based on a process called Scoring Analysis using the Peak Score generated from the CCTV inspection reports (refer to section E1 Preliminary Condition Grading, New Zealand Gravity Pipe Inspection Manual, 4th Edition, 2019). The condition grade generated is referred to as a 'Preliminary Condition Grade' as the reliability of the condition grade is not considered as being high. This is because there can be significant variability in the quality of the CCTV reporting (leading to incorrect assessments) and also due to the limitations of the scoring analysis process itself, in particular for inspections completed under the earlier 2nd and 3rd editions of the pipe inspection manual. The variabilities often lead to condition grades that tend to overstate the pipe condition typically resulting in a greater proportion of grades 3 to 5 than would result from a more detailed engineering review of the inspection video. On this basis the confidence grade allocated to the CCTV condition assessment grades at most is a B.

p-CAT Inspections of 450mm and 600mm diameter Cast Iron Drinking Water Pipes

In August 2024 WDC completed inspections of approximately 6.3km (29 assets) of parallel Cast Iron trunk mains within the drinking water network using inverse transient pressure analysis (p-CAT). These 450mm and 600mm diameter pipes installed in 1883 start at Oamaru water treatment plant (WTP) and connect to Oamaru township reticulation network on Eden Street and Thames Street.

The assessment from this investigation found that these pipes were in good to moderate condition (Grades 2 and 3).

Confidence in the condition assessment from the p-CAT inspections

While the investigations had measured the remaining wall thickness, the assessment of the pipe condition has been based on percentage of the remaining wall in comparison to the original wall thickness and not the assessment of the remaining structural capacity of the pipe wall (refer to 2.3 Approach, Limitations and Assumptions, Cast Iron Pipes). While the assessment provides confidence above a predicted grade as it utilises a measured remaining wall thickness, as it does not consider the actual pipe capacity it cannot be considered as high confidence. On this basis the confidence grade allocated to the p-CAT condition assessment is a grade B.

2.2.3 Pipe Materials

The WDC 3 waters network consists of a total of 1,883km of pipelines including 1,622km of water pipes, 203km of wastewater pipes (including rising mains) and 58.6km of stormwater pipes.

There are 16 unique material code attributes within the WDC data set, several of these relate to plastic pipes. As part of the assessment process these material codes were simplified clustering groups of subset materials under a single material attribute as shown in Table 5. The reclassified material codes are referenced within this report when referring to the various pipe materials.

Table 5 Reclassification/Grouping of Pipe Materials for the Assessment Process

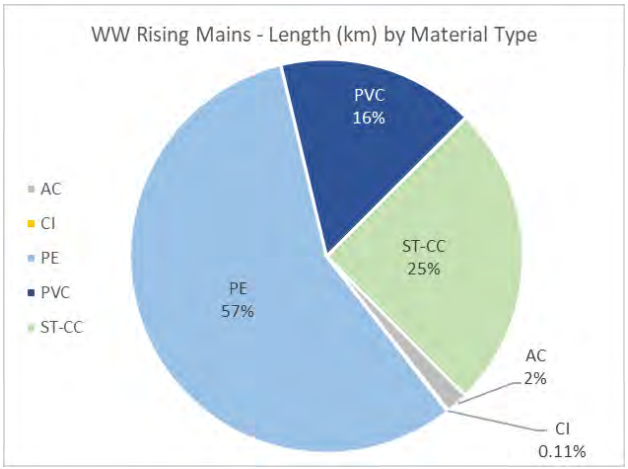
Reclassified Material Code	Reclassified Name	Material Code List from Pipe Attribute Data Supplied
ABS	Acrylonitrile Butadiene Styrene	ABS
AC	Asbestos Cement	AC
CC	Reinforced Concrete Pipe	CC
CI	Cast Iron	CI
DI	Ductile Iron	DI
PE	Polyethylene	HDPE, MDPE, PE, PE80, PE_100,
PVC	Polyvinyl Chloride	PVC, PVCm, PVCo, PVCo_S1, PVCo_S2, uPVC
ST-CC	Steel Cement Lined	ST-CC
ST	Steel	ST
Galv	Galvanised Steel	GALV
RL	Relined Pipe	FF-CIPP, UV-CIPP
EW	Earthenware	EW
SN	Stoneware	SN

The pipe materials in each of the water types mostly consist of three to four predominant material types along with a much smaller proportion of other materials as can be seen in Graphs 1 to 4 and in Table 6.

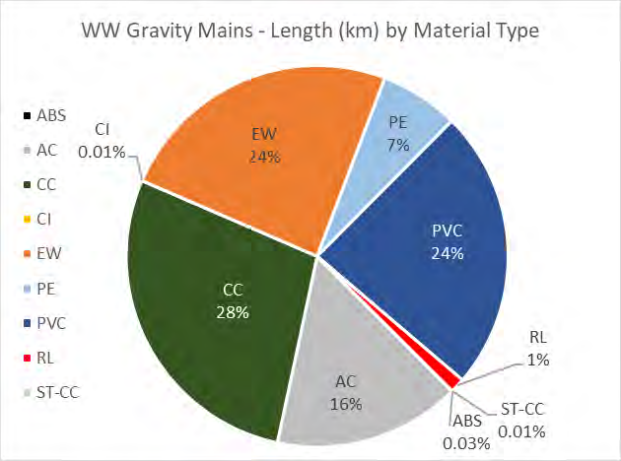
Table 6 Pipe Materials by Water Type

Water Type	Major Materials	Minor Materials (<10%)
Wastewater Rising Mains	PE, PVC, ST-CC,	AC, CI
Wastewater Gravity	CC, EW, PVC, AC,	PE, RL, ST-CC, ABS, CI
Stormwater Gravity	CC, EW, PVC	AC, ST, SN, PE, CI
Water Mains	PE, PVC, AC	CI, ST, GALV, DI

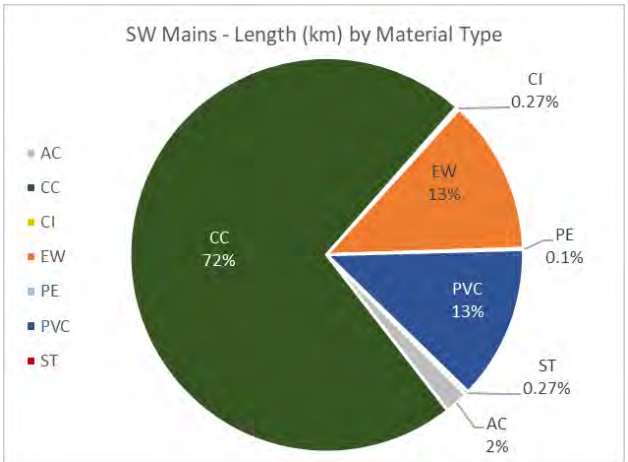
Graph 1 Wastewater Rising Mains: Length by material type



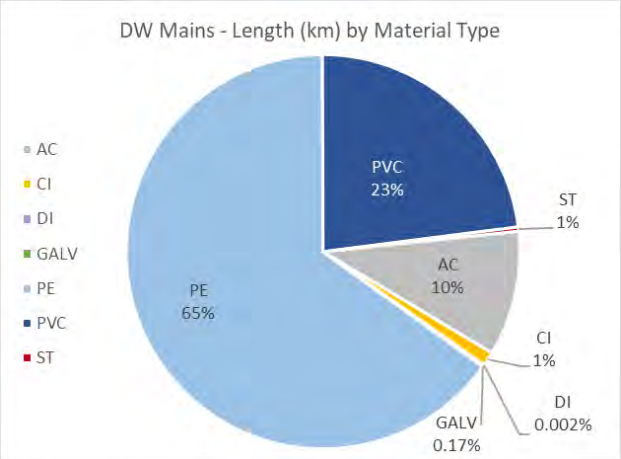
Graph 2 Wastewater Gravity Mains: Length by material type



Graph 3 Stormwater Mains: Length by material type



Graph 4 Drinking Water Mains: Length by material type



The data review process prior to the condition assessment identified some material anomalies. These anomalies are unexpected install dates associated with pipe material. These are identified as follows:

Table 7 Material Data Anomalies

Material	Install Decade	Occurrences	Comment
PE	1880	1	Likely GIS date not updated
	1910	2	
PVC	1880	1	
	1881	1	
	1946	1	
AC	1880	1	Incorrect GIS date but material should be confirmed
	1938	1	Material should be confirmed
	1994 to 2017	20	Likely GIS material not updated
CI	2013	2	

No changes were made to the data supplied and the assessments were undertaken using the existing attribute data with the anomalies. As the number of anomalies are small compared to the overall data, it is acknowledged that these anomalies are expected to result in a condition assessment of these particular pipe assets that will not reflect the actual material in place. These anomalies should be reviewed and corrected to improve confidence in the assessed condition.

WDC has applied pipe material data confidence rating descriptions against each pipe asset. These define confidence in the identification of the pipe material ranging from very Low to Very High. In addition, the confidence description includes identification as to the source of the data (e.g., "Assumption", "Asbuilt", "Survey/Inspection"). In a small number of cases, confidence in the pipe material is unknown. As the desktop condition assessment relies on the pipe material to apply the appropriate assessment model, this confidence rating system is very positive and can determine where value could be gained by improving the confidence on the pipe material attribute. Table 8 identifies the number of pipe assets where the assessed pipe condition is poor or very poor, (grades 4 and 5) and the material confidence rating is Low or Very Low. If these materials were to change it is likely that this would result in a change in the assessed condition. However, in perspective, the number of assets identified in Table 8 represents less than 2% of all the assets. To help close these gaps over time and further enhance the material reliability it is recommended that WDC collect information and update or confirm the pipe materials (along with other attribute data, e.g., pipe diameter) through opportunistic data collection as part of BAU, (e.g., as part of reactive maintenance or planned inspections) in particular for the assets that are believed to be in poor or very poor condition and have low or very low confidence in the pipe material.

Table 8 Overview of assets with assessed condition grades of 4 and 5 with low material confidence

Row Labels	Material Confidence	Condition Grade 4	Condition Grade 5	Sum	Condition Grade 4	Condition Grade 5	Sum
WW Gravity	Combined	**26**	**16**	**42**	**1,668**	**3,178**	**4,846**
	Low, Archive Info	1		1	29		29
	Low, Assumption	1		1	1		1
	Unknown	24	16	40	1,638	3,178	4,816
WW Rising	Unknown	**10**	**4**	**14**	**2,917**	**2,214**	**5,131**
SW	Combined	**69**	**13**	**82**	**3,631**	**547**	**4,178**
	Low, Assumption	63	11	74	3,534	326	3,860
	Low, Survey / Inspection		1	1		119	119
	Very Low, Assumption	2		2	8		8
	Unknown	4	1	5	89	102	191
DW	Combined	**196**	**49**	**245**	**17,543**	**5,453**	**22,996**

Row Labels	Material Confidence	Condition Grade 4	Condition Grade 5	Sum	Condition Grade 4	Condition Grade 5	Sum
	Low, As Builts	20	3	23	5,869	1,566	7,435
	Low, Assumption	10	1	11	2,172	1,408	3,581
	Low, Local / Contractors Knowledge	20	2	22	1,986	903	2,889
	Very Low, Assumption	8	3	11	401	52	453
	Unknown	138	40	178	7,115	1,523	8,638
Sum		**301**	**82**	**383**	**25,759**	**11,391**	**37,150**

2.3 Approach, Limitations and Assumptions to Condition Assessment

The approach to undertaking the desktop assessment of the water assets is a multi-model approach differentiated largely by gravity pipe assets and pressure pipe assets as follows:

Gravity Pipes – Assessment is based on utilising a database of assessments and apply statistical analysis for various pipe material and diameter cohorts and apply to the WDC gravity assets using Monte Carlo Simulation. The intent is to determine the likely condition of each gravity pipe based on the likely condition of pipes of the same material, age and where possible diameter.

Pressure Pipes – individual condition assessment models have been developed for the dominant pressure pipe materials (CI, AC, PE and PVC).

Minor and small quantity pipe materials – for the pipe materials where there is little or no gravity pipe assessments or where the development of assessment models is not economical, pipes have been assessed based on historical evidence of performance, or industry technical guidelines.

The following discusses the basis of the application of the pressure pipe assessment models as well as setting out the assumptions made and discussing the factors and limitations that will affect the desktop assessment of pipe condition.

Plastic Pressure Pipes

Although studies have identified a number of potential failure modes and factors (such degradation due to chemical attacks, crack growth, pressure fatigue, and the influence of environmental factors), in practice there is little concrete evidence linking these with failure rates or residual life.

The primary failure mechanism for PVC & PE pipes is poor installation or manufacturing defects and in instances where the pipeline is subjected to high internal pressures, or higher

cyclic loadings, cracking (or micro-cracking) can occur. For example, resistance to slow crack growth in PVC has been found to decrease with time (at least in accelerated ageing tests) for pipes produced in the 1970s, but not for more recent (post 1997) pipe specifications.

The adoption of joint standards and specific variations and types of material have developed significantly since the late 1970s leading to increased expected lives. Research shows the fact that the lifetime of the average well installed PVC pressure pipe has almost certainly been extended through steady improvements to material quality as invoked by the 1987 (*NZS 7648:1987)* and 1997 (*AS/NZS 1477:1997)* standards. For example:

- A PVC pipeline constructed in e.g. 1979 may be expected to have had an economic life of 50 years when new and therefore should be considered to be in Grade 4 (or worse) condition now and have a residual life of 0-10 years.
- A pipeline installed in e.g. 1990 manufactured to the 1987 standard may reasonably be expected to have a longer economic life of, say, 70-80 years and therefore currently have a residual life of 35-45 years and can be assumed to be in a "mid-life" Grade 3 condition by default.
- A pipeline installed in 2000 manufactured to the 1997 standard may be expected to last 100 years with a current residual life of 75 years (and is likely to be in Grade 1 or Grade 2 condition at worst*).

**There are studies which show that exhumed in-service PVC pipe shows little or no degradation following destructive testing after 20-30 years. These are likely to be pipes manufactured to a standard at least consistent with the 1987 if not the 1997 AZ/NS standard, which have been handled and installed appropriately.*

The examples above are supported by the failure rate observations within the Noell paper on the Seismic Performance of Plastic Pipe Systems in 2010/11 Canterbury Earthquakes, which compares the historical performance of PVC and PE pipelines through various vintages, and helpfully broadly aligns their analysis to the same periods in which the standards changed.

From this paper, there is clear evidence of the significant change in performance in the water mains installed between 1986-1996 (0.76 repairs/km) and between 1997 and 2006 (0.41 repairs/km). PVC pipes installed before 1986 failed more frequently still (1.14 repairs/km).

The Noell paper was one of the main sources for Table C.8 (Table 9 below) within the New Zealand Pressure Pipe Inspection Manual (1st Edition, 2024) for Estimating the Remaining Life of PVC pipe.

Table 9 Pipe material considerations

Material	Installation Date	Consideration
PVC-U	Before 1986	Fracture toughness requirement had not yet been incorporated into BS 3505, and pipes may have relatively low resistance to slow crack growth. As pipes will already be over 38 years old, crack growth should be assumed to be occurring, and condition grades should not be better than grade 4. Pipes with a history of bursts that cannot be attributed to specific causes may be approaching (or have approached) the end of their useful operational lifetimes.
All PVC	Before 1997	PVC manufacturing standard AS/NZS 1477 was introduced in 1997. Some variances in additives and performance of pipes may be present between manufacturers leading up to this date. Condition grade should not be better than grade 3.
PVC-O	After 2008	PVC-O against AS/NZA 4441 has better fracture toughness than PVC-U and better fatigue resistance than PVC-U and PVC-M
PVC-M	After 2000	PVC-M against AS/NZS4765 has improved fracture toughness relative to PVC-U but inferior fatigue resistance.

The selection of 1986 and 1997 as milestone dates in table C.8 was deliberately aligned to the introduction of the new standards NZS 7648:1987 and AS/NZS 1477:1997 which progressively tightened the specification of PVC pipelines for pressure applications in various ways and aligns with the Noell paper observations of failures.

PE pipes have also seen improvements to the material specifications and availability over time. Early PE prior to 1970 is likely to be either Low-Density PE or Type 50 HDPE. Most of the PE pipe installed in WDC was from 1967 onwards. Mono Polymer and Bi- or Multi-Modal Polymer materials began to be available from the early 1980's and from 2000 PE100 and PE100RC materials were further introduced. While manufacturers would state that an expected life of 100 years should be expected for all PE materials evidence would suggest that prior to 1985, the expected service life would better be considered as 80 years.

Several lifetime prediction models (e.g. using the standard extrapolation method based on hydrostatic tests, linear elastic fracture mechanics and using quality number) have been utilised in the literature in order to describe some of these failure mechanisms and estimate the residual lifetime of plastic pipes. However, given their limitations, the predicted lifetimes are certainly open to dispute, as no model encompassing all possible failure mechanisms has been proposed yet.

In the absence of a defined model for predicting remaining life of plastic pipes, the method used for this condition assessment is based on the evaluation of the residual (remaining) life

of the pipe from its date of installation against the expected service life of the pipe based upon the time period set out in the discussion above relating to and expressed Table 10.

Table 10 Expected Service Life of Plastic Pipes

Material	Installation Period	Expected Service Life	WDC Base Life
PVC	Install prior to 1986	50[1] years	100 years (modified base life varying from 80 to 100 years)
	Install between 1986 to 1997	80[1] years	
	Install after 1997	100 years	
PE	Install prior to 1960	70 years	80 years (modified base life varying from 64 to 96 years)
	Install 1960 to 1985	80 years	
	Install after 1985	100 years	

[1] For the PVC where the modelled pressure for the pipe is less than or equal to 60mh2o a service life of 100 years has been used.

As the improvements to PVC specifications have predominantly had the effect of improving the expected length of life by reducing the failure through fatigue, a higher expected service life of 100 years has been adopted for the assessment of PVC pipes in the drinking water network that have lower pressure. This has been adopted to recognise that lower pressures within the network are less likely to lead to early failures and therefore the pipes manufactured to 'lower' specifications are also less likely to fail by this method. This approach for pipes with low pressure was intended as part of the assessment process to avoid unfair assessment of the older PVC pipes in the network where the likelihood of fatigue failures is less. This default higher service life has not been applied to the Wastewater Rising Mains as these are more likely to be subject to higher frequency pump cycles.

The assessed condition grade is assigned based on the calculated remaining life as shown in the following

Table 11 which is taken “Table C.18 Remaining Life Based on Condition Grade” from Section C of the New Zealand Pressure Pipe Inspection Manual (1st edition 2024)

Table 11 Condition Grade based on Remaining Life

Condition Grade	Remaining Life
1 Very Good	>50 years
2 Good	30-50 years
3 Moderate	10-30 years
4 Poor	3-10 years
5 Very Poor	<3 years

Limitations

Several factors can influence the deterioration of the plastic pressure pipes, and the actual lives of these pipes may extend well beyond the stated expected service lives used for the assessment. Factors such as the pressure, presence of transient pressures and cyclic frequencies within the networks all potentially work to either increase or decrease the expected lives. The use of the variable expected lives based on the development of material specifications over time and published research demonstrating decreased rates of failure is, in the absence of more robust prediction models, a reasonable basis for a desk top assessment of the plastic pressure pipes.

The confidence grading applied to the assessed condition of the plastic pressure pipes of Grade D (very uncertain) reflects that possible variability of the performance of the plastic pipes over the network and other influencing (non-deterioration related) factors such as installation or material defects may have that cannot be effectively evaluated from a desk top assessment. There are also no field investigation results from WDC that can be used as a comparative benchmark.

Cast Iron Pipe

Cast iron is here refers to both vertically cast and spun iron. While the method of manufacture affects the wall thickness and the consistency of the wall thickness, the deterioration mechanisms and approaches to condition assessment are identical.

For cast iron pipes, the primary deterioration mechanism is internal and external corrosion, which causes an overall reduction in wall thickness accompanied by localised pitting. Typically, the ultimate cause of failure for the majority of cast iron pipes is not simply via through-wall corrosion, but by a mechanism whereby corrosion weakens the pipe to the extent that it can no longer withstand the stresses associated with internal operating pressure and external loading factors.

Remaining wall thickness is the predominant indicator by which condition grade and remaining time to failure are estimated. The rate at which a cast iron pipe corrodes is dependent on both environmental factors and the precise interaction mechanism between the environment and the iron in the pipe.

For the desk top condition assessment environmental factors such as soil properties etc. are not available and therefore the rate of pipe wall loss through corrosion is assumed as constant corrosion rate. The assumed rate of corrosion applied for these assessments has been derived from the maximum rate of observed corrosion from the p-CAT inspections undertaken on the WDC 450mm diameter CI water mains in August 2024. This maximum rate of deterioration of CI mains was 0.061mm/year. The choice of the maximum rate of corrosion was chosen to reflect the 'worst-case' scenario.

As WDC information does not provide a record of the original pipe wall thickness, Look-up tables were developed based on the pipe diameter and modelled pressure within the drinking water network*. The dimension of the original wall thickness was derived from the most applicable manufacturing standard for the vintage of the majority of the cast iron pipes (BS78: 1917) which (using the diameter and current pressure) defines the most likely pipe class and therefore wall thickness.

**Modelled pressure for the Wastewater Rising Mains was not available, however the reported pressures at the pumpstations did not exceed 61m and so therefore a default of Class B was used to determine the original pipe wall thickness of the Wastewater CI Rising Mains.*

The condition grades are then inferred from the calculated remaining wall thickness based on Table 12 below. This table is Table C.6 CI condition Grades and is based on the assessment methodology used by the New York City Department of Environmental Protection for evaluation of CI pressurised mains.

Table 12 Condition Grade based on % of wall loss (CI Pipe)

Condition Grade	Remaining Life
1 Very Good	0-25% wall thickness loss
2 Good	Wall thickness loss between 25-50%
3 Moderate	Wall thickness loss between 50-75%
4 Poor	Greater than 75% loss of wall thickness at any cross section. Noticeable sag or change in cross-section
5 Very Poor	Cracks, breaks, significant change in cross section, bending deflection >4mm

Note for this Assessment Table C.6 was modified to evaluate Grade 5 (very Poor) where the amount of wall loss exceeded 85% of the original pipe wall. The exception to the above grading method is where the modelled pressure is less than or equal to 30mh2o, a default grade of 2 is applied.

Limitations

Whilst the benefit of estimating the remaining life using this method is a more realistic estimation of the pipe condition than using residual age (from an assumed base life) there are several assumptions that are applied. These are primarily:

- Selection of the original wall thickness based on pipe class using the current modelled pressure. This assumes that the current pressure is similar to the pressure applied for the design of the pipe. A lower modelled pressure compared to the design could underestimate the original wall thickness therefore resulting in a poorer assessed condition than maybe justified. Equally the opposite could be true if the modelled pressure is more than the original design assumptions.
- The applied rate of deterioration is based on the 2024 p-CAT inspections. The maximum rate of deterioration from the 2024 investigations is similar to the average rate of deterioration assessed from other p-CAT inspections of CI pipes in Wellington and Auckland. This indicates that the rate of deterioration in WDC is slower than in other observed locations. Given the type of soil present in the region, which is not known to generally be highly corrosive, this could be a reasonable assumption. However, if the actual rates of deterioration are higher in other CI pipes in WDC then the rate applied could understate the pipe condition.
- Use of percentage of wall loss to assess the pipe condition. This method has been utilised by other water utilities for estimating the pipe condition, as per the example used within the New Zealand Pressure Pipe Inspection manual. However, the actual remaining life of the pipe, and therefore the condition of the pipe as noted above, is based on the pipe capacity to withstand the loads applied upon it. The actual condition will be dependent on the measured loading, including surge/transients and the actual least amount of pipe wall remaining to resist it.

Comparing the assessed grades for all of the CI drinking water pipes against the grades generated from the p-CAT inspections shows comparative results which tend to indicate that the predicted grades using the desk top assessment method are reasonable within expected ranges.

Table 13 Comparison of Assessed Grade v Predicted & Assessed Grades (CI pipes)

Condition Grade	Assessed from p-CAT	Predicted and assessed
1	0%	5%
2	35%	61%
3	65%	28%
4	0%	6%
5	0%	0%

The method used by WSP for assigning condition grade for the p-CAT assessments is very similar but based on the percentage remaining wall, which simply can be converted to the equivalent of percentage of wall loss. However, when converted the values used within the grading ranges differs from that set out within the New Zealand Pressure Pipe Inspection Manual. The range used for the assessment of the p-CAT inspections are as follows:

Table 14 Condition Grade Based on Remaining Wall Thickness (WSP, CI Pipe)

Grade	Remaining Wall Thickness	Conversion to Wall Loss
1	90 – 100%	<10%
2	80 -90%	10 – 20%
3	70 – 80%	20 – 30%
4	60 -70%	30 – 40%
5	<60	>40%

The Methodology used for this assessment has applied the grade ranges for wall loss utilising the Table 12 consistent with the New Zealand Pressure Pipe Inspection Manual.

As part of the review and comparison of the WDC data it was observed that pipe assessed from the p-CAT investigation's completed and also from this desktop assessment determined that while the CI pipes had in many cases reached the WDC base life age the assessed condition was good or moderate condition indicating that the expected life of the CI pipes will well exceed the current base life. On this basis WDC could review and increase the current base life of 150 years to a possible minimum of 200 years based on the assessed condition.

Asbestos Cement Pipe

Failures in asbestos cement (AC) pipes are most identified through reduced structural wall thickness/competency which then eventually causes a burst of the pipe wall. Asbestos cement is susceptible to lime leaching and sulphate attack which results in softening of the interior and/or exterior surfaces of the pipe which reduces the structural wall thickness of

the pipe. This would often occur without a reduction in the physical thickness of the pipe wall.

Remaining structural wall thickness is widely adopted as the best indicator of remaining life of AC pipe for pipes without other known defects. Structural thickness, as with the CI pipe is the ability of the pipe to bear a structural load, in terms of equivalent thickness of a new pipe. In the case of AC pipe, this is commonly calculated as the original pipe thickness minus the deterioration thickness. This of course needs to be physically measured.

As a desktop assessment, in the absence of measurement of the remaining pipe wall thickness from a physical inspection, an estimate of the expected life of the AC pipe can be obtained by using national average deterioration rates provided by the Lifetime Prediction Charts within the Asbestos Cement Manual (Water New Zealand, Volume 2, 2017) for a particular class of pipe.

As WDC information does not provide a record of the pipe class, A look-up table has been developed based on the pipe diameter and a default pipe class. The default pipe class is for various pipe diameters is set out in within the Asbestos Cement Manual (Water New Zealand, Volume 1, 2017).

The 'fits' of these linear models are not precise, but the method provides an opportunity to estimate the expected life of the AC pipe based on observed national rates of AC pipe deterioration. The remaining life of the AC pipe can then be estimated by deduction of the pipe age from the maximum expected life for a particular pipe class and modelled pressure.

The condition grade is then inferred from the calculated remaining life as shown in the following Table 15 which, as per the method for the assessment of the plastic pipes, is taken from "table C.18 Remaining Life Based on Condition Grade" from Section C of the New Zealand Pressure Pipe Inspection Manual (1st edition 2024)

Table 15 Condition Grade based on Remaining Life (AC pipe)

Condition Grade	Remaining Life
1 Very Good	>50 years
2 Good	30-50 years
3 Moderate	10-30 years
4 Poor	3-10 years
5 Very Poor	<3 years

Limitations

Like the deterioration method for CI pipe, the benefit of estimating the remaining life utilising the Lifetime Prediction Chart within the AC manual is that it provides a more realistic estimation of the expected life based on observed national average rates of deterioration than just using residual age (from the current age and assumed base life). There are several assumptions that are applied. These are primarily:

- Selection of the pipe class based on the default class. This assumes that the pipe installed is the same as the expected default class for that pipe diameter and design pressure. If the installed pipe was a higher class of pipe, then the assumption for this assessment could underestimate the expected lifetime of the pipe therefore resulting in a poorer assessed condition than maybe justified. Equally the opposite could be true if the installed pipe class was less than the default assumption.
- Expected life expressed within the AC manual is based on the National average rate of deterioration. Deterioration of the pipe wall occurs both internally and externally. This is dependent on the chemistry of the water being transported and the corrosivity of the soil around the pipe. No information is known about the water chemistry, but there is possible indication from the p-CAT investigation of the CI pipes that the type of soil within the WDC may be less corrosive than the national average. If this is the case, then it is possible that the expected life of the AC pipe in WDC could be longer than what is included within the ranges specified within the AC manual. However, the corrosivity of the soil for individual AC pipes within WDC is not known, neither the chemistry of the flow and therefore the remaining life of the AC pipes can only reliably be confirmed by physical inspection.

At present WDC base life for AC pipe materials varies dependent on the pipe diameter ranging from 70 years to 140 years. The published data on expected lives within the AC Manual also reflects increasing expected life with increased diameter but also is dependent on whether the pipe is a drinking water pipe or a wastewater pipe. For drinking water, the highest likely pipe life ranges from 45 years to 140 years (these are based on the default class). Whereas the wastewater pipes are expected to have a much shorter life with the highest likely life ranging from 26 years to 83 years. A cursory review would indicate that the WDC base lives for drinking water appear reasonable, and could be expected, particularly in the larger diameters. However, in comparison with the AC manual, the base life would appear to be overly optimistic. A review of the assessed data does not provide any evidence that the WDC lives of the drinking water pipes should be changed. But consideration of reducing the AC wastewater pipes to reflect the AC manual lives should be given. However, noting that there are only 3 AC watermains and these have all been assessed as grade 5.

2.4 Statistical Models for Gravity Assets (Predictor)

PML used their large dataset of historic condition assessment data to determine the probability of an asset being assessed with a Condition Grade of 1 (very good) through 5 (very poor). This analysis notes that three factors are hierarchically important: material type, current age, and diameter. In addition, the analysis also indicated that diameter is a relevant factor for reinforced concrete (RC) SW assets.

Table 16 lists the seven 'Predictor' models developed by PML. Where a model may be applied to both SW and WW assets, the dataset analysed included both SW and WW data. Models applied to one water type are derived from data from only that water type, e.g., SW AC data was not used in the development of the Gravity AC WW model.

The models are separated first by water type (excepting those where the model applies to both SW and WW assets), then material category, and then the relevant factors are noted. All models used Age at Inspection as the primary factor, with either 20-year brackets used, or brackets defined by PML. The Gravity RC SW model also uses diameter brackets as sub-factors of each 20-year age bracket.

Table 16 List of Predictor Models

Name	Water Type(s)	Material Type(s)	Conditions
Gravity AC SW	SW	Asbestos Cement (AC)	Use 20 year age brackets
Gravity AC WW	WW	Asbestos Cement (AC)	Use 20 year age brackets
Gravity EW	SW and WW	Earthenware (EW)	Use 20 year age brackets until 100 years, then use a combined >100 bracket
Gravity PE	SW and WW	Polyethylene (PE)	Use two age brackets: ≤20 years and >20 years
Gravity PVC	SW and WW	Polyvinyl Chloride (PVC)	Use three age brackets: ≤20 years, 20-60 years, >60 years
Gravity RC SW	SW	Reinforced Concrete (RC)	Use 20 year age brackets Use relevant diameter brackets for each age bracket
Gravity RC WW	WW	Reinforced Concrete (RC)	Use 20 year age brackets until 80 years, then use a combined >80 bracket

The assessment undertaken does not utilise the WDC base life to determine the pipe condition. A review of the results from the assessment does not provide enough information that would indicate that the current WDC base lives are not reflective of the expected life.

2.4.1 Development

2.4.2 Probability Distribution and Application

The Predictor models define the condition grade probabilities based on material type and age factors. The application of these probabilities was applied to the WDC assets in order to calculate a predicted condition grade based on known asset data. The calculation method utilises a random number generator to apply Monte Carlo methodology.

For example, a six-sided dice has an equal probability of landing on numbers 1 through to 6. The probability expressed as a decimal is $0.16\dot{6}$. The sum of the probabilities adds to 1.

A random value of 0.38 is generated. The resulting dice face is the first result where the cumulative sum of the probabilities is less than or equal to 0.38:

Dice Face	1	2	3	4	5	6
Probability	$0.16\dot{6}$	$0.16\dot{6}$	$0.16\dot{6}$	$0.16\dot{6}$	$0.16\dot{6}$	$0.16\dot{6}$
Cumulative Probability	$0.16\dot{6}$	$0.33\dot{3}$	0.5	$0.66\dot{6}$	$0.83\dot{3}$	1
Is 0.38 ≤ the cumulative probability?	No	No	Yes	Yes	Yes	Yes

The first cumulative probability ≤ 0.38 corresponds to a dice face value of 3.

2.4.3 Application

Asset data provided by WDC included a unique asset identifier (COMP Key), water type, a material code (which was matched up to the material categories listed in this document), install year, and diameter. For WW assets, the type (rising or gravity) was also included.

Using the Install Year, the Current Age can be calculated:

Current Age = [Current Year] – Install Year

The Current Age is then used to identify which Age Group applies to the asset.

A random number is generated and then saved as a fixed value.

For all models except Gravity RC SW, the Age Group and the random number are then used in the Monte Carlo method to generate a predicted condition grade for each asset.

For Gravity RC SW, the Age Group is calculated, and then the asset diameter is used to determine the Diameter Group. A random number is generated and saved as a fixed value. Then the Age Group, Diameter Group and random number are all incorporated in the Monte Carlo method to generate a predicted condition grade for each asset.

2.5 Decision Trees for Pressure Assets

Table 17 lists the Decision Tree methodologies applied for pressure pipes. The methodology for each is detailed in sections 2.5.1.1 to 2.5.1.5.

Table 17 List of Pressure Decision Trees

Name	Water Type(s)	Material Type(s)
Pressure AC DW	DW	Asbestos Cement (AC)
Pressure AC WW	WW	Asbestos Cement (AC)
Pressure CI	DW and WW	Cast Iron (CI)
Pressure PE	DW and WW	Polyethylene (PE)
Pressure PVC	DW and WW	Polyvinyl Chloride (PVC)

2.5.1.1 Pressure AC DW

WDC data required: COMP Key, Install Year, High Pressure, Diameter

- Use High Pressure to determine Pressure Group

High Pressure (m)		
Lower Range (>)	**Upper Range (<=)**	**Group**
0	30	30
30	60	60
60	90	90
90	1000	120

- If High Pressure is not specified, use Diameter to identify Default Pressure
- For all assets, use Diameter to identify Diameter Group

Diameter (mm)			Default Pressure (m)
Lower Range (>=)	**Upper Range (<=)**	**Group**	
0	50	50mm	120
51	75	75mm	120
76	80	80mm	120
81	100	100mm	120
101	150	150mm	90
151	200	200mm	90
201	225	225mm	90
226	250	250mm	90
251	300	300mm	90
301	375	375mm	90
376	6000	450mm	60

- Use Diameter Group and Pressure Group to return Likely High Age (years) and Max Life (years)

Pressure Group		120			90			60			30		
Diameter Group	Default Pressure	Likely Min Age	Likely High Age	Max Life	Likely Min Age	Likely High Age	Max Life	Likely Min Age	Likely High Age	Max Life	Likely Min Age	Likely High Age	Max Life
50mm	120	24	36	47	28	39	47	32	42	47	35	45	47
75mm	120	24	36	47	28	39	47	32	42	47	35	45	47
80mm	120	24	36	47	28	39	47	32	42	47	35	45	47
100mm	120	30	45	58	34	48	58	39	52	58	44	56	58
150mm	90	41	60	80	38	56	70	46	62	70	52	67	70
200mm	90	53	77	103	44	63	82	53	70	82	62	77	82
225mm	90	56	83	112	48	70	90	57	77	90	67	85	90
250mm	90	63	91	122	49	72	95	62	81	95	72	90	95
300mm	90	76	108	147	58	86	113	72	96	113	86	106	113
375mm	90				72	104	140	90	118	140	107	131	140
450mm	60				88	122	163	54	81	105	74	96	105

- Use Install Year to calculate Current Age
    - If Current Age is less than the Likely High Age, calculate Likely Remaining Life (LRL):
        - LRL = [Likely High Age] – [Current Age]
    - If Current Age is greater than or equal to the Likely High Age:
        - If Current Age is less than Max Life, calculate Max Remaining Life (MRL):
            - MRL = [Max Life] – [Current Age]
        - If Current Age is greater than or equal to Max Life:
            - Remaining life is considered to be 0 and condition grade is 5
- Use LRL or MRL (depending on which was applied to the asset) to determine the condition grade from the table

LRL (years)			MRL (years)			Condition Grade
Lower Range (>=)	Upper Range (<)	Group	Lower Range (>=)	Upper Range (<)	Group	
0	3	<3 years	0	3	<3 years	5
3	10	3-10 years	3	10	3-10 years	4
10	30	10-30 years	10	30	10-30 years	3
30	50	30-50 years	30	50	30-50 years	2
50	300	>50 years	50	300	>50 years	1

2.5.1.2 Pressure AC WW

WDC data required: COMP Key, Install Year, High Pressure, Diameter

- Use High Pressure to determine Pressure Group

High Pressure (m)		
Lower Range (>)	**Upper Range (<=)**	**Group**
0	30	30
30	60	60
60	90	90
90	1000	120

- If High Pressure is not specified, use Diameter to identify Default Pressure
- For all assets, use Diameter to identify Diameter Group

Diameter (mm)			Default Pressure (m)
Lower Range (>=)	**Upper Range (<=)**	**Group**	
0	50	50mm	120
51	75	75mm	120
76	80	80mm	120
81	100	100mm	120
101	150	150mm	90
151	200	200mm	90
201	225	225mm	90
226	250	250mm	90
251	300	300mm	90
301	375	375mm	90
376	6000	450mm	60

- Use Diameter Group and Pressure Group to return Likely High Age (years) and Max Life (years)

Pressure Group		120			90			60			30		
Diameter Group	**Default Pressure**	**Likely Min Age**	**Likely High Age**	**Max Life**	**Likely Min Age**	**Likely High Age**	**Max Life**	**Likely Min Age**	**Likely High Age**	**Max Life**	**Likely Min Age**	**Likely High Age**	**Max Life**
50mm	120	16	24	32	18	26	32	22	28	32	24	30	32
75mm	120	16	24	32	18	26	32	22	28	32	24	30	32
80mm	120	16	24	32	18	26	32	22	28	32	24	30	32
100mm	120	20	30	39	23	33	39	26	35	39	30	38	39
150mm	90	28	41	54	26	38	48	32	42	48	36	45	48
200mm	90	36	52	70	30	43	55	36	47	55	42	52	55
225mm	90	38	56	76	32	47	61	39	52	61	46	58	61
250mm	90	43	62	83	33	49	65	41	55	65	49	61	65

Pressure Group		120			90			60			30		
Diameter Group	Default Pressure	Likely Min Age	Likely High Age	Max Life	Likely Min Age	Likely High Age	Max Life	Likely Min Age	Likely High Age	Max Life	Likely Min Age	Likely High Age	Max Life
300mm	90	52	74	99	40	58	76	49	65	76	58	72	76
375mm	90				50	71	94	61	80	94	73	89	94
450mm	60				60	83	110	37	55	71	50	65	71

- Use Install Year to calculate Current Age
  - If Current Age is less than the Likely High Age, calculate Likely Remaining Life (LRL):
    - LRL = [Likely High Age] – [Current Age]
  - If Current Age is greater than or equal to the Likely High Age:
    - If Current Age is less than Max Life, calculate Max Remaining Life (MRL):
      - MRL = [Max Life] – [Current Age]
    - If Current Age is greater than or equal to Max Life:
      - Remaining life is considered to be 0 and condition grade is 5
- Use LRL or MRL (depending on which was applied to the asset) to determine the condition grade from the table

LRL (years)			MRL (years)			Condition Grade
Lower Range (>=)	Upper Range (<)	Group	Lower Range (>=)	Upper Range (<)	Group	
0	3	<3 years	0	3	<3 years	5
3	10	3-10 years	3	10	3-10 years	4
10	30	10-30 years	10	30	10-30 years	3
30	50	30-50 years	30	50	30-50 years	2
50	300	>50 years	50	300	>50 years	1

2.5.1.3 Pressure CI

WDC data required: COMP Key, Water Type, Install Year, High Pressure, Diameter

- Use High Pressure to determine Class
  - If there is no High-Pressure data for DW pipes, assign Class C
  - If there is no High-Pressure data for WW pipes, assign Class B (as WDC's maximum WW pumping pressure is 60m)

High Pressure (m)			Class
Lower Range (>)	Upper Range (<=)	Group	
0	30	30	A
30	60	60	B
60	90	90	C

High Pressure (m)			Class
Lower Range (>)	**Upper Range (<=)**	**Group**	
90	1000	120	D

- Class A = condition grade 2
- Classes B, C, D: Use diameter to calculate Design Thickness (dt) in mm

		Pressure Group	**60**	**90**	**120**
		Class	**B**	**C**	**D**
Lower Range (>=)	**Upper Range (<=)**	**Group**	**Design Thickness (mm)**		
0	75	≤75mm	9.65	9.65	10.16
76	80	76-80mm	9.65	9.65	10.16
81	100	81-100mm	9.91	10.16	11.68
101	125	101-125mm	10.41	11.43	13.21
126	126	126-126mm	10.41	11.43	13.21
127	150	127-150mm	10.92	12.45	14.48
151	175	151-175mm	11.43	13.46	15.49
176	200	176-200mm	11.94	14.48	16.51
201	225	201-225mm	12.45	15.24	17.53
226	250	226-250mm	13.21	16	18.54
251	300	251-300mm	14.48	17.53	20.32
301	375	301-375mm	16	19.56	22.61
376	450	376-450mm	17.53	21.59	24.89
451	6000	>450mm	20.32	24.89	28.7

- Use Install Year to calculate Current Age
- Calculate Remaining Wall Thickness (RWT) using 0.061 as the default rate of deterioration for WDC
    - RWT = dt – [Current Age] *x* 0.061
- Calculate Wall Thickness Loss percentage (WTL%):
    - WTL% = RWT / dt
- Use WTL% to determine condition grade from the table

WTL%			Condition Grade
Lower Range (>)	**Upper Range (<=)**	Group	
0.00	0.25	≤25%	1
0.25	0.50	>25-50%	2
0.50	0.75	>50-75%	3
0.75	0.85	>75-95%	4
0.85	2.00	>95%	5

2.5.1.4 Pressure PE

WDC data required: COMP Key and Install Year

- Use Install Year to calculate Base Life in years from the table

Lower Range (>=)	Upper Range (<)	Base Life (years)
1800	1967	70
1967	1985	80
1985	2100	100

- Use Install Year to calculate Current Age:
  - Current Age = [Current Year] – Install Year
- Calculate the percentage of Remaining Life (%RL):
  - %RL = ([Base Life] – [Current Age]) / Base Life
- Use %RL to determine condition grade from the table

% RL			Condition Grade
Lower Range (>=)	Upper Range (<)	Group	
0.00	0.02	<2%	5
0.02	0.16	2-15%	4
0.16	0.36	16-35%	3
0.36	0.86	36-85%	2
0.86	1.10	>85%	1

2.5.1.5 Pressure PVC

WDC data required: COMP Key, Water Type, Install Year, High Pressure, Diameter

- For DW assets with no High-Pressure data, use diameter to calculate Default Pressure

Diameter (mm)			Default Pressure (m)
Lower Range (>=)	Upper Range (<=)	Group	
0	60	60mm	60
61	6000	90mm	90

- For DW assets where High Pressure or calculated Default Pressure >60m; AND

- All WW assets:
    - Use Install Year to determine Base Life in years

Lower Range (>=)	Upper Range (<)	Base Life (years)
1800	1987	50
1987	1997	80
1997	2100	100

- For DW assets where High Pressure <= 60m:
    - Use Base Life of 100 years
- Use Install Year to calculate Current Age:
    - Current Age = [Current Year] – Install Year
- Calculate the percentage of Remaining Life (%RL):
    - %RL = ([Base Life] – [Current Age]) / Base Life
- Use %RL to determine condition grade from the table

% RL			Condition Grade
Lower Range (>=)	Upper Range (<)	Group	
0.00	0.02	<2%	5
0.02	0.16	2-15%	4
0.16	0.36	16-35%	3
0.36	0.86	36-85%	2
0.86	1.10	>85%	1

2.6 Static Condition Grades

Asset types that did not correlate with a Predictor model or a Decision Tree are listed in Table 18 below, along with the condition grade methodology applied.

Table 18 Other Condition Assessments

Water Type(s)	Material Type(s)	Condition Grade Method
WW Gravity	Relined (RL)	Assessed as Condition Grade 1
SW	Steel (ST)	Assessed as Condition Grade 2
DW	Ductile Iron (DI)	Assessed as Condition Grade 1
WW Gravity	ABS	Assessed as Condition Grade 2
WW Rising	Asbestos Cement (AC)	Assessed as Condition Grade 5
SW	Cast Iron (CI)	Assessed as Condition Grade 2
WW Gravity	Cast Iron (CI)	Assessed as Condition Grade 1

Water Type(s)	Material Type(s)	Condition Grade Method
DW	Galvanised Steel	Assessed as Condition Grade 5
DW	Steel <20 years old	Assessed as Condition Grade 1 using expected base life of 120 years
DW	Steel >20 years old and installed during or after 1900	Assessed as Condition Grade 2 using expected base life of 120 years
DW	Steel installed prior to 1900	Assessed as Condition Grade 5 using expected base life of 120 years
WW Gravity	Steel Cement Lined (ST-CC)	Assessed as Condition Grade 1
WW Rising	Steel Cement Lined (ST-CC)	Assessed as Condition Grade 2
SW	Stoneware (SN)	Distribution of condition grades in line with results from CCTV inspections

Where assessed grades were available (from CCTV structural condition grades and DW CI p-CAT assessments), these condition grades were prioritised over those predicted by the models.

2.7 Analysis

The gravity and pressure models were applied to generate an assessed condition grade for the WDC assets, and the unique COMP Key was used to add these grades to the original dataset supplied by WDC. Additional fields were added for the purpose of analysing the data, as detailed in Table 19.

Table 19 Additional calculations added to WDC data

Column Name	Description
Install Decade	Using the Install Year as a lookup value, assigns each asset to a decade
Age in 2025	As this assessment was run in 2025, this calculates the age of each asset at the time of the assessment
Age Bracket 10y	Using the calculated Age in 2025, this groups the assets into 10 year age bands
Age Bracket 20y	Using the calculated Age in 2025, this groups the assets into 20 year age bands
AC Watermain High Pressure Group	This groups DW AC assets into groups based on the High-Pressure value. If the asset has no High-Pressure data, then the diameter is used to identify the Default Pressure using the methodology in the Pressure AC DW model

Column Name	Description
Confidence Grade	If the assessed condition grade was from observational data (CCTV structural grade or DW CI p-CAT assessment), then the confidence grade is B. If the assessed condition grade is due to the application of the model, then the confidence grade is D.

2.7.1 Condition Grade Scores

Table 20 details the data used in determining the final assessed condition grade of the assets.

Table 20 Additional calculations added to WDC data

Column Name	Description
Static Condition Grade	Assets that were assessed without Predictor or a Decision Tree
CCTV Structural Grade	Condition grades derived from CCTV assessments
DW CI pCAT Assessed Grade	Condition grades derived from p-CAT assessments
Predicted Condition Grade	Condition grades derived from the Predictor models and Decision Tree methods
Assessed Condition Grade	The final condition grade used in the data analysis. If an asset has a condition grade from a CCTV or p-CAT assessment, then this is used as the assessed condition grade. If an asset does not have a CCTV or p-CAT condition grade, but it does have a static condition grade, then this is used as the assessed condition grade. If an asset does not have a CCTV, p-CAT, or static condition grade, then the predicted condition grade is used as the assessed condition grade.

3 Results

Condition grading results from the preliminary condition grading assessment are summarised by water type. Quantities represent the total number of assets for each Condition Grade. Assets from all WDC townships are included in the total figures for each condition grade.

A summary of total asset count within each condition grade is summarised in the following sections: first with all water types combined, then followed by separate summaries for wastewater pressure, wastewater gravity, stormwater and drinking water assets.

3.1 Combined Network Summary

Table 21 summarises the assets by water type and the Likelihood of Failure (LoF) score provided by WDC. Table 22 presents an overview of all assets by water type and assessed condition grade. Table 23 combines the data for LoF and assessed condition grade and presents the percentage of assets within each category.

Table 21 Count of assets by original Condition Grade score (Likelihood of Failure (LoF) supplied by Waitaki District Council) for all water types

Water Type	1	2	3	4	5	Sum
Sewer Main	974	1,330	194	589	0	3,087
Storm Main	370	652	112	6	16	1,156
Water Main	5,831	2,274	3,500	556	62	12,223

Table 22 Count of assets by assessed Condition Grade for all water types

Water Type	1	2	3	4	5	Sum
Sewer Main	768	1024	581	434	280	3,087
Storm Main	295	424	187	162	88	1,156
Water Main	4,263	3,038	1,087	2,977	858	12,223

Table 23 Percentage comparison of CG and LoF scores for all water types

Water Type	LoF or CG	1	2	3	4	5
Sewer Main	LoF	31.6%	43.1%	6.3%	19.1%	0.0%
	Assessed CG	24.9%	33.2%	18.8%	14.1%	9.1%
Storm Main	LoF	32.0%	56.4%	9.7%	0.5%	1.4%
	Assessed CG	25.5%	36.7%	16.2%	14.0%	7.6%
Water Main	LoF	47.7%	18.6%	28.6%	4.5%	0.5%
	Assessed CG	34.9%	24.9%	8.9%	24.4%	7.0%

As shown in Table 23 the assessed condition has generally seen a reduction in the proportion of the assets in all three waters for grades 1 and 2 and an increase in the number of assets with grades 3 to 5, overall showing a greater level of deterioration than was previously assessed. The proportion of all 3-waters pipes in very poor condition (Grade 5) has increased from an average of 0.5% to 7.4%.

A comparison between the condition grades that have been assessed as part of this work and the original condition grade(Likelihood of Failure) provided by WDC in the *Predictive Condition Model 20250131* shown as the percentage of assets within each pipe type and material is provided in Table 35 within Appendix A.

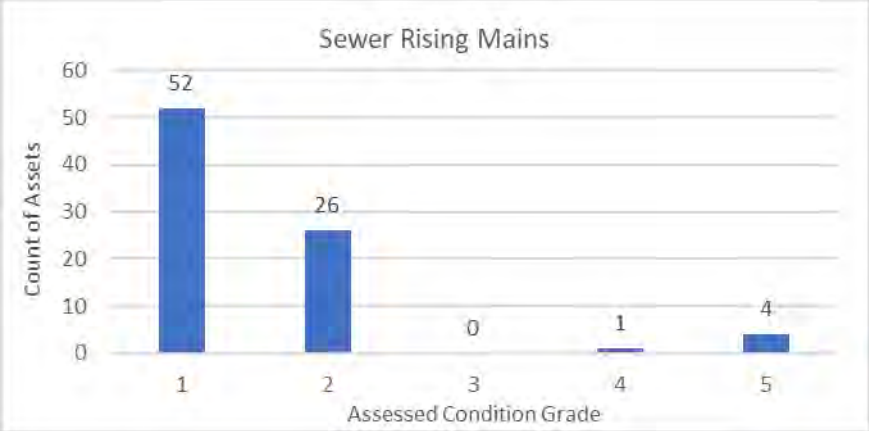
3.2 Wastewater (Pressure) Summary

Table 24 shows the percentage of wastewater rising mains by material type and assessed condition grade. While 100% of the AC and CI assets were assessed as condition grade 5, Graph 5 shows that this includes only 4 assets, and that the majority (78) were assessed as condition grades 1 and 2. Graph 6 presents the total length in km of the assets, illustrating that the majority of the wastewater rising main length is assessed as condition grade 2.

Table 24 Wastewater Rising Mains: Percentage of assets by Material Type and assessed Condition Grade

Material Type	**1**	**2**	**3**	**4**	**5**
Asbestos Cement (AC)	0%	0%	0%	0%	100%
Cast Iron (CI)	0%	0%	0%	0%	100%
Polyethylene (PE)	75%	25%	0%	0%	0%
Polyvinyl Chloride (PVC)	20%	70%	0%	10%	0%
Steel Cement Lined (ST-CC)	0%	100%	0%	0%	0%
Combined Sewer Rising Mains	63%	31%	0%	1%	5%

Graph 5 Wastewater Rising Mains: Number of assets by assessed Condition Grade



Graph 6 Wastewater Rising Mains: Total length of assets by material type and assessed Condition Grade

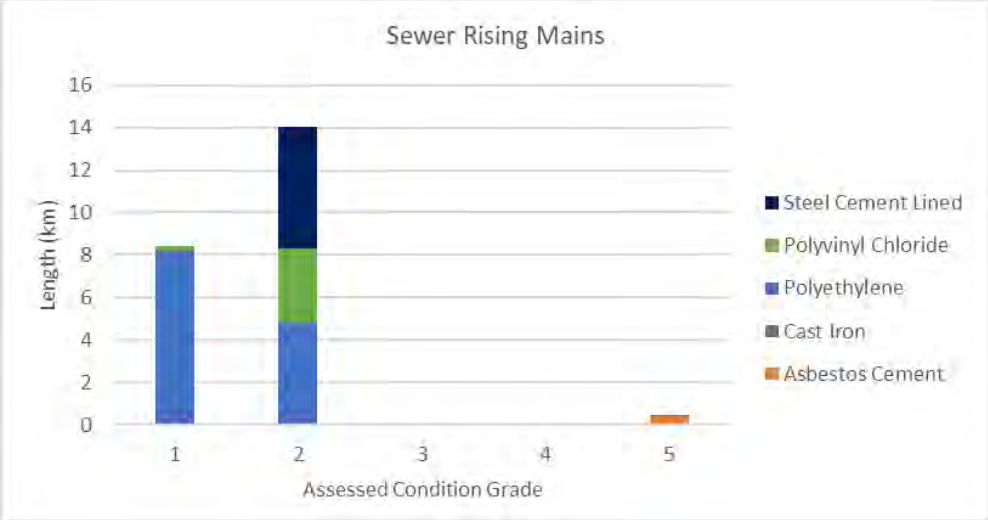


Table 25 Wastewater Rising Mains: Percentage of assets by total length and assessed Condition Grade

Material Type	**1**	**2**	**3**	**4**	**5**
Asbestos Cement (AC)	0.0%	0.0%	0.0%	0.0%	100.0%
Cast Iron (CI)	0.0%	0.0%	0.0%	0.0%	100.0%
Polyethylene (PE)	63.0%	37.0%	0.0%	0.0%	0.0%
Polyvinyl Chloride (PVC)	5.9%	93.9%	0.0%	0.2%	0.0%
Steel Cement Lined (ST-CC)	0.0%	100.0%	0.0%	0.0%	0.0%
Combined Sewer Rising Mains	36.8%	61.3%	0.0%	0.0%	2.0%

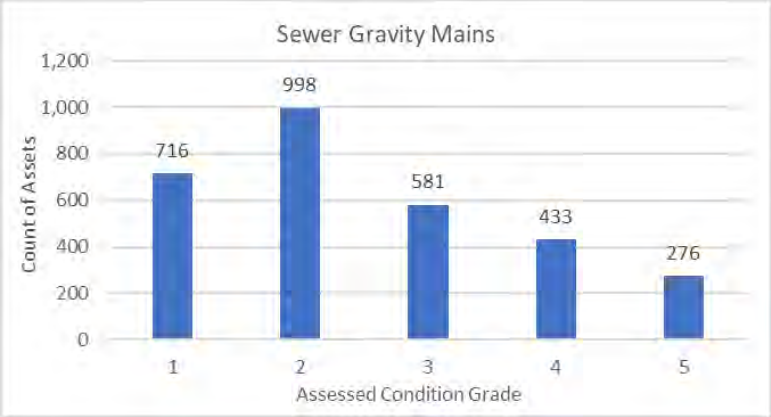
3.3 Wastewater (Gravity) Summary

Table 26 shows the percentage of wastewater gravity mains by material type and assessed condition grade. Most material types had the majority of assets assed as condition grades 1 – 3, however over half of the EW assets were assessed as condition grade 4 or 5. Overall, 9% of the assets were assessed as condition grade 5. Graph 7 shows that this is comprised of 276 assets. Graph 7 and Graph 8 show that the distribution of assets across the condition grades is similar for both the count of assets and the percentage of length in km. This is supported by the summary data in Table 27.

Table 26 Wastewater Gravity Mains: Percentage of assets by Material Type and assessed Condition Grade

Material Type	**1**	**2**	**3**	**4**	**5**
ABS	0%	100%	0%	0%	0%
Asbestos Cement (AC)	12%	45%	35%	5%	2%
Cast Iron (CI)	100%	0%	0%	0%	0%
Earthenware (EW)	4%	18%	22%	31%	26%
Polyethylene (PE)	18%	82%	0%	0%	0%
Polyvinyl Chloride (PVC)	69%	22%	4%	4%	1%
Reinforced Concrete (RC)	8%	47%	24%	15%	6%
Relined (RL)	100%	0%	0%	0%	0%
Steel Cement Lined (ST-CC)	100%	0%	0%	0%	0%
Combined Sewer Gravity Mains	24%	33%	19%	14%	9%

Graph 7 Wastewater Gravity Mains: Number of assets by assessed Condition Grade



Graph 8 Wastewater Gravity Mains: Total length of assets by material type and assessed Condition Grade

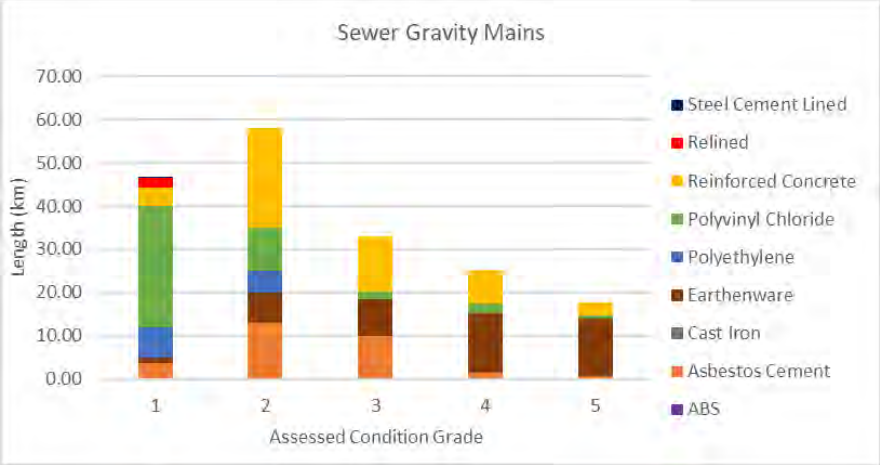


Table 27 Wastewater Gravity Mains: Percentage of assets by total length and assessed Condition Grade

Material Type	1	2	3	4	5
ABS	0.0%	100.0%	0.0%	0.0%	0.0%
Asbestos Cement	12.9%	44.9%	34.7%	5.3%	2.2%
Cast Iron	100.0%	0.0%	0.0%	0.0%	0.0%
Earthenware	2.6%	16.4%	19.5%	31.1%	30.3%
Polyethylene	59.4%	40.6%	0.0%	0.0%	0.0%
Polyvinyl Chloride	65.2%	23.2%	4.3%	5.7%	1.6%
Reinforced Concrete	8.4%	45.7%	24.8%	15.2%	6.0%
Relined	100.0%	0.0%	0.0%	0.0%	0.0%
Steel Cement Lined	100.0%	0.0%	0.0%	0.0%	0.0%
Combined Sewer Gravity Mains	25.8%	32.2%	18.2%	14.0%	9.8%

3.4 Stormwater Summary

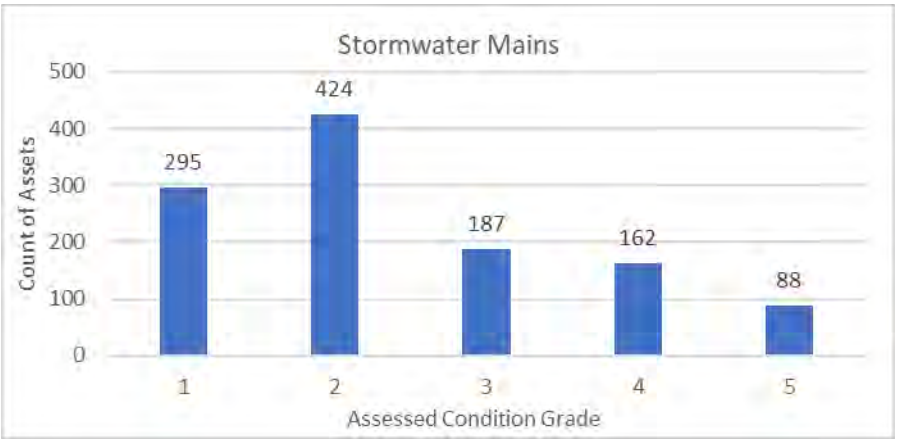
Table 28 and Graph 9 illustrate the distribution of stormwater assets across assessed condition grade by material type. Table 29 and Graph 10 present the total length of stormwater mains across assessed condition grade by material type. These show that the distribution of assets by number and total length is similar, with the largest proportion for both being assessed as condition grade 2. Graph 10 also highlights that the majority of the total length of SW assets are reinforced concrete.

Table 28 Stormwater Mains: Percentage of assets by Material Type and assessed Condition Grade

Material Type	1	2	3	4	5
Asbestos Cement (AC)	45%	35%	5%	15%	0%

Material Type	1	2	3	4	5
Cast Iron (CI)	0%	100%	0%	0%	0%
Earthenware (EW)	8%	20%	23%	29%	21%
Polyethylene (PE)	100%	0%	0%	0%	0%
Polyvinyl Chloride (PVC)	78%	15%	2%	3%	2%
Reinforced Concrete (RC)	16%	45%	19%	14%	6%
Steel (ST)	0%	100%	0%	0%	0%
Stoneware (SN)	28%	6%	11%	17%	39%
Combined Stormwater Mains	26%	37%	16%	14%	8%

Graph 9 Stormwater Mains: Number of assets by assessed Condition Grade



Graph 10 Stormwater Mains: Total length of assets by material type and assessed Condition Grade

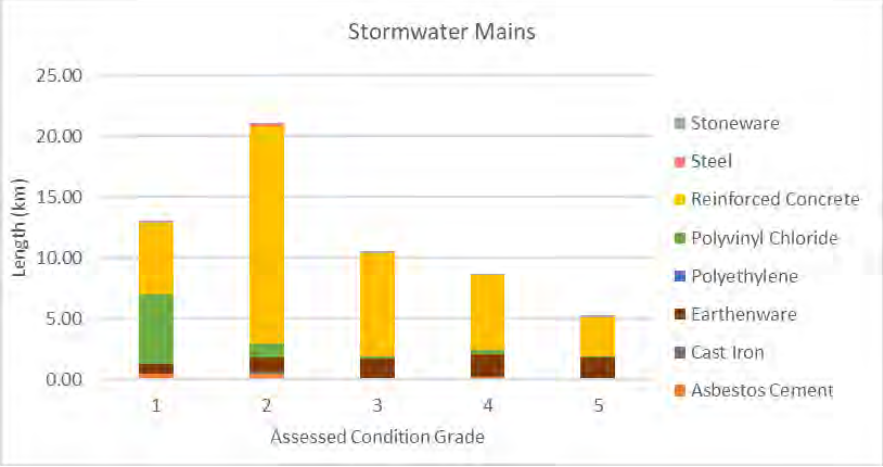


Table 29 Stormwater Mains: Percentage of assets by total length and assessed Condition Grade

Material Type	1	2	3	4	5
Asbestos Cement (AC)	42.9%	38.2%	4.8%	14.0%	0.0%
Cast Iron (CI)	0.0%	100.0%	0.0%	0.0%	0.0%
Earthenware (EW)	10.0%	16.8%	22.9%	26.3%	23.9%
Polyethylene (PE)	100.0%	0.0%	0.0%	0.0%	0.0%
Polyvinyl Chloride (PVC)	77.5%	15.0%	1.9%	3.8%	1.8%
Reinforced Concrete (RC)	14.2%	42.9%	20.4%	14.9%	7.6%
Steel (ST)	0.0%	100.0%	0.0%	0.0%	0.0%
Stoneware (SN)	27.4%	10.5%	18.1%	16.5%	27.5%
Combined Stormwater Mains	22.3%	36.0%	17.9%	14.8%	9.0%

3.5 Drinking Water Summary

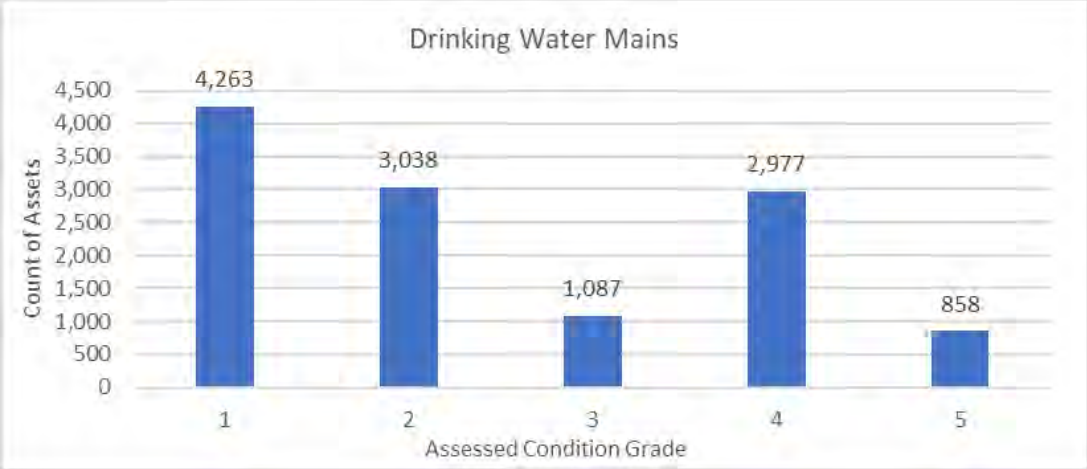
Table 30 Table 31 Graph 11 Graph 12 Graph 13 Graph 14

Table 30 and Graph 11 summarise the distribution of drinking water mains across assessed condition grades by material type, showing that the condition grade with the largest number of assets is condition grade 1, followed by grade 2. Table 31 and Graph 12 present the total length of assets by condition grade and material type and show that the condition grade with the highest total length is grade 2 followed by grade 4. Graph 12 also illustrates that the material type with the highest total length is PE.

Table 30 Drinking Water Mains: Percentage of assets by Material Type and assessed Condition Grade

Material Type	1	2	3	4	5
Asbestos Cement (AC)	1%	3%	19%	26%	51%
Cast Iron (CI)	10%	61%	22%	6%	1%
Ductile Iron (DI)	100%	0%	0%	0%	0%
Galvanised Steel (GALV)	0%	0%	0%	0%	100%
Polyethylene (PE)	36%	24%	9%	32%	0%
Polyvinyl Chloride (PVC)	52%	35%	3%	7%	3%
Steel (ST)	13%	61%	0%	0%	26%
Combined Drinking Water Mains	35%	25%	9%	24%	7%

Graph 11 Drinking Water Mains: Number of assets by assessed Condition Grade



Graph 12 Drinking Water Mains: Total length of assets by material type and assessed Condition Grade

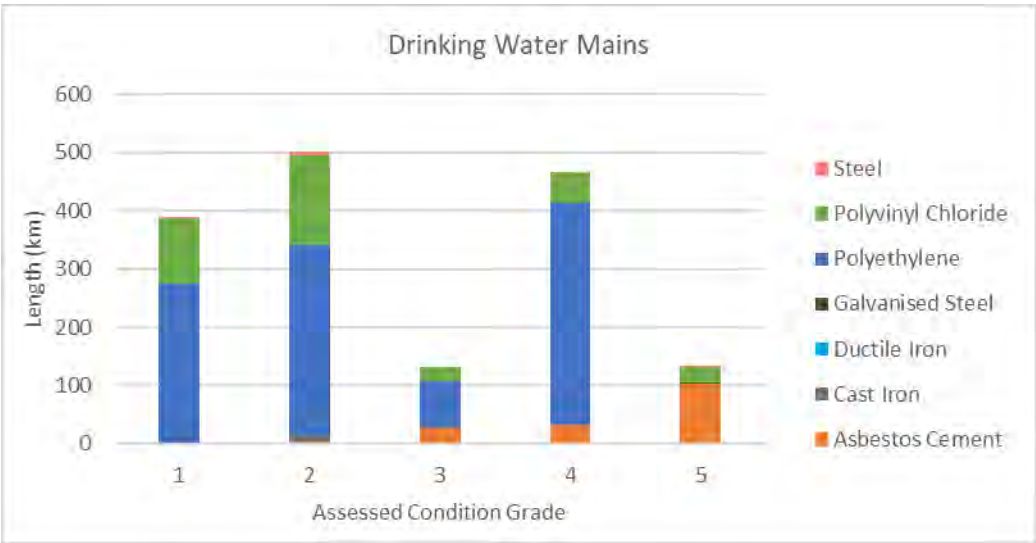


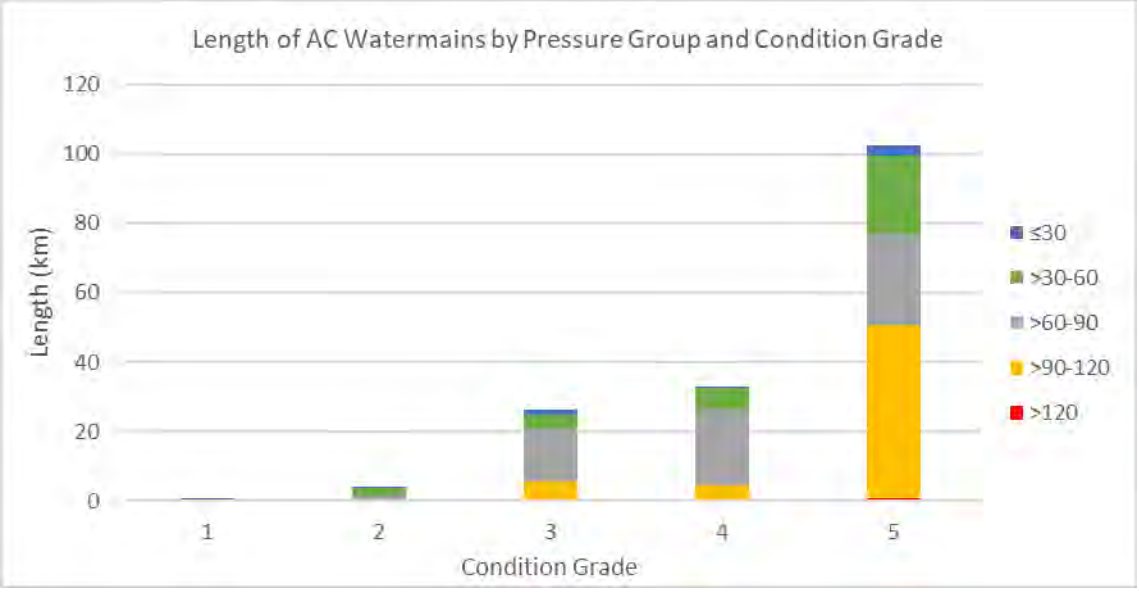
Table 31 Drinking Water Mains: Percentage of assets by total length and assessed Condition Grade

Material Type	1	2	3	4	5
Asbestos Cement (AC)	0.6%	2.3%	15.9%	19.6%	61.6%
Cast Iron (CI)	5.0%	61.4%	27.5%	6.0%	0.0%
Ductile Iron (DI)	100.0%	0.0%	0.0%	0.0%	0.0%
Galvanised Steel (GALV)	0.0%	0.0%	0.0%	0.0%	100.0%
Polyethylene (PE)	25.9%	30.9%	7.3%	35.9%	0.0%
Polyvinyl Chloride (PVC)	30.2%	41.5%	6.4%	14.6%	7.3%
Steel (ST)	0.3%	88.3%	0.0%	0.0%	11.4%

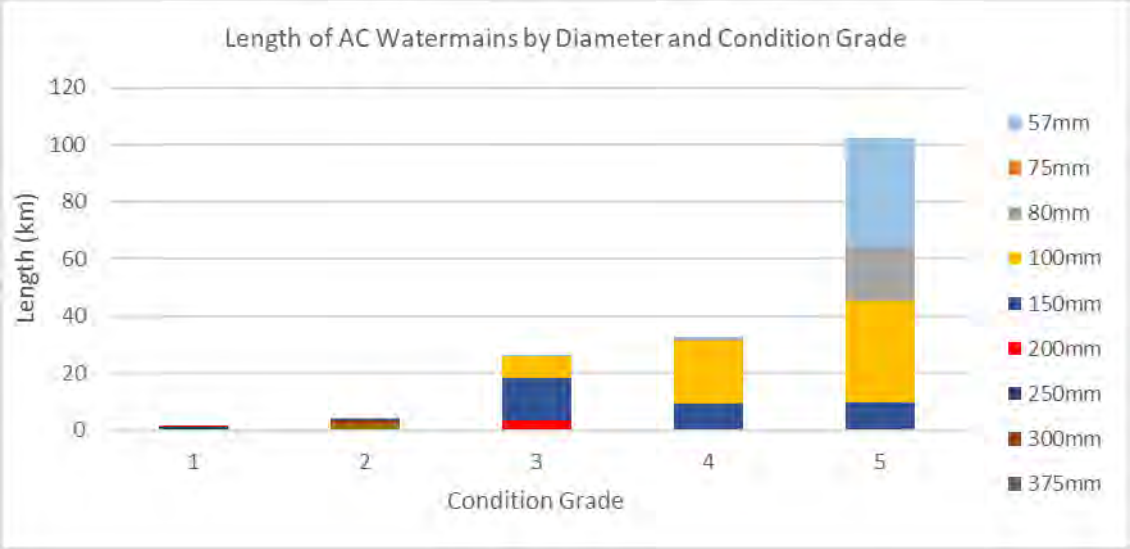
Material Type	1	2	3	4	5
Combined Drinking Water Mains	23.9%	34.3%	6.9%	27.9%	7.0%

Graph 12 shows that AC assets have a significant amount of total network length, and Table 30 highlights that the majority of AC assets are assessed as condition grade 4 and 5. Graph 13 and Graph 14 are included to show the distribution of AC assets across condition grades by pressure (Graph 13) and diameter (Graph 14). These graphs show that the majority of assets with a condition grade of 5 have a high-pressure value between 90-120m. However, assets with a high-pressure value of 60-90m are evenly distributed between condition grades 3-5. Graph 14 shows that the majority of assets with a condition grade of 5 have a diameter of 100mm or less. The proportion of assets with a diameter of 150mm or greater was higher in grades 3 and 4 and was the majority in grades 1 and 2.

Graph 13 Length of AC watermains by Pressure Group and Condition Grade



Graph 14 Length of AC watermains by Diameter and Condition Grade



4 Recommendations

The following sets out the recommendations to further improve the confidence and WDC understanding of the network asset condition.

4.1 Data

4.1.1 Pipe Material Confidence

The data supplied by WDC for the wastewater, stormwater and drinking water linear assets is significantly complete. The data review process prior to the condition assessment identify only a very small number (<2% of all assets) of anomalies with the pipe material installation dates for some of the pipe materials and also low and very low material data confidence for pipes that have a high likelihood of failure (refer to section 2.2.3 Pipe Materials)

The following close out the small number of anomalies identified in Table 7 and further enhance the pipe material reliability it is recommended that WDC collect information and update or confirm the pipe materials (along with other attribute data, e.g., pipe diameter) through opportunistic data collection carried out as part of BAU, (e.g., as part of reactive maintenance or planned inspections)

4.1.2 Pipe Base Life

The Assessment has identified recommended changes to the current WDC base lives for some the materials, in particular within the pressure pipe summarised as follows:

Plastic Pressure Pipe (drinking water and wastewater rising mains) – recommend adjusting the base lives to the values used within this assessment as set out in Table 10 Expected Service Life of Plastic Pipes

Asbestos Cement Pressure pipe (wastewater rising mains) - recommend adjusting the base lives from current 120 years to 40 years which is the expected life set out in the AC Manual. Noting that there are only 3 AC wastewater rising mains and these are currently assessed as grade 5 (very poor). There is no recommendation to change the base lives for the drinking water pipes at this time.

Cast Iron pressure pipe – Recommend, (dependent on the results of recommended inspections/assessments) adjusting the current base life of 150 years to 200 years.

There is no recommendation to change other pipe base lives at this time.

4.2 Previous Inspections

4.2.1 Existing CCTV inspection of Gravity Pipe

The CCTV inspections that have been completed between 2001 and 2024 assessed the condition approximately 17km of stormwater and wastewater gravity pipe in poor or very poor condition (Grade 4 or 5). The grades from the CCTV inspection have been included within the assessment results in preference to predicted assessment, as described within the assessment methodology. However, while the grades the CCTV inspection provide a higher confidence than the predicted grades, they should not be considered sufficiently reliable to justify renewal of the pipes without further assessment of the CCTV inspection data being undertaken to confirm the pipe condition. It is generally expected that following engineering assessment of the CCTV inspections that the quantity assessed as poor or very poor will reduce allowing deferral of the pipe renewal into the future or confirming with high confidence the justification of the pipe renewal. 7km of the 17km assessed as in poor condition have a high or very high criticality (**Error! Reference source not found.**). It recommended that where CCTV videos are available that an engineering assessment of the pipes with a CCTV assessed grade of 4 or 5 (17km) is undertaken to confirm the pipe condition with a focus prioritised on the pipes with a consequence of failure grade of 4 and 5 (the most critical pipes) as these would be expected to be the first assets to be considered for renewal.

Table 32 Total Length of pipes (m) with COF 4 and 5 and Confidence Grade B

Water Type	Material Type	Condition Grade 4	Condition Grade 5	Total Length (m)
WW Gravity	Combined	2,626	2,386	5,012
	CC	1,162	169	1,331
	EW	1,465	2,110	3,574
	PVC		107	107
SW	Storm Main	1,055	1,128	2,182
	CC	828	850	1,677
	EW	227	203	430
	SN		75	75
Total Length (m)		**3,681**	**3,514**	**7,195**

A recommended engineering assessment on the previous CCTV inspections that are available is could be commenced within December 2025 and completed prior to April 2026.

4.2.2 Existing Assessment of Cast Iron Pipes

The assessment of the condition of the cast iron pipes previously inspected using p-CAT technology was based on a percentage of remaining wall loss, resulting in a confidence grade of only B. It is recommended to undertake further assessment of these pipes (shown in Table 33) utilising the remaining wall thickness measurements available from the p-CAT and utilising the modelled network pressure with an allowance for surge to confirm the remaining pipe structural capacity and remaining life.

It is expected that this analysis could be undertaken completed within December 2025. to be able to be complete prior to April 2026.

The Outcomes of both the engineer assessment of the CCTV inspections and CI watermains should be integrated into the desktop assessment to improve data confidence for condition grading of previously inspected assets. The refined condition grading data should be referenced in the response to the DIA Review as appropriate.

Table 33 COF 4 and 5, Confidence Grade B, Cast Iron water mains

Assessed Condition Grade	2	3	Sum
CI Water Main length (m)	2,684	3,581	6,265

4.3 Future Inspections

Future pipe inspections are recommended to improve confidence of pipe condition grading and inform evidence-based renewals based on a risk-based approach. Future inspections of both gravity and pressure pipes should where appropriately include engineering assessment to confirm failure modes, remaining useful life and recommended the most appropriate interventions including maintenance, repair, relining or replacement.

These recommendations are longer-term (beyond June 2026) and short-term (prior to April 2026) to help inform the updates to the WSDP.

4.3.1 Long-term horizon (post June 2026)

Development of a prioritised annual asset inspection programme for wastewater, stormwater and drinking water assets is recommended. Pipe information including predicted pipe condition, criticality and other asset attributes are assessed to create a prioritised annual inspection programme Pipes with very poor condition and high criticality

are generally prioritised for inspection (and renewal). The quantity of these assets is identified in **Error! Reference source not found.**.

Table 34 Total Length of pipes (m) with COF 4 and 5, Assessed Condition Grades 4 and 5, and Confidence Grade D

Water Type	Material Type	Condition Grade 4	Condition Grade 5	Total Length (m)
WW Gravity	Combined	4,718	2,165	6,883
	AC	260		260
	CC	1,251	736	1,988
	EW	2,508	1,301	3,809
	PVC	698	128	826
WW Rising	Combined		296	296
	AC		272	272
	CI		24	24
Storm Main	Combined	1,566	1,179	2,745
	CC	1,224	604	1,827
	EW	272	525	797
	PVC		10	10
	SN	70	42	111
Water Main	Combined	35,281	16,837	52,118
	AC	12,538	13,661	26,199
	CI	933	2	935
	GALV		170	170
	PE	15,694*	244*	15,938*
	PVC	6,116	2,760	8,876
Total Length (m)		**41,564**	**20,478**	**62,042**

**WDC have already identified the planned renewal of smaller diameter PE pipelines within their renewal strategy as is evidence by recorded high rates of failure.*

It is recommended that inspection prioritisation, scoping and technical support (if required) is completed within FY25-26 so WDC can inform their asset condition inspection programme for FY26-27.

4.3.2 Short-Term Horizon (Prior to April 2026)

It is noted that the desktop condition assessment has identified significantly more AC drinking water pipes with a predicted Condition Grade of 5 than has been previously assessed by WDC based on very low failure rates having been observed for 100/150mm diameter AC pipe. As described in section 2.3 (Approach, Limitations and Assumptions to Condition Assessment) there are limitations to on the confidence that can be achieved through desktop assessment models. Higher confidence in the pipe condition can only be addressed through undertaking pipe condition investigations. Given the large number of AC

equal or greater than 100mm in diameter pipe with a predicted grade 5, (45km) a cohort sampling of a size sufficient to provide improved confidence as to whether the condition grade 5 and therefore the required level of renewal is justified should be undertaken. It should be noted that and as can be seen in graph 14 (page 61) that the majority of the AC pipes with grade 5 are small diameter (<100mm) which are currently already identified in the Interim Oamaru Urban Water Main Renewals Strategy for renewal commencing in year 3 to 4. These smaller diameter pipes are not recommended for further investigation as based on the reported failure rates the poorer assessed condition is in line with evidence available from WDC.

Some cast iron pipe was previously considered to be more deteriorated than the assessments completed have suggested as most of the cast iron pipe are approaching the current base life of the pipe. It is recommended undertaking some field inspections of cast iron drinking water pipes within the townships that have not been previously inspected to confirm that the rate of deterioration is slower than previously expected and improving confidence on the timing of pipe renewals.

Detailed scope for asset inspection prioritisation, scoping and technical support as noted in Section 1.3.2 will be prepared in a separate document for WDC consideration.

4.4 Department of Internal Affairs Review

It is recommended that outcomes from this desktop condition assessment are considered with other information to inform the WDC response to DIA review comments on the 2025 Water Services Delivery Plan.

Appendix A Comparison between Assessed Condition and the Original WDC Likelihood of Failure Grades

Where the assessed Condition Grage (CG) are lower than the corresponding LoF score these are highlighted in blue, and higher scores are highlighted in amber. Where there is no change there is no highlight.

Table 35 Percentage comparison of CG and LoF scores for material types

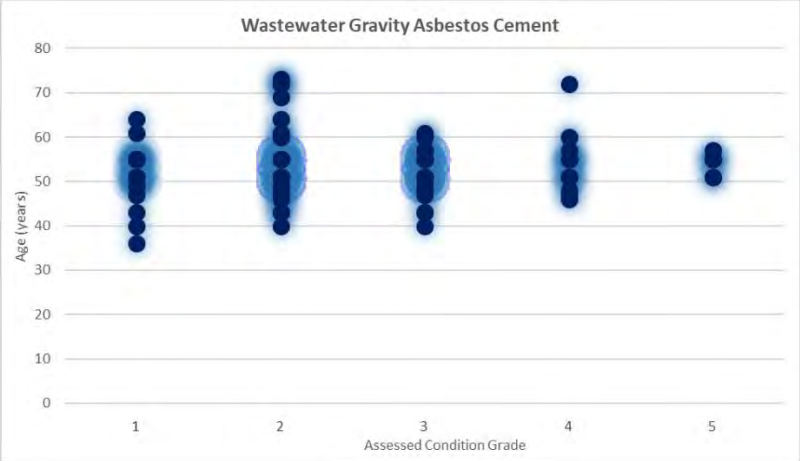
Water Type	Material Type	LoF Score					Assessed CG				
		1	2	3	4	5	1	2	3	4	5
WW	Combined	31.6%	43.1%	6.3%	19.1%	0.0%	24.9%	33.2%	18.8%	14.1%	9.1%
WW Gravity	Combined	29.8%	44.2%	6.5%	19.6%	0.0%	23.8%	33.2%	19.3%	14.4%	9.2%
WW Gravity	ABS	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
WW Gravity	AC	5.0%	95.0%	0.0%	0.0%	0.0%	11.9%	45.3%	35.2%	5.5%	2.1%
WW Gravity	CC	10.0%	86.3%	3.7%	0.0%	0.0%	7.8%	46.8%	24.4%	15.5%	5.5%
WW Gravity	CI	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
WW Gravity	EW	0.1%	7.0%	20.0%	72.8%	0.0%	4.0%	17.8%	21.8%	30.5%	26.0%
WW Gravity	PE	100.0%	0.0%	0.0%	0.0%	0.0%	18.4%	81.6%	0.0%	0.0%	0.0%
WW Gravity	PVC	88.0%	11.8%	0.1%	0.0%	0.0%	69.1%	21.6%	4.1%	4.0%	1.2%
WW Gravity	RL	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
WW Gravity	ST-CC	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
WW Rising	Combined	96.4%	3.6%	0.0%	0.0%	0.0%	62.7%	31.3%	0.0%	1.2%	4.8%
WW Rising	AC	66.7%	33.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
WW Rising	CI	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
WW Rising	PE	98.5%	1.5%	0.0%	0.0%	0.0%	74.6%	25.4%	0.0%	0.0%	0.0%
WW Rising	PVC	90.0%	10.0%	0.0%	0.0%	0.0%	20.0%	70.0%	0.0%	10.0%	0.0%
WW Rising	ST-CC	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
SW	Combined	32.0%	56.4%	9.7%	0.5%	1.4%	25.5%	36.7%	16.2%	14.0%	7.6%
SW	AC	5.0%	95.0%	0.0%	0.0%	0.0%	45.0%	35.0%	5.0%	15.0%	0.0%
SW	CC	24.7%	71.4%	3.4%	0.5%	0.0%	16.2%	45.0%	18.9%	13.8%	6.1%
SW	CI	0.0%	66.7%	33.3%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%

SW	EW	2.1%	40.8%	57.0%	0.0%	0.0%	7.7%	19.7%	22.5%	28.9%	21.1%
SW	PE	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
SW	PVC	94.4%	5.6%	0.0%	0.0%	0.0%	78.3%	15.0%	1.7%	3.3%	1.7%
SW	SN	0.0%	0.0%	0.0%	11.1%	88.9%	27.8%	5.6%	11.1%	16.7%	38.9%
SW	ST	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
DW	Combined	47.7%	18.6%	28.6%	4.5%	0.5%	34.9%	24.9%	8.9%	24.4%	7.0%
DW	AC	0.8%	38.5%	33.7%	26.6%	0.4%	0.7%	2.9%	19.0%	26.2%	51.2%
DW	CI	8.5%	2.7%	7.1%	81.7%	0.0%	9.8%	60.7%	22.3%	6.3%	0.9%
DW	DI	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
DW	PE	0.0%	0.0%	4.5%	2.3%	93.2%	35.5%	23.8%	8.9%	31.7%	0.0%
DW	PVC	49.9%	10.5%	39.6%	0.0%	0.0%	51.6%	35.5%	3.3%	6.7%	2.9%
DW	ST	68.2%	31.7%	0.0%	0.0%	0.1%	13.2%	60.5%	0.0%	0.0%	26.3%
DW	GALV	18.4%	31.6%	23.7%	0.0%	26.3%	0.0%	0.0%	0.0%	0.0%	100.0%
Combined WW, SW, DW		**43.6%**	**25.8%**	**23.1%**	**7.0%**	**0.5%**	**32.3%**	**27.2%**	**11.3%**	**21.7%**	**7.4%**

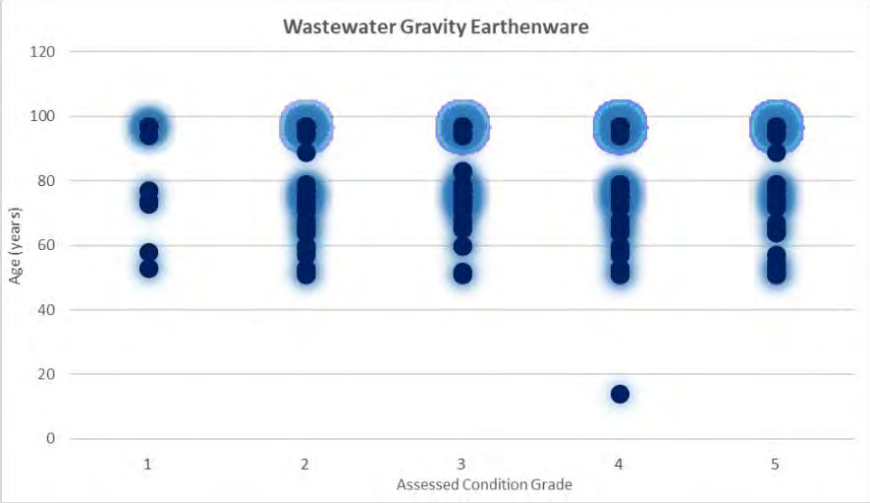
Appendix B Distribution of Condition Grade by Age for Each Material

The following graphs illustrate the distribution of pipe age across assessed condition grades. A larger aura around the data indicates a higher number of assets. For example, the majority of gravity wastewater AC mains assessed as condition grade 1 were between 50-60 years of age.

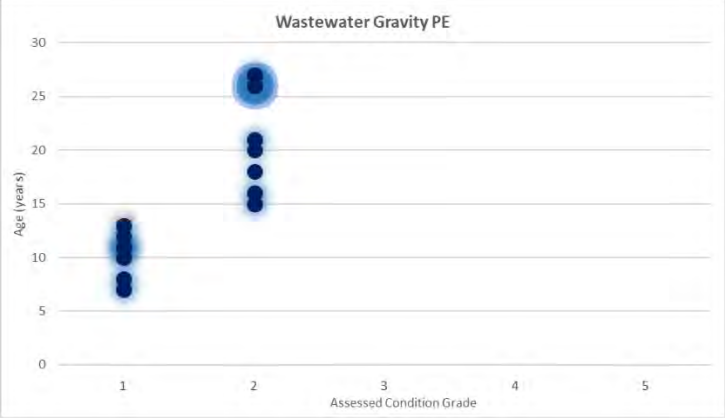
Graph 15 Wastewater Gravity Asbestos Cement



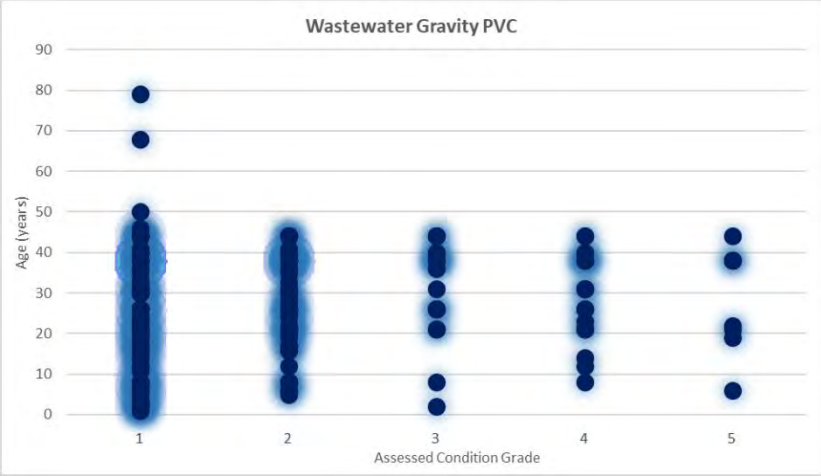
Graph 16 Wastewater Gravity Earthenware



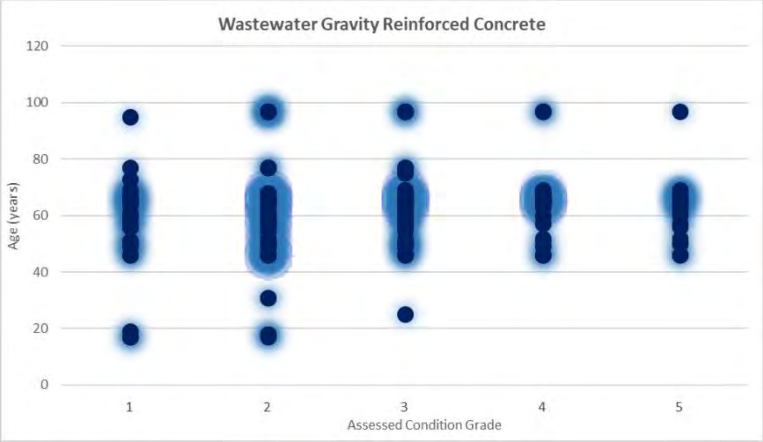
Graph 17 Wastewater Gravity PE



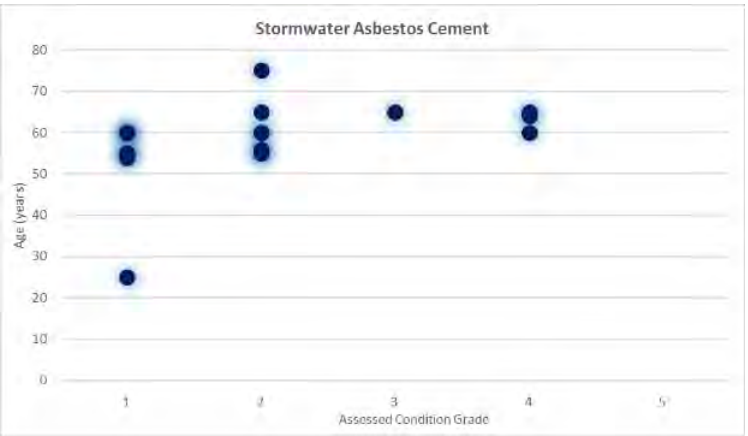
Graph 18 Wastewater Gravity PVC



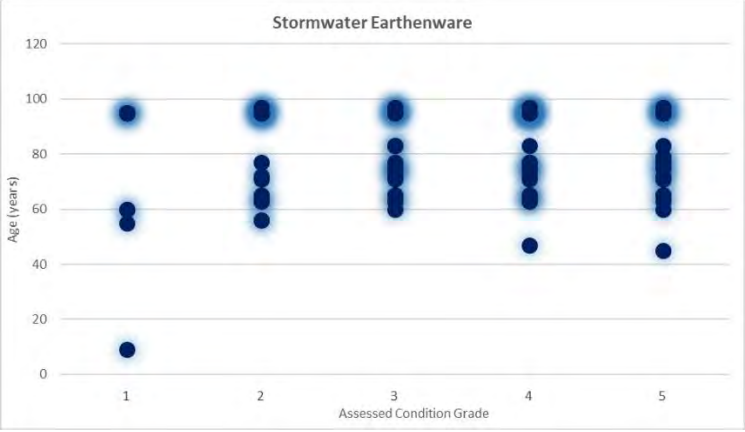
Graph 19 Wastewater Gravity Reinforced Concrete



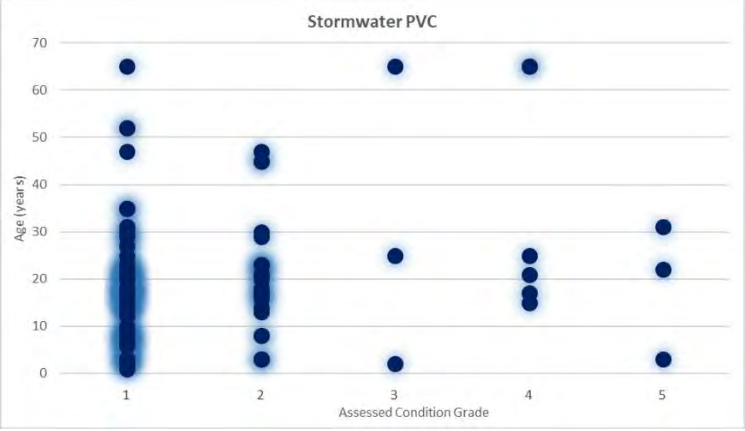
Graph 20 Stormwater Asbestos Cement



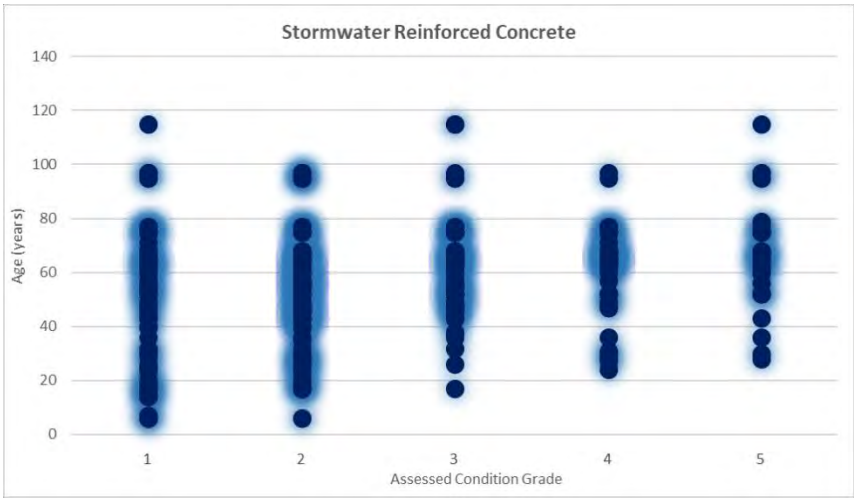
Graph 21 Stormwater Earthenware



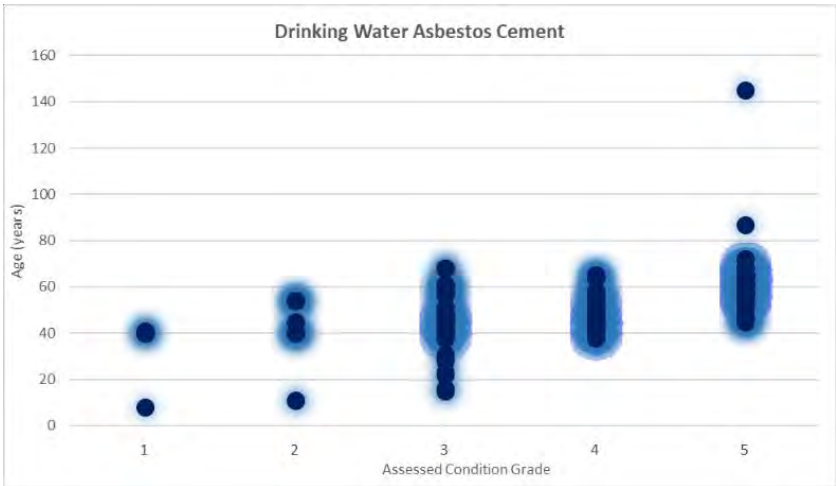
Graph 22 Stormwater PVC



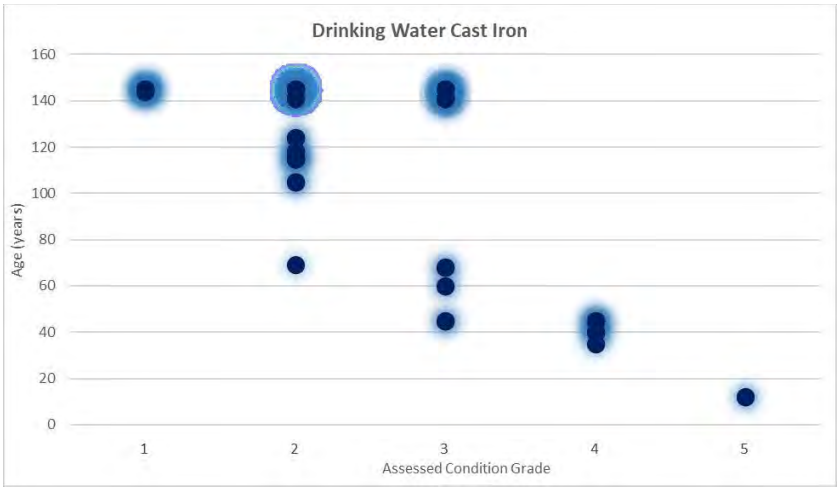
Graph 23 Stormwater Reinforced Concrete



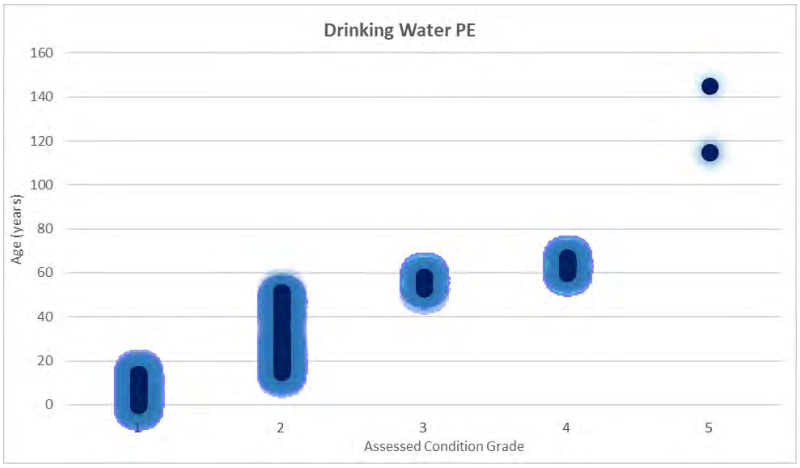
Graph 24 Drinking Water Asbestos Cement



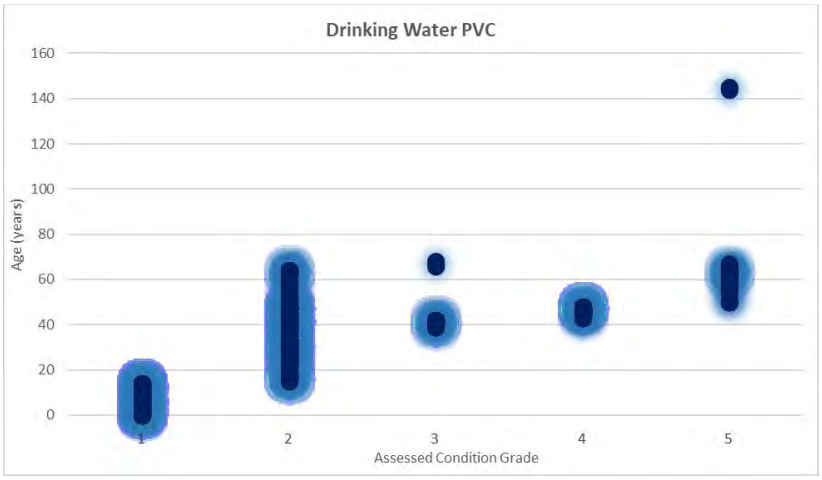
Graph 25 Drinking Water Cast Iron



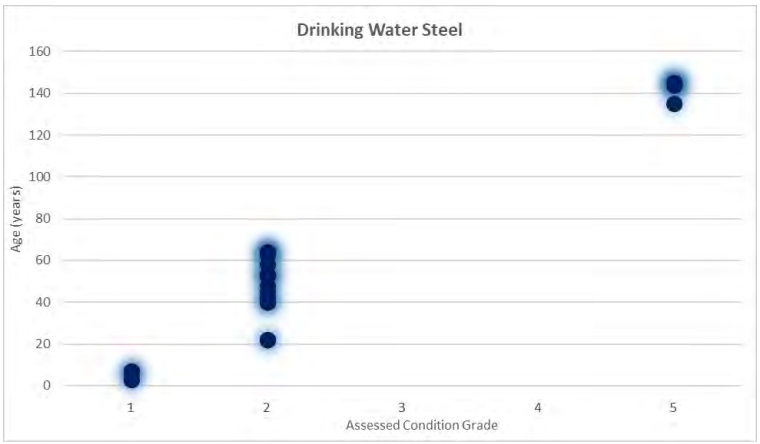
Graph 26 Drinking Water PE



Graph 27 Drinking Water PVC



Graph 28 Drinking Water Steel



Appendix 4 – Assessment of Stormwater CCTV data

27th March 2026

Attention: Paul Hayes
Waitaki District Council
20 Thames Street | Private Bag 50058
Ōamaru 9444 | New Zealand

Memorandum: Condition Assessment of Existing Stormwater CCTV Inspections

1 Introduction

A desktop assessment of the Waitaki District Councils (WDC) Three Waters pipe assets was undertaken in November 2025. As part of the desktop assessment of the gravity stormwater assets, the structural condition grades generated from existing CCTV inspection reports were used for the assessment results in preference to the predicted condition grades. However, while the grades from the CCTV inspection were considered at the time a higher confidence than the predicted grades, they should not be considered sufficiently reliable to justify renewal of the pipes without further assessment of the CCTV inspection data being undertaken to confirm the pipe condition. It is generally expected that an engineering assessment of the CCTV inspection videos will result in a reduced quantity of assets that are assessed as poor or very poor, which will can justify deferral of pipe renewal into the future or confirm justification of the pipe renewal with high confidence.

The desktop assessment report recommended that where CCTV videos are available, an engineering assessment should be undertaken to confirm the pipe condition of gravity stormwater assets with improved confidence to inform the renewal planning of wastewater assets and updates to the Water Services Delivery Plan.

This memorandum sets out the engineering assessment of the available CCTV inspections of the gravity wastewater assets, the findings and recommendations.

2 Methodology

All received CCTV video inspections were reviewed by an experienced engineer.

Received CCTV data was reviewed to determine suitability of the data for assessment.

For pipes with suitable CCTV data, a detailed review was performed included viewing of the full video files, confirming pipe attributes and providing an assessment to determine Assessed Structural Condition Grades and Assessed Service Condition Grades.

The predicted condition grades from the December 2025 desktop assessment were then compared with condition grades provided with the CCTV data to determine which condition grades are considered most reliable.

3 Pipe Characteristics and Data Integrity

The CCTV inspection footage provided by WDC included 174 inspections totalling 7.1km of inspected length. The inspections were completed between 2023 and 2025. Most of these inspections (68%) were completed between in 2023 with virtually all others completed in 2024 as summarised in Table 1.

Table 1 Years that inspections supplied were undertaken

Inspection Year	Number of Inspections	% of Total
2023	118	68%
2024	55	32%
2025	1	1%

Upon receiving the information, ProjectMax undertook a review of the inspections in preparation for the condition assessment. The review identified that several inspections supplied were either duplicates or were inspections that had been subsequently reinspected by a more recent inspection (i.e., superseded inspections). Others were also not suitable for assessment as the inspected lengths were either too short or has missing information for the inspection to be suitable for assessment. Table 2 summarises the assessed status of reviewed inspections. The inspections identified as "Current" were confirmed as inspections that could be assessed which included 106 inspections with an inspected length of 5.5km (6.3km GIS Length). All Current inspections were conducted between 2022 and 2024 as no inspections prior to 2022 were suitable for assessment.

Table 2 Status of inspections supplied for assessment

Inspection Status	Number of Inspections	Total Length	Total Inspected Length
Current	125	7032.8	5787.1
Duplicate	10	817.0	567.0
Superseded	38	3091.1	782.5
Unsuitable	1	14.9	0.0
Grand Total	**174**	**10955.8**	**7136.5**

The assessment of Current pipes characterises pipes by material, diameter, age and length. Table 3 presents differences between pipe materials observed in CCTV inspection and pipe material stated in GIS data for Current pipes. Cells highlighted in green are of interest because pipe materials observed in the CCTV differed from pipe material stated in GIS.

Table 3 - Comparison of GIS and Observed Material

GIS Material	Material Observed from CCTV								Grand Total
	AC	CC	CIS	CLS	EW	PVC	RL	SN	
CC		67	6		4				**77**
EW	2	16			12	1			**31**
PVC				1	2	2	2		**7**
SN					1			9	**10**
Grand Total	**2**	**83**	**6**	**1**	**19**	**3**	**2**	**9**	**125**

Of the 125 pipes with current inspections 35 were found from the review to be different material than described in GIS.

A comparison of pipe material observed from CCTV data and GIS diameter is summarised in Table 4.

Table 4 - Comparison of GIS and Observed Diameter

GIS Diameter	Diameter Observed from CCTV												Grand Total
	100	150	225	300	375	450	600	675	750	900	1050	NC	
100	2												2
150		9	1			1						3	14
200												1	1
225			30										30
300				14									14
375				2	16								18
450						14						1	15
600							12						12
675								1					1
750									11				11
900										6			6
1050											1		1
Grand Total	**2**	**9**	**31**	**16**	**16**	**15**	**12**	**1**	**11**	**6**	**1**	**5**	**125**

The diameters of Current inspected pipes ranged between 100mm and 1050mm in diameter. Two pipes were identified with pipe diameter different that what is recorded in GIS. There were Five other pipes (SN material) where the pipe diameters could not be determined. Pipes with differences from GIS are highlighted green in Table 4.

Note the pipe diameters reported as observed diameter have been taken from the information provided with the CCTV inspection (e.g., reported by the CCTV Contractor on the video file) and are not verified.

Most of the pipes that were inspected are circular pipes but 15 of 125 pipes were rectangular pipes or variations of rectangular pipes, such as U-shape pipes or Arched pipes. All the inspected pipes were recorded as Circular in GIS

Table 5 Pipe Shape

GIS Shape	Shape Observed from CCTV		Grand Total
	CP	RP	
CP	110	15	**125**

Table 6 presents a summary of installation dates for Current inspections.

Table 6 - Rounded Installation Date and Observed Materials

Install Year	Pipe Material Observed from CCTV								Grand Total
	AC	CC	CIS	CLS	EW	PVC	RL	SN	
1910					3	2		7	**12**
1928		6			3				**9**
1930	2	14			7			2	**25**
1946		1			2				**3**
1948		5	1						**6**
1950		7	4						**11**
1957		1							**1**

Install Year	Pipe Material Observed from CCTV								Grand Total
	AC	CC	CIS	CLS	EW	PVC	RL	SN	
1958		13							**13**
1959		5							**5**
1960		3	1	1	2		2		**9**
1961		1							**1**
1962		6							**6**
1965		3				1			**4**
1969		1							**1**
1970					1				**1**
1973		5			1				**6**
1976		2							**2**
1978		3							**3**
1989		4							**4**
1998		1							**1**
2001		2							**2**
Grand Total	**2**	**83**	**6**	**1**	**19**	**3**	**2**	**9**	**125**

The pipe materials largely align with credible installation dates, except for AC, PVC and Relined (RL) pipes. The materials for the AC, PVC and RL pipe were confirmed from review of the CCTV video, so it is likely that the GIS records for the pipe installation dates were not updated following renewal.

4 Assessed Condition

The assessment process generates condition grades (Structural grades and Service grades) on a 1-5 scale in line with the International Infrastructure Management Manual (IIMM) and the New Zealand Gravity Pipe Inspection Manual. A condition grade of '1' translates to a pipe that has an 'as new' pipe condition while a '5' indicates that there is 'no reliable service life remaining'.

The condition grade assessed by ProjectMax largely relates to the worst defects observed in each pipe where service or structural failure is likely to occur. In some pipes this may reflect the condition throughout the pipe (e.g., old and severely deteriorated throughout). In other pipes it may reflect a particular fault that requires attention and the rest of the pipe is otherwise in good condition. Our recommended responses reflect these differences.

The assessed structural condition grades for the 6.3Km of Current inspections are summarised in Table 7.

Table 7 – Assessed Condition Grades by Pipe and Observed Length

Assessed Structural Condition	Number of Assets	% of Assets	Length of Pipe	% of Length
1	26	22%	1084.08	15%
2	61	52%	3822.92	55%
3	11	9%	976.92	14%
4	8	7%	475.11	7%
5	11	9%	649.41	9%
Grand Total	**117**	**100%**	**7008.45**	**100%**

A comparison of the ProjectMax assessed structural grades with the grades from the desktop assessment is presented in Table 8. The comparison shows a decrease in the number of pipes with a structural grade of 3,5 and 5, and an increase in the number of pipes with a structural grade of 1 and 2. Table 9 shows a further breakdown of the movements (variances) between the ProjectMax assessed grades and grades from the desktop assessment.

Table 8 Comparison of Desktop Assessed Grades v ProjectMax Assessed Grades

Structural Grade	Desktop Assessment Grade	ProjectMax Assessed Grade	Change	
1	24	26	2	8%
2	22	60	38	173%
3	18	9	-9	-50%
4	16	8	-8	-50%
5	34	11	-23	-68%

Note: the above table contains only 114 assets as 3 of the assessed inspections do not have a matching Compkey in GIS and therefore do not have a corresponding Desktop Grade.

Table 9 Movement/Variance of Assessed Condition Grades Compared to the Desktop Grades

Grade Variance	Desktop Assessment Grade					Number within Variance	% Variance
	1	**2**	**3**	**4**	**5**		
-3				3	18	21	18%
-2			2	12	4	18	16%
-1		6	11		3	20	18%
0	15	13	2	1	9	40	35%
1	6	1	1			8	7%
2	2	2	2			6	5%
3	1					1	1%
No. Changes	9	9	16	15	25		
% Changes	12%	12%	22%	20%	34%		

Approximately 60% of the assessed grades are either the same grade as the desktop grade or have increased/decreased by only one grade.

Table 10 summarises the recommended actions to be taken by WDC for each of the assessed assets.

Table 10 Recommended Actions from the Condition Assessment (provided by ProjectMax based on observations from Assessment)

Observed Pipe Material	Clean and reinspect	Complete inspection	No Remedial Action	Reinspect	Renew	Repair	Repair and reinspect	Grand Total
AC			2					**2**
CC	1		79			2	1	**83**
CIS	2		1			3		**6**
CLS			1					**1**

Observed Pipe Material	Clean and reinspect	Complete inspection	No Remedial Action	Reinspect	Renew	Repair	Repair and reinspect	Grand Total
EW			10	1	7		1	**19**
PVC			3					**3**
RL					2			**2**
SN		1	2	2	2	2		**9**
Grand Total	**3**	**1**	**98**	**3**	**11**	**7**	**2**	**125**

Eleven assets are recommended for renewal, and these are Earthenware (EW) pipes, Stone Pipe (SN) and two relined pipes (RL). A further 9 assets have recommendation for either repairs or repairs with further inspections to confirm what actions may be required.

Note: the RL pipes recommended for renewal do appear to contain structural liners.

5 Comparisons with Predicted and WDC CCTV Structural Grade

In December 2025, a desktop assessment of gravity wastewater pipes was performed by ProjectMax. The desktop assessment applied a statistical analysis of national condition data[1] to determine the '***Predicted Structural Grade***'.

CCTV inspection data provided by WDC included condition grade reporting based on peak structural scores[2]. The condition grade referenced from the CCTV data is referred to as '***WDC CCTV Structural Grade***'.

The desktop assessment utilised both the Predicted Grades and the WDC CCTV Structural Grades for assets where CCTV inspections had been completed (the Predicted Structural Grade was superseded with the WDC CCTV Structural Grade where a WDC CCTV Structural Grade was available).

Assessed Condition Grades from this assessment were compared with the Predicted Condition Grade from the desktop assessment and the WDC CCTV Structural Grade from CCTV data to determine which of the Predicted Condition Grade or the WDC CCTV Structural Grade is considered to be more reliable.

The total length (m) of pipes applied in the desktop assessment with Predicted Grades and WDC CCTV Structural Grades is summarised in Table 11.

Table 11 Length of pipes and Condition Grades used in December 2025 Desktop Assessment

Methodology	Length (m)
Predicted Structural Grade	50,712
WDC CCTV Structural Grade	7,490

Table 12 presents a comparison of the assessed grades from this assessment referred to as '***ProjectMax Assessed Condition Grade***', the WDC CCTV Structural Grades and the Predicted Structural Grades for the 104 assets for where the assessment of the CCTV inspections has been completed and matches GIS Compkeys.

[1] Predicted conditions determined by ProjectMax and included in WDC report "20251128 WDC Network Asset Condition Grading Assessment Report - Final Rev2"

[2] Scoring Analysis determined from the CCTV Peak Score as described in Section E1, New Zealand Gravity Pipe Inspection Manual, 4th Edition, 2019.

The purpose of this comparison is to determine the variance between the different grades and to inform what level of confidence WDC can have in the other remaining assets where the current pipe condition is based on either the WDC CCTV Structural Grade or the Predicted Structural Grade.

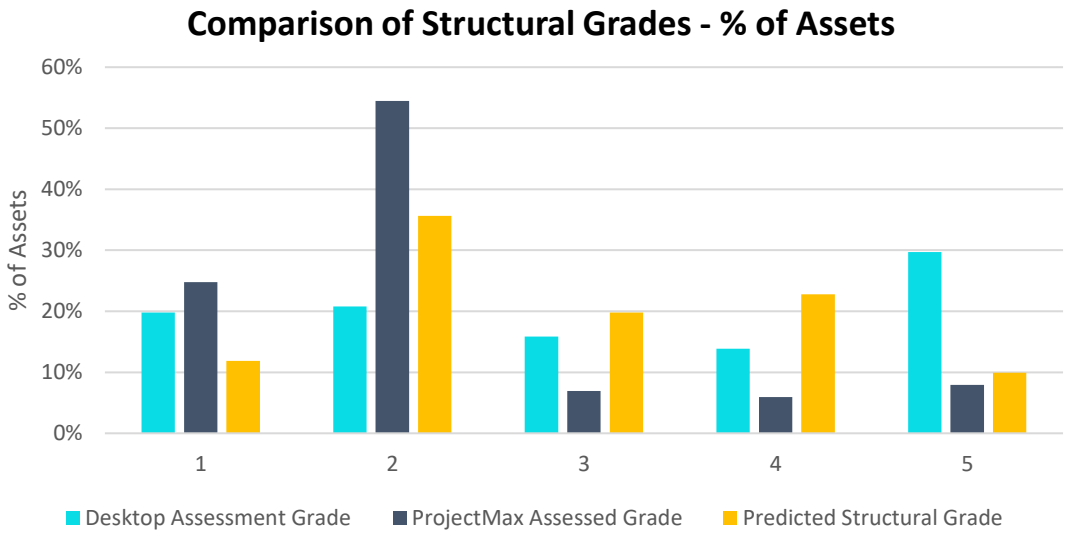
Table 12 Comparison of Assessed Structural Grade with Predicted Grade and WDC CCTV Structural Grade (% of grades within Grades 1 - 5)

Structural Grade	Desktop Assessment Grade	ProjectMax Assessed Grade	Predicted Structural Grade
1	20%	25%	12%
2	21%	54%	36%
3	16%	7%	20%
4	14%	6%	23%
5	30%	8%	10%
	100%	100%	100%

Note Data in Table x is based on 101 assets (less than the 114) as a predicted grade for some assets (13) was not assigned

Figure 1 presents a comparison of distribution of structural grades for each of the grading methods.

Figure 1 Comparing the distribution of Structural Grades against the various assessment methods



The results indicate that while there is a variance of results across all three of the assessment methodologies with no clear alignment over the inspected pipes.

5.1 Opportunity to Update Desktop Assessed Grades

Given lack of an observed correlation between the various assessment methodologies for the Stormwater assets, it is difficult to determine an opportunity to make any further updates to the desktop assessed grades other than where an assessed grade has been determined from the assessment of the CCTV inspections.

6 Recommendations

The following recommendations are made following this assessment:

1. The ProjectMax Assessed Condition largely has a very high confidence where a full inspection of the assets is available or where there is sufficient evidence from the CCTV inspection to enable a complete Engineering assessment of the Video footage. It is recommended that the desktop condition grades of the 7Km of assets where ProjectMax has completed the assessment from the CCTV video be updated with the Assessed Grades and the associated Confidence Grades.
2. Based on the comparison of the Predicted Structural Condition Grades and the WDC CCTV Structural Grades with the ProjectMax Assessed Grades, it is recommended that no further updates be made to the desktop condition grade.

7 Contact

Report Authored by: Steve Apeldoorn, Director, CTO, ProjectMax Ltd, (steve.apeldoorn@projectmax.co.nz)

Report Reviewed by: Eric Skowron, Three Waters Network Strategy Engineer, ProjectMax Ltd. (eric.skowron@projectmax.co.nz)

Appendix 5 – Assessment of Wastewater CCTV data

12th March 2026

Attention: Paul Hayes
Waitaki District Council
20 Thames Street | Private Bag 50058
Ōamaru 9444 | New Zealand

Memorandum: Condition Assessment of Existing Wastewater CCTV Inspections

1 Introduction

A desktop assessment of the Waitaki District Councils (WDC) Three Waters pipe assets was undertaken in November 2025. As part of the desktop assessment of the gravity wastewater assets, the structural condition grades generated from existing CCTV inspection reports were used for the assessment results in preference to the predicted condition grades. However, while the grades from the CCTV inspection were considered at the time a higher confidence than the predicted grades, they should not be considered sufficiently reliable to justify renewal of the pipes without further assessment of the CCTV inspection data being undertaken to confirm the pipe condition. It is generally expected that following engineering assessment of the CCTV inspection videos, the quantity assessed as poor or very poor will reduce allowing deferral of the pipe renewal into the future or confirming justification of the pipe renewal with high confidence.

The desktop assessment report recommended that where CCTV videos are available, an engineering assessment should be undertaken to confirm the pipe condition of gravity wastewater assets with improved confidence to inform the renewal planning of wastewater assets and updates to the Water Services Delivery Plan.

This memorandum sets out the engineering assessment of the available CCTV inspections of the gravity wastewater assets, the findings and recommendations.

2 Methodology

All received CCTV video inspections were reviewed by an experienced engineer.

Received CCTV data was reviewed to determine suitability of the data for assessment.

For pipes with suitable CCTV data, a detailed review was performed included viewing of the full video files, confirming pipe attributes and providing an assessment to determine Assessed Structural Condition Grades and Assessed Service Condition Grades.

The predicted condition grades from the December 2025 desktop assessment were then compared with condition grades provided with the CCTV data to determine which condition grades are considered most reliable.

3 Pipe Characteristics and Data Integrity

The CCTV inspection footage provided by WDC included 160 inspections totalling 8.6km of inspected length. Most of these inspections (93%) were completed between 2022 and 2024 as summarised in Table 1.

Table 1 Years that inspections supplied were undertaken

Inspection Year	% of Total
2021	1%
2022	33%
2023	40%
2024	26%

Upon receiving the information, ProjectMax undertook a review of the inspections in preparation for the condition assessment. The review identified that several inspections supplied were either duplicates or were inspections that had been subsequently reinspected by a more recent inspection (i.e., superseded inspections). Others were also not suitable for assessment as the inspected lengths were either too short or has missing information for the inspection to be suitable for assessment. Table 2 summarises the assessed status of reviewed inspections. The inspections identified as "Current" were confirmed as inspections that could be assessed which included 106 inspections with an inspected length of 5.5km (6.3km GIS Length). All Current inspections were conducted between 2022 and 2024 as no inspections prior to 2022 were suitable for assessment.

Table 2 Status of inspections supplied for assessment

Inspection Status	Count of COMP Key	Sum of Length	Sum of Inspected Length
Current	106	6305.0	5484.1
Duplicate	8	338.7	192.3
Superseded	31	1281.7	867.8
Unsuitable	15	758.4	43.4
Grand Total	**160**	**8683.8**	**6587.6**

The assessment of Current pipes characterises pipes by material, diameter, age and length. Table 3 presents differences between pipe materials observed in CCTV inspection and pipe material stated in GIS data for Current pipes. Cells highlighted in green are considered to be of interest because pipe materials observed in the CCTV differed from pipe material stated in GIS.

Table 3 - Comparison of GIS and Observed Material

GIS Material	Material Observed from CCTV					Grand Total
	AC	CC	CLS	EW	PVC	
CC		16				16
EW	3	7	2	74	4	90
Grand Total	**3**	**23**	**2**	**74**	**4**	**106**

Of the 90 Current pipes identified as Earthenware (EW) in GIS, 74 were found to be EW from review of the CCTV data. 16 of the Current inspected pipes identified as EW in GIS data were found to be of different materials including Asbestos Cement (AC), Concrete (CC), Cement Lined Steel (CLS) and PVC.

A comparison of pipe material observed from CCTV data and GIS diameter is summarised in Table 4.

Table 4 - Comparison of GIS and Observed Diameter

GIS Diameter	Diameter Observed from CCTV						Grand Total
	150	225	300	375	450	600	
150	62						62
225	2	24					26
300			3				3
375			3	3			6
450					6		6
600						1	1
Not known	2						2
Grand Total	**66**	**24**	**6**	**3**	**6**	**1**	**106**

The diameters of Current inspected pipes ranged between 150mm and 600mm in diameter with most 150mm. Three pipes were recorded as 300mm diameter during inspection but have a diameter of 375mm in GIS. Two other pipes did not have a recorded GIS diameter (as the inspected pipe Compkeys did not match GIS) were confirmed to be 150mm diameter. Both are highlighted green in Table 4.

Note the pipe diameters reported as observed diameter have been taken from the information provided with the CCTV inspection (e.g., reported by the CCTV Contractor on the video file) and are not verified.

Table 5 presents a summary of installation dates for Current inspections.

Table 5 - Rounded Installation Date and Observed Materials

Install Year	AC	CC	CLS	EW	PVC	Grand Total
1928	3	6	2	67	2	80
1931				4		4
1948		4		2		6
1950				1		1
1959		13				13
Not Known					2	2
Grand Total	**3**	**23**	**2**	**74**	**4**	**106**

The pipe materials largely align with credible installation dates, except for AC and PVC pipes with a GIS installation date of 1928. The materials for the AC and PVC pipe were confirmed from review of the CCTV video, so it is likely that the GIS records for the pipe installation dates were not updated following renewal.

4 Assessed Condition

The assessment process generates condition grades (Structural grades and Service grades) on a 1-5 scale in line with the International Infrastructure Management Manual (IIMM) and the New Zealand Gravity Pipe Inspection Manual. A condition grade of '1' translates to a pipe that has an 'as new' pipe condition while a '5' indicates that there is 'no reliable service life remaining'.

The condition grade assessed by ProjectMax largely relates to the worst defects observed in the pipes as this is considered to be a location where service or structural failure is likely to occur. In some pipes this may reflect the condition throughout the pipe (e.g., old and severely deteriorated throughout). In other pipes it may reflect a particular fault that requires attention and the rest of the pipe is otherwise in good condition. Our recommended responses reflect these differences.

The assessed structural condition grades for the 6.3Km of Current inspections are summarised in Table 6.

Table 6 – Assessed Condition Grades by Pipe and Observed Length

Assessed Structural Condition	Number of Assets	% of Total Assets Assessed	Length of Pipe	% of Length
5	23	22%	1814.5	29%
4	34	32%	2401.1	38%
3	14	13%	629.6	10%
2	28	26%	1237.0	20%
1	7	7%	222.8	3%
Grand Total	**106**	**100%**	**6305.0**	**100%**

A comparison of the ProjectMax assessed grades with the grades from the desktop assessment, Table 7, shows a decrease in the number of pipes with a structural grade of 5, 3 and 1, and an increase in the number of pipes with a structural grade of 4 and 2. Table 8 shows a further breakdown of the movements (variances) from the desktop assessment.

Table 7 Comparison of Desktop Assessed Grades v ProjectMax Assessed Grades

Structural Grade	Desktop Assessment Grade	ProjectMax Assessed Grade	Change	
5	35	23	-12	-34%
4	24	33	9	38%
3	22	14	-8	-36%
2	14	29	15	107%
1	9	5	-4	-44%

Note: the above table contains only 104 assets as 2 of the assessed inspections do not have a matching Compkey in GIS and therefore do not have a corresponding Desktop Grade.

Table 8 Movement/Variance of Assessed Condition Grades Compared to the Desktop Grades

Grade Variance	Condition Grade					No. within Variance	% Variance
	5	4	3	2	1		
2	0	0	0	1	0	1	1%
1	0	4	10	8	6	28	27%
0	19	10	1	6	3	39	38%
-1	13	5	10	0	0	28	27%
-2	0	5	1	0	0	6	6%
-3	1	0	0	0	0	1	1%
-4	1	0	0	0	0	1	1%
No. Changes	15	14	21	9	6		
% Changes	23%	22%	32%	14%	9%		

91% of the assessed grades are either the same grade as the desktop grade or have increased/decreased by only one grade.

Table 9 Recommended Actions from the Condition Assessment (provided by ProjectMax based on observations from Assessment)

Observed Pipe Material	Further investigation	No further action	No work required	Reinspect the pipe.	Renew	Repair and reinspect	Spot repair	Grand Total
AC	1		2					3
CC		13	10					23
CLS			1	1				2
EW	6	3	6		56	1	2	74
PVC			4					4
Grand Total	**7**	**16**	**23**	**1**	**56**	**1**	**2**	**106**

Table 9 summarises the recommended actions to be taken by WDC for each of the assessed assets. As noted in section 3, the majority of the assessed assets are Earthenware (EW) pipe. 76% (56 of the 74 EW pipes) are recommended to be renewed. A further 12% (9 assets) have recommendation for either repairs or further inspections to confirm what actions may be required.

5 Comparisons with Predicted and WDC CCTV Structural Grade

In December 2025, a desktop assessment of gravity wastewater pipes was performed by ProjectMax. The desktop assessment applied a statistical analysis of national condition data[1] to determine the '***Predicted Structural Grade***'.

CCTV inspection data provided by WDC included condition grade reporting based on peak structural scores[2]. The condition grade referenced from the CCTV data is referred to as '***WDC CCTV Structural Grade'***.

The desktop assessment utilised both the Predicted Grades and the WDC CCTV Structural Grades for assets where CCTV inspections had been completed (the Predicted Structural Grade was superseded with the WDC CCTV Structural Grade where a WDC CCTV Structural Grade was available).

Assessed Condition Grades from this assessment were compared with the Predicted Condition Grade from the desktop assessment and the WDC CCTV Structural Grade from CCTV data to determine which of the Predicted Condition Grade or the WDC CCTV Structural Grade is considered to be more reliable.

The total length (m) of pipes applied in the desktop assessment with Predicted Grades and WDC CCTV Structural Grades is summarised in Table 10.

Table 10 Length of pipes and Condition Grades used in December 2025 Desktop Assessment

Methodology	Length (m)
Predicted Structural Grade	155,933
WDC CCTV Structural Grade	24,387

[1] Predicted conditions determined by ProjectMax and included in WDC report "20251128 WDC Network Asset Condition Grading Assessment Report - Final Rev2"

[2] Scoring Analysis determined from the CCTV Peak Score as described in Section E1, New Zealand Gravity Pipe Inspection Manual, 4th Edition, 2019.

Table 11 presents a comparison of the assessed grades from this assessment referred to as '***ProjectMax Assessed Condition Grade***', the WDC CCTV Structural Grades and the Predicted Structural Grades for the 104 assets for where the assessment of the CCTV inspections has been completed and matches GIS Compkeys.

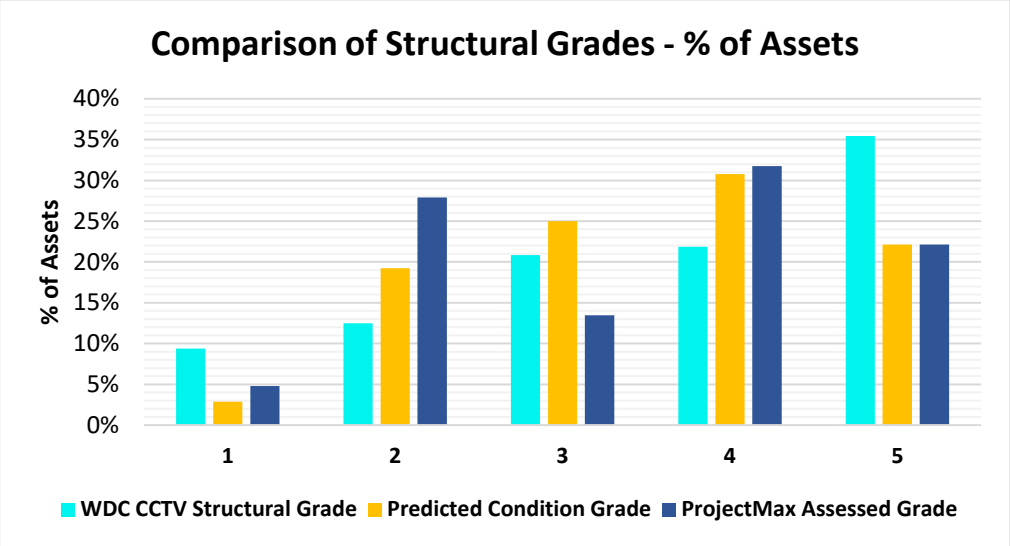
The purpose of this comparison is to determine the variance between the different grades and to inform what level of confidence WDC can have in the other remaining assets where the current pipe condition is based on either the WDC CCTV Structural Grade or the Predicted Structural Grade.

Table 11 Comparison of Assessed Structural Grade with Predicted Grade and WDC CCTV Structural Grade (% of grades within Grades 1 - 5)

Structural Grade	ProjectMax Assessed Condition Grade	Predicted Structural Grade	WDC CCTV Structural Grade
5	22%	22%	35%
4	32%	31%	22%
3	13%	25%	21%
2	28%	19%	13%
1	5%	3%	9%

Figure 1 presents a comparison of distribution of structural grades for each of the grading methods.

Figure 1 Comparing the distribution of Structural Grades against the various assessment methods



The results indicate that while there is variance of results across all three of the assessment methodologies, the variance between the Predicted Structural Grade and the ProjectMax Assessed Grade is least and aligns relatively well, particularly for Grade 5 (very poor), where the % proportions are equal, and Grade 4 (poor) where there is only a 1% difference.

Most of the variance between these two methods is between grades 2 (good) and 3 (moderate).

The largest variance is between the Assessed Grades and the WDC CCTV Structural Grades where there appears to be little alignment.

5.1 Opportunity to Update Desktop Assessed Grades

Given observed correlation between the ProjectMax Assessed Grades and the Predicted Condition Grade and poor alignment between the ProjectMax Assessed Grades WDC CCTV Structural Grades (particularly for condition grade 4 and 5), use of the WDC CCTV Structural Grades in the desktop assessment is expected to result in decreased confidence for the remaining 18km of assets where the WDC CCTV Structural Grades were used for desktop assessment.

Based on the closer alignment of the Predicted Structural Grades and the ProjectMax Assessed Grades consideration should be given to updating the Desktop grades for the remaining assets using the WDC CCTV Structural Condition with the Predicted Structural Condition.

Table 12 presents the total length of Wastewater Gravity Pipes within each structural grade under two scenarios:

1. **Desktop Assessment** – this the current condition from the desktop assessments undertaken by ProjectMax in November 2025 (used as default the Predicted Structural Grade but superseded by the WDC CCTV Structural Grade where applicable)
2. **Predicted & Assessed** – Uses by default the Predicted Structural Grade but superseded by the ProjectMax Assessed Grade for the 6.3km that have been assessed by ProjectMax and does not utilise the WDC CCTV Structural Grades. This scenario prioritises the high confidence assessed grades and Predicted grades that show good alignment in place of the WDC CCTV Structural Grades which have a higher proportion of grade 5 assessments.

Table 12 Total length of WW Gravity Assets Assessed within each Grade for each Assessment Scenario

Structural Grade	Predicted & Assessed (m)	Desktop (m)	Difference (m)
1	47784	46494	1290
2	59182	58040	1142
3	34351	32867	1484
4	24626	25288	-662
5	14376	17631	-3255

Based on the results in Table 12, an update of the desktop assessed grades for the Wastewater Gravity Pipes using the Predicted and Assessed Grades (Scenario 2) would reduce the quantity of assets with condition grades 5 and 4 by 3.92km. This represents a reduction of approximately 4km of pipes expecting to need to be renewed within 10 years.

6 Recommendations

The following recommendations are made following this assessment:

1. The ProjectMax Assessed Condition has a very high confidence as this is based on Engineering assessment of the Video footage and not relying on scoring analysis. It is recommended that the desktop condition grades of the 6.3Km of assets where ProjectMax has completed the assessment from the CCTV video be updated with the Assessed Grades and the associated Confidence Grades be updated from the current B grade to an A grade.
2. Based on the comparison of the Predicted Structural Condition Grades and the WDC CCTV Structural Grades with the ProjectMax Assessed Grades it is recommended that the remaining Desktop

assessed grades using the WDC CCTV Structural Grades be replaced with the Predicted Structural Grades as this is expected to provide a more reliable desktop assessment of the pipe condition.
The Confidence Grade for the predicted grades for the gravity wastewater assets, based on the comparison with the assessments are recommended to be increased to grade C in line with the New Zealand Pressure Pipe Inspection Manual table A.7 Data Reliability Bands.

3. If recommendation 2 is not adopted and the WDC Structural Grades are to remain as the assessed Desktop Condition, we would recommend that the Confidence Grade for these assessments be reduced from the Current B grade to a D grade.

7 Contact

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Appendix 6 – Condition assessment of cast iron and asbestos cement water pipes

14th May 2026
Attention: Paul Hayes
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Memorandum: Condition Assessment of AC and CI Drinking Water Pipes

1 Introduction

A desktop assessment of the Waitaki District Councils (WDC) Three Waters pipe assets was undertaken in November 2025. The desktop assessment methodologies for cast iron (CI) and asbestos cement (AC) pipes estimated pipe condition using indirect indicators of structural capacity. For CI pipes, condition was determined by calculating remaining wall thickness from an assumed original thickness (based on pipe diameter, pressure, and historical manufacturing standards, BS78:1917) and applying a constant corrosion rate, (based on the earlier p-CAT investigation results of 0.061mm/year) with condition grades assigned accordingly; for AC pipes, condition is inferred by estimating remaining life from national average deterioration rates and assumed pipe class, with grades derived from the residual life relative to expected service life.[1]

Both approaches are subject to inherent uncertainty due to reliance on assumptions regarding original pipe characteristics and generalized deterioration rates that may not reflect actual installation or local environmental conditions. Additionally, the methods infer condition from surrogate measures (wall loss or remaining life) rather than direct assessment of structural performance, and do not explicitly account for site specific factors such as soil corrosivity, water chemistry, pressure transients, or localised defects, meaning the confidence in the assessment results are lower than those verified through physical inspection and structural assessment.

The only physical investigations completed prior to the November 2025 desktop assessments were p-CAT inspections of a limited selected lengths of cast iron pipe. For these pipes, the condition used in the assessment was taken directly from the field inspection reports, in place of the desktop evaluation.

The desktop assessment report recommended further investigations to validate and improve confidence in the condition assessments for both AC and CI pipes. For AC pipes, this included targeted cohort sampling across selected diameters, while for CI pipes, additional field inspections in areas not previously covered by p-CAT were proposed to validate corrosion rates and refine renewal timing. For CI pipes already inspected using p-CAT technology, further analysis of the inspection data was recommended to confirm structural capacity and remaining life, thereby improving confidence in the results.

This memorandum outlines the results of the recommended physical investigations completed by WDC, together with the analysis of existing p-CAT inspection data and presents the associated findings and recommendations.

2 Methodology

2.1 Assessment Methodology

The following method of analysis and assessment was undertaken for all inspected pipes (CI & AC) including the analysis of the existing p-CAT investigation data.

[1] Predicted condition determined by ProjectMax and included in WDC report "20251128 WDC Network Asset Condition Grading Assessment Report - Final Rev2"

The assessment of pipe condition is based on evaluating load bearing capacity relative to a safety factor (SF) that indicates the point of failure. Structural failure is expected when SF is less than 1, while an SF between 1 and 2 represents a critical state where failure may occur and remaining life is uncertain. Factors influencing failure include external loads (e.g., traffic), variations in pipe wall thickness, internal pressure, transient or surge pressures exceeding expected operating ranges, and inherent variability in test results.

Based on industry literature and experience, an SF of 2 is adopted as the threshold for a safe condition for critical assets; below this, the pipe is considered to have no remaining useful life. For pipes with an SF greater than 2, remaining useful life is defined as the time until the SF reduces to 2, forming the basis for assigning structural condition grades. The SF and remaining life are calculated from measured wall thickness and applied loading, considering:

- Hoop stress under working pressure plus surge,
- External loading from earth and traffic, and
- The combined ultimate loading condition.

The internal pressure used for the assessments based on the following:

For the CI pipe, including the additional analysis of the p-CAT inspection data the WDC modelled pressure plus a surge allowance of 1.5 has been used

For AC pipe, transient pressure monitoring was undertaken for each investigation site for a minimum period of 2 weeks. The pressure applied for the assessment was the maximum observed pressure reading – refer to Table 3, within 3.1.

The assessment process generates condition grades (Structural grades and Service grades) on a 1-5 scale in line with the International Infrastructure Management Manual (IIMM) and the New Zealand Pressure Pipe Inspection Manual. A condition grade of '1' translates to a pipe that has an 'as new' pipe condition while a '5' indicates that there is 'no reliable service life remaining'. Allocation of the structural condition grade is based on the time (years) to SF of 2, as the reliable remaining life. This translates as follows:

Table 1 Allocation of Condition Grade based on remaining life

Structural Condition Grade	Remaining Life
1	>30 years with less than 1% wall deterioration.
2	>30 years
3	11 to 30 years
4	3 to 10 years
5	< 3years

2.2 Additional Investigations Undertaken

2.2.1 AC pipes

A total of 11 site locations were chosen for extracting pipe samples for testing. Locations were selected to provide a representation of pipe diameters and proportional distributed sites across the district. The locations were collectively selected by WDC, South Roads and ProjectMax. Some locations were selected

because it provided the opportunity for installation of valves and therefore providing some additional economic cost benefit in addition to the testing value alone.

A sample of pipe was extracted from each site location and sent to a laboratory where Phenolphthalein testing was undertaken in accordance with the WaterNZ Asbestos Pipe Manual to measure the effective remaining pipe wall thickness.

The extracted samples included:

- Four coupon core samples (50mm diameter core); and
- Seven pipe sections (300mm long).

Refer to the laboratory testing reports within Appendix 1

2.2.2 CI pipes

Ultrasonic Testing (UT), a non-destructive method of testing using hand-held ultrasonic measurement devices, which measure the thickness of the pipe wall at various points around the pipe circumference was undertaken on three in service pipes.

In addition to exposing and measuring these pipes a further five extract samples of pipe wall previously recovered by WDC were measured using a digital micrometre to measure the remaining wall thickness.

While only the results from the in-service pipes could be directly applied to update the pipe condition, the assessment results from the other samples provided information to validate the assessment results.

Refer to the UT testing reports within Appendix 2.

3 Assessed Pipe Condition

3.1 AC Pipe Condition

Table 3 sets out the assessed condition of the collected and analysed AC pipe samples against the pipe asset ID corresponding the to the pipe which the sample was extracted from.

Table 3 also shows data used for the desktop condition assessment (November 2025) and compares whether there is a change in the condition of the pipe from the desktop assessment to the assessment gained from the field investigation.

Observations from the data within Table 3.

- Four of the 11 pipes saw no change from the desktop assessed condition. Three assessed as grade 5 (very poor condition).
- Pipes assessed from the inspection results as Grade 5 aligning with the November desktop assessment validates the presence of AC pipes in very poor condition that had not been expected from the previous WDC Likelihood of Failure assessments.
- While there were some reductions in the expected maximum length of life (compared to the national expected lives), overall, the results show, over the 11 locations tested, an increase in maximum expected life over the national averages by approximately 28%.
- In 4 of 11 locations, the condition grade reduced by 1 or 2 grades
- In 2 of 11 locations, the condition grade increased by 1 and 2 grades
- For 6 of 11 locations, the measured maximum internal pressure is >10 mH2O greater than the modelled pressure used for the desktop analysis. This change in pressure does not generally appear to have influenced in the changes to the grade and remaining life results.

Analysis of the of extracted samples identified that in some cases the measured thickness of the AC pipe wall is greater than the standard wall thicknesses, indicating that the pipe installed was either manufactured for a particular local specification or alternative supplier was used. A thicker wall would lend to a longer than average life. It is possible that other local factors may contribute to lower rates of deterioration including soil conditions and quality of treated drink water, but these factors have not been verified.

Due to the observed overall longer expected life of the AC pipes, adjustments were made to the value of expected lives used in the desktop evaluation for the remainder of the AC pipes, modifying the desk top assessment results to better align with the assessment results obtained from the condition inspection. In general, while overall all pipes are lasting longer, 'newer' pipes show greater improvements.

The adjustments made to the national maximum expected lives used for the desktop assessment are applied as a factor based on the installation decade as set out in Table 2.

Table 2 Factors applied to adjust the national maximum expected lives for desktop assessment

Install Decade	Maximum Expected Life Adjustment Factor
1950s	1.13
1960s	1.16
1970s	1.16
1980s	1.65

Table 3 Analysis of AC samples with Assessed Condition

COMP Key	Install Decade	Age in 2025	Base Life	National Average Max Life	National Likely High Life	Years Remaining to Max Life	Years Remaining to Likely Life	Assessed Condition Grade (Nov 2025)	Modelled High Pressure	Measured Max Pressure	Remining life to SF2	Expected Max Age	Assessed Condition from Investigations (April 2026)	Condition Grade Variance	Change of Expected Life
45986	1980s	43	70	47	42	4	-1	4	40.42	44	>100	143	2	-2	96
59879	1970s	51	70	58	45	7	-6	4		70	1	52	4	0	-6
46162	1960s	57	80	70	56	13	-1	3	68.48	81	6.6	63.6	4	1	-6.4
46614	1960s	57	80	70	62	13	5	4	59.15	70	56	113	2	-2	43
57846	1960s	56	70	47	42	-9	-14	5	42.14	60	0	56	5	0	9
94265	1960s	64	70	58	52	-6	-12	5	44.94	83	0	64	5	0	6
97179	1960s	58	70	58	52	0	-6	5	50.64	59	26	84	3	-2	26
97519	1950s	68	80	80	60	12	-8	3	101.81	116	0	68	5	2	-12
45975	1980s	43	70	58	52	15	9	4	34.07	44	51	94	2	-2	36
143975	1970s	51	80	82	63	31	12	3		76	24	75	3	0	-7
166705	1960s	65	70	58	48	-7	-17	5	72.84	87	3.5	68.5	4	-1	10.5

Notes:

- Cells highlighted Orange indicate where the maximum measured internal pipe pressure is >10 mH2O than the modelled pressure used for the November Desktop Assessment. The Transient Pressure Monitoring undertaken did not, except for 1 location, detect transient pressures exceeding 10% of the measured base pressure. The exception location is Ash Street (asset 46162) where multiple transients were detected above a 10% threshold level of 77m, with a maximum recorded 81.8m (16% of base pressure). Overall, the monitoring indicates that the pressure within the WDC drinking water network is stable with no significant transients which reduces the overall risk and incidence of failure.
- Cells highlighted Green indicate where the assessment of condition based on the field investigations has reduced (improved the condition) compared to the November 2025 desktop assessments
- Cells highlighted Red indicate where the assessment of condition based on the field investigations has increased (reduced the condition) compared to the November 2025 desktop assessments

Following the update of the November Desktop Condition Assessment with the adjusted factors and the addition of the assessments based on the investigation results, the following tables set out the quantum of AC pipes within each Structural Grade and changes between the November 2025 assessment, and this updated assessment (April 2026).

Table 4 Assessed Condition of All AC pipe (from inspection and updated desktop assessment)

Structural Grade	Number of Assets	% of Total Assets	Length of Pipe (m)	% of Length
1	40	3%	4,834	3%
2	386	28%	27,550	17%
3	89	6%	12,667	8%
4	150	11%	13,805	8%
5	724	52%	106,558	64%
Grand Total	**1389**	**100%**	**165,415**	**100%**

Table 5 Assessed Condition (April 2026 updated condition grades) of All AC pipe by Pipe Diameter

Structural Grade	Number of Assets per Diameter(mm) with Assessed Grade									
	57	**75**	**80**	**100**	**150**	**200**	**250**	**300**	**375**	**450**
1						17	16	1	3	3
2	1			263	98		5	19		
3	8		3	3	49	21	5			
4			4	111	35					
5	166	1	122	370	65					
Grand Total	**175**	**1**	**129**	**747**	**247**	**38**	**26**	**20**	**3**	**3**

Table 6 Assessed Condition (April 2026 updated condition grades) % of All AC pipe by installation decade

Structural Grade	Installation Decade			
	1950s	**1960s**	**1970s**	**1980s**
1				10%
2		1%	8%	87%
3		6%	18%	3%
4	2%	12%	33%	
5	98%	82%	41%	

Table 7 Comparison between Desktop Assessment Condition November 2025 & Condition post inspection and updated desktop condition April 2026 (% of pipes within each grade)

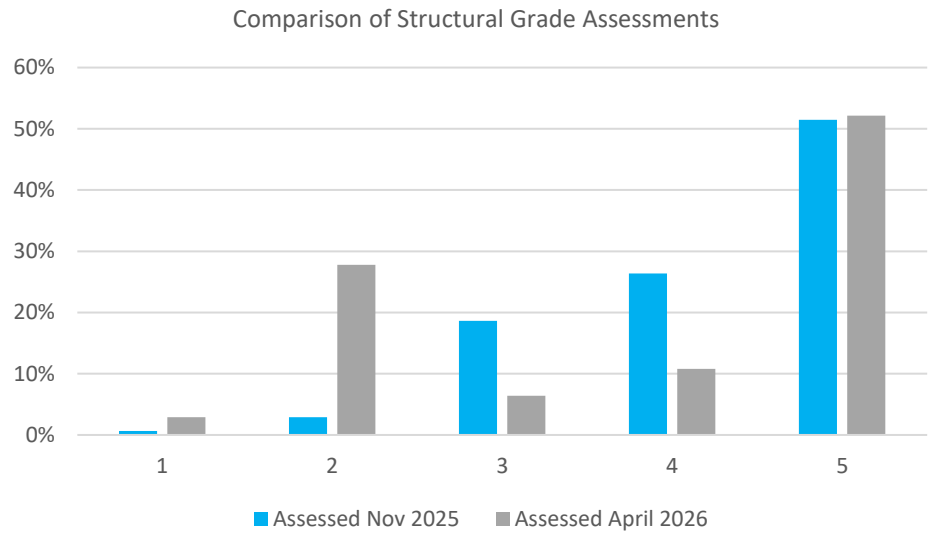
Structural Grade	Assessed Nov 2025	Assessed April 2026
1	1%	3%
2	3%	28%
3	19%	6%
4	26%	11%
5	51%	52%

Table 8 Comparison between Desktop Assessment Condition November 2025 & Condition post inspection and updated desktop condition April 2026 (Length of pipes within each grade) and quantity of Change

Structural Grade	Assessed Nov 2025	Assessed April 2026	Change
1	1027.5	4834.3	3806.8
2	3879.5	27550.4	23671
3	25415.2	12667.2	-12748
4	32636.6	13804.9	-18831.7
5	102455.7	106557.8	4102

Figure 1 illustrates a comparison between November 2025 and April 2026 Assessment.

Figure 1 Comparison between November 2025 and April 2026 Assessment



3.2 CI Pipe Condition

Table 9 sets out the assessed condition of CI pipe and pipe samples, based on the UT and micrometre measurements of the pipe wall. Only 3 of the assessments relate to pipe that are in service. The records labelled as “Sample” represent pipe that is either no longer in service, or samples extracted from in-service pipes, but the precise Asset ID is not known (Refer to 2.2.2)

Table 9 also shows the November 2025 desktop condition assessment grade and compares whether there is a change in the condition of the pipe from the desktop assessment to the assessment gained from the field investigation.

Table 9 Analysis of Cast Iron UT measurements with Assessed Condition

Asset ID	Material	OD (mm)	Size (inch)	Assessed Condition Grade (Nov 2025)	Wall Thickness[1]	Pressure Max Assumed (mH2O)	Min. Wall Thickness (measured)	Age (2026)	SF	Years to SF =2	Assessed Condition from Investigations (April 2026)	Condition Grade Variance
45870	CI	261	9	2	21	120	12.52	150	11.32	>100	2	0
114901	CI	124	4	1	15	120	10.14	150	21.16	>100	2	1
114900	CI	261	9	2	23	120	12.35	150	11.03	>100	2	0
Sample 1	CI	345	12	-	21.84	180	12.34	150	5.48	>100	2	
Sample 2	ST	162		-	5	180	4.51	40	8	>100	2	
Sample 3	CI	174	7	-	15.5	180	10.2	150	9.25	>100	2	
Sample 4	CI	337	12	-	21.84	180	14.4	150	6.5	>100	2	
Sample 5	CI	498	18	-	24.9	<180	17.26	150	5.15	>100	2	
Sample 6	CI	655	24	-	28.7	<180	20.73	150	4.66	>100	2	

Notes:

- Measurement is the maximum of either the measured wall thickness or value provided or Class D as per BS78:1917
- Cells highlighted Red indicate where the assessment of condition based on the field investigations has increased (reduced the condition) compared to the November 2025 desktop assessments

Table 10 Variance in wall thickness of CI pipe installed prior to BS78:1917

Asset ID	OD (mm)	Size (inch)	Measured Wall Thickness (mm)	BS78:1917 Standard		Increased wall thickness[1]
				Wall Thickness (in)	Wall Thickness (mm)	
45870	261	9	21	0.69	17.5	31%
114901	124	4	15	0.46	11.68	28%
114900	261	9	23	0.69	17.5	20%

Notes:

- The increased wall thickness is a conservative measurement as the Measured Wall Thickness is from the deteriorated sample and not original wall thickness

Observations from the assessment of the of CI pipe sample measurements in Table 9 include:

- The analysis of the UT and micrometre measurements reveals that the rate of deterioration (mm/year of wall loss) on average is slightly less than the rate used in the November 2025 Assessment (which was obtained from the p-CAT inspection data (0.061mm/year)) with an average value of 0.0602mm/year, a difference of 1.3%.

  While the different rate results in slightly less wall loss over time, its reduction is not significant enough to result in a change to the predicted grades within the November 2025 assessment. Therefore, the initial rate of 0.061mm/year has been retained for the updated condition grades.

  The slightly reduced rate of deterioration could be due to the location of pipe compared to p-CAT tested pipes (i.e., different soil profile), or more accurate measurement than the p-CAT results (which utilise an average measurement over a 10m 'partitioned' section of pipe.

  However, with only a slight difference the field testing tends to corroborate the expected rates of deterioration used in the prediction model.

- As shown in Table 10 the measurements taken of the CI pipe show that the wall thickness of the pipes from prior to 1917 (introduction of BS78:1917) are thicker than the post 1917 standard installed pipes by an average of 26%. It would appear that prior to the introduction of the BS78 standard manufacturing provided more conservative allowance for structural capacity which resulted in a thicker pipe wall. This results in a longer expected pipe life prior to risk of structural failure.

On the following page, Table 11 sets out the assessed condition of the CI pipes inspected using the p-CAT inspection technique.

Table 11 also shows the November 2025 desktop condition assessment grade for these pipes that was based on the measured wall loss to determine the condition. A comparison is provided between the November 2025 and this latest detailed assessment (April 2026) utilising the modelled pressure and measured remaining wall thickness as part of the calculation of the remaining FS (refer to 2.1) identifying the changes in the assessed condition grades.

As presented in Table 11, the most notable change is that all assets previously assessed as Grade 3 have shown an improvement in condition, as a result of the more detailed assessment, and are now assessed as Grade 2.

Table 11 Assessment of Cast Iron Condition from the Analysis of the p-CAT Inspection Results

COMP Key	Diameter	Install Year	Age in 2025	Length	Modelled Pressure (mH2O)	Assessed Grade (Nov 2025)	Measured Min Wall Thickness (mm)	Design Wall Thickness (mm)	Theoretical SF	Years to SF = 2	Assessed Structural Condition Grade	Condition Grade Variance	Expected Age at End of Life
45790	225	1880	145	187.4	77.47	2	7.4	12.4	6.3	150	2	0	295
176814	225	1880	145	24.9	78.73	2	7.4	12.4	6.3	150	2	0	295
108143	375	1884	141	154.0	18.28	2	9.6	16	20.4	195	2	0	336
116895	375	1884	141	155.3	16.81	3	9.6	16	23.6	200	2	-1	341
45789	450	1880	145	114.0	76.82	2	11.3	19.9	4.9	115	2	0	260
45504	450	1880	145	2.0	76.76	3	11.3	19.9	4.9	115	2	-1	260
45782	450	1880	145	461.7	15.06	2	11.3	19.9	23.1	180	2	0	325
45783	450	1880	145	221.3	76.04	2	11.3	19.9	4.9	115	2	0	260
108141	450	1884	141	4.6	18.28	3	11.3	19.9	19.7	175	2	-1	316
45857	450	1880	145	23.2	76.1	2	11.3	19.9	4.9	115	2	0	260
46348	450	1880	145	34.1	76.12	2	11.3	19.9	4.9	115	2	0	260
145250	450	1880	145	1059.8	32.3	2	11.3	19.9	11.8	165	2	0	310
145251	450	1880	145	0.8	56.67	3	11.3	19.9	6.5	135	2	-1	280
145252	450	1880	145	0.6	56.63	3	11.3	19.9	6.5	135	2	-1	280
149590	450	1880	145	479.1	56.69	3	11.3	19.9	6.5	135	2	-1	280
45784	600	1884	141	114.9	70.44	3	15.4	22.7	5.8	200	2	-1	341
45516	600	1884	141	506.6	76.33	3	15.4	22.7	5.3	190	2	-1	331
45785	600	1884	141	24.4	79.09	3	15.4	22.7	5.1	185	2	-1	326
46226	600	1884	141	10.9	71.07	3	15.4	22.7	5.8	200	2	-1	341
46379	600	1884	141	462.9	56.71	3	15.4	22.7	6.8	210	2	-1	351
46667	600	1884	141	219.9	52.02	3	15.4	22.7	7.6	225	2	-1	366
46668	600	1884	141	0.8	70.44	3	15.4	22.7	5.8	200	2	-1	341
108144	600	1884	141	1053.1	32.27	2	15.4	22.7	12.3	255	2	0	396
108145	600	1884	141	390.9	42.03	3	15.4	22.7	9.4	240	2	-1	381
108146	600	1884	141	156.1	17.06	3	12.9	18.4	7.3	245	2	-1	386

COMP Key	Diameter	Install Year	Age in 2025	Length	Modelled Pressure (mH2O)	Assessed Grade (Nov 2025)	Measured Min Wall Thickness (mm)	Design Wall Thickness (mm)	Theoretical SF	Years to SF = 2	Assessed Structural Condition Grade	Condition Grade Variance	Expected Age at End of Life
145253	600	1884	141	261.2	56.73	3	15.4	22.7	6.8	210	2	-1	351
145254	600	1884	141	0.8	56.69	3	15.4	22.7	6.8	210	2	-1	351
145255	600	1884	141	0.5	56.67	3	15.4	22.7	6.8	210	2	-1	351
179242	600	1884	141	140.1	46.11	3	15.4	22.7	8.7	235	2	-1	376

Notes:

- Cells highlighted Green indicate where the assessment of condition based on the Analysis of the p-CAT inspection data has reduced (improved the condition) compared to the November 2025 desktop assessments (which utilised the condition data provided with the p-CAT report)

Following review of the assessed condition of the CI pipe from the field investigations and detailed analysis of the p-CAT inspection results, adjustments were deemed appropriate to modifying the November desk top assessment results to better align the desktop assessment with the field inspection observations. To update the predicted condition grades, the following adjustments were made:

- A 1.5 surge factor was applied to the modelled pressure to determine the pipe class and initial wall thickness, aligning the approach more closely with the engineering assessment methodology.
- The BS78 pipe wall thickness was increased by +25% for all CI pipes installed prior to 1917 in line with the field inspection results.

The following tables set out the quantum of CI pipes within each Structural Grade and changes between the November 2025 assessment, and this updated assessment (April 2026). The adjustments made to the desktop evaluation process generally increases the assumed pipe wall thickness which results an overall increase, (improvement in the pipe condition) which is justified by the analysis of the inspection data available. Notably, there are no CI assets predicted to be in Grade 4 or 5.

Table 12 Assessed Condition of All CI pipe (from inspection and updated desktop assessment)

Structural Grade	Number of Assets	% of Total Assets	Length of Pipe (m)	% of Length
1	20	9%	1,847	10%
2	176	79%	14,881	79%
3	28	13%	2,070	11%
4				
5				
Grand Total	**224**	**100%**	**18,798**	**100%**

Table 13 Assessed Condition (April 2026 updated condition grades) of All CI pipe by Pipe Diameter

Structural Grade	Number of Assets per Diameter(mm) with Assessed Grade													
	75	**80**	**100**	**125**	**126**	**150**	**175**	**200**	**225**	**250**	**300**	**375**	**450**	**600**
1			6		2	9			1				2	
2			3	6		12	12	6	40	16	29	25	12	15
3	4	4	12	6			2							
Grand Total	4	4	21	12	2	21	14	6	41	16	29	25	14	15

Table 14 Assessed Condition (April 2026 updated condition grades)% of All CI pipe by installation decade

Structural Grade	Installation Decade								
	<1900	**1900s**	**1910s**	**1920s**	**1950s**	**1960s**	**1980s**	**1990s**	**2010s**
1					25%		100%	100%	100%
2	89%	100%	43%	0%	75%	100%			
3	11%		57%	100%					
4									
5									

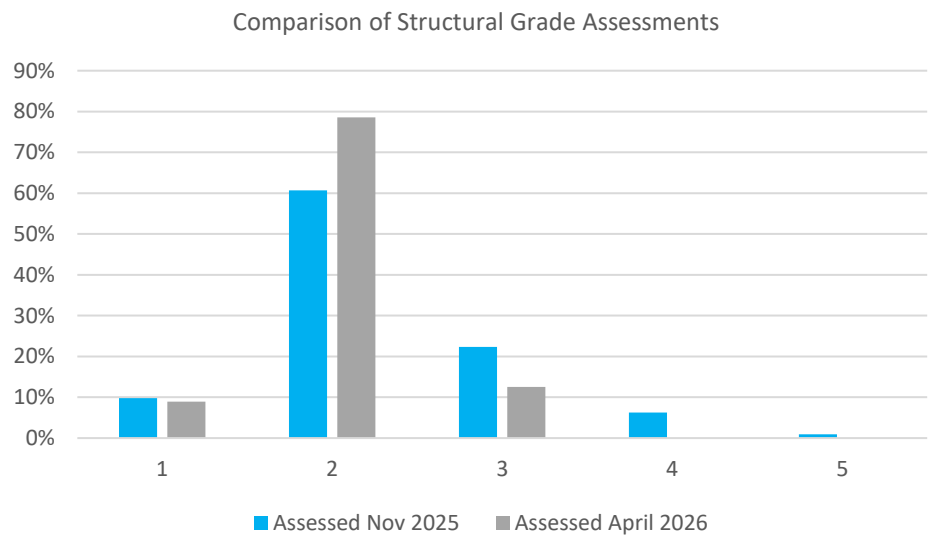
Table 15 5 Comparison between Desktop Assessment Condition November 2025 & Condition post inspection and updated desktop condition April 2026 (% of pipes within each grade)

Structural Grade	Assessed Nov 2025	Assessed April 2026
1	10%	9%
2	61%	79%
3	22%	13%
4	6%	0%
5	1%	0%

Table 16 Comparison between Desktop Assessment Condition November 2025 & Condition post inspection and updated desktop condition April 2026 (Length of pipes within each grade) and quantity of Change

Structural Grade	Assessed Nov 2025	Assessed April 2026	Change
1	944.6	1846.6	902.0
2	10893.1	14880.8	3987.7
3	5826.6	2070.3	-3756.4
4	1131.2	0.0	-1131.2
5	2.2	0.0	-2.2

Figure 2 Comparison between November 2025 and April 2026 Assessment



3.3 All Drinking Water Pipes Condition

No changes were made to the assessed condition of the other drinking water pipe materials. Table 17 sets out the overall Drinking Water pipe condition as of April 2026.

Table 17 Assessed Condition of All Drinking Water Pipe (from inspection and updated desktop assessment)

Structural Grade	Number of Assets	% of Total Assets	Length of Pipe (m)	% of Length
1	4292	35%	392,546	24%
2	3430	28%	529,140	33%
3	889	7%	115,409	7%
4	2747	22%	447,527	28%
5	865	7%	137,401	8%
Grand Total	**12223**	**100%**	**1,622,023**	**100%**

4 Pipe Attributes and Adjustments to GIS Data

Key water pipeline details were reviewed, in particular whether installation dates match when the listed pipe materials were commonly available and used. It helps find records that may be wrong, incomplete, or unlikely, and shows where the GIS data needs correction or further checking. These are shown in the following tables.

Table 18 Comparison of GIS install decades for all AC pipes against current records as of April 2026

GIS Install Decade	Updated Install Decade							
	1950s	**1960s**	**1970s**	**1980s**	**1990s**	**2000s**	**2010s**	**Grand Total**
<1900				1				1
1930s			1					1
1950s	119							119
1960s		628						628
1970s			222					222
1980s				414				414
1990s		1			2			3
2000s		1				2		3
2010s		1	1				3	5
Grand Total	**119**	**631**	**224**	**415**	**2**	**2**	**3**	**1396**

Notes:

- Cells highlighted Green indicate adjusts identified to correctly align the install decade with the AC pipe insitu
- Cells highlighted pink indicate install date records that require correction or further investigation.

Table 19 Comparison of GIS install decades for all CI pipes against current records as of April 2026

GIS Install Decade	Updated Install Decade									Grand Total
	<1900	1900s	1910s	1920s	1950s	1960s	1980s	1990s	2010s	
<1900	183									183
1900s		6								6
1910s			7							7
1920s				3						3
1950s					4					4
1960s						2				2
1980s							16			16
1990s								1		1
2010s									2	2
Grand Total	**183**	**6**	**7**	**3**	**4**	**2**	**16**	**1**	**2**	**224**

Notes:

- Cells highlighted pink indicate install date records that require correction or further investigation.

5 Recommendations

The following recommendations are made following this updated assessment:

1. Revise the Base Lives of the AC and CI pipe:

   Cast Iron

   Recent p-CAT and UT inspections confirm that the cast iron (CI) pipes are in significantly better condition than their current 150-year "Base Life" suggests.

   Condition assessments indicate that pipes installed prior to 1917 have at least 130 years of remaining life before reaching a safety factor of 2. This longevity is largely due to the thicker pipe walls manufactured before the introduction of BS78:1917. While pipes installed after 1917 also show improved life expectancy over current estimates, the increase is less pronounced.

   Based on these findings, we recommend the following revised Base Lives for CI pipes:

   Table 20 Recommended updates to the CI pipe Base Life

Date Range	Recommended Base Life
Prior 1917	290
From 1917	180

   Asbestos Cement Pipes

   The November 2025 desktop assessment initially applied national deterioration rates to the AC pressure pipe network. However, subsequent testing of samples from 11 sites revealed that while approximately 50% of the pipes align with "Grade 5" national averages, the overall expected life is up to 20% longer than the national average. This extended longevity is attributed to favourable soil conditions, high water quality, and pipe walls that occasionally exceed standard thickness. Notably, results varied by pipe specification:

- Small Diameter Pipes: Expected life is shorter than the current WDC base life.
- Large Diameter Pipes: Expected life exceeds the current WDC base life.
- 1980s Installations: These pipes demonstrate a slightly higher-than-average life expectancy.

We recommend adjusting the AC pipe base lives according to the table below. These adjustments are specific to the diameters and installation decades observed within the WDC network.

Table 21 Recommended adjustments to AC pipe Base Life

Pipe Diameter	Recommended Base Life by Decade and Diameter		
	1950s	**1960s/1970s**	**1980s**
<100	45	45	65
100	60	60	80
150	70	70	100
200		80	110
250		90	130
300		100	140
375			150
450			

2. It is recommended to undertake further condition investigations to validate assumptions of the desktop assessments and confirm current condition of pipes believed to be in poor or very poor condition so as re-affirm and prioritise renewal timeframes as per the following table. Includes recommended priority. The timing of the inspections can be as budget allows, but with consideration of priority 1 being some pipe likely to fail within next 3 years.

Table 22 Recommended Inspections and Assessments

Pipe Material	Priority	Selection Criteria	Basis for Inspection & Assessment
AC	1	Diameter = 50 – 150mm Install Decade = 1960 to 1970 Condition Grade = 4 or 5	Confirm timing for renewal and validate assumptions. Focus on any critical pipes first.
CI	2	Diameter = 75 to 175mm	Validate assumptions
CI	3	Install decade >1980	Confirm pipe material & condition

6 Contact

Report Authored by: Steve Apeldoorn, Director, CTO, ProjectMax Ltd, (steve.apeldoorn@projectmax.co.nz)

Report Reviewed by: Eric Skowron, AM Lead, ProjectMax Ltd, (eric.skowron@projectmax.co.nz)

7 Appendix 1 – AC Testing Laboratory Reports

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UT Scan – Field Form

Asset ID: VNREEO61	Project: Reed st Density Testing.
Location address or GPS co-ordinates (NZTM): Intersection of Reed + Clark st East Inde	

☑ Water supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater

Diameter: 100mm CI *(must be measured on site with calliper or circumference tape)*	Material: CI *(As observed)*	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

☑ Bedding sample collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – top of pipe to surface (m) ~ 580	☐ Groundwater depth from surface (m) NA

Surface Type		Bedding Material		Soil / Backfill Material	
☑ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☑ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☑ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation / scan can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Contractor's name: Scott	Signature:

Job completed: (Yes) / No *(If no describe what is required to complete)*	Date: 9/3/26	Time: 11:00am

Supporting documents/images: (attach to word doc here, or describe here and send as separate files to oliver.modricker@projectmax.co.nz)

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AC Sample – Field Form

Asset ID: WFAVS001 Palmerston		Project:	
Location address or GPS Co-ordinates (NZTM):			
☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☐ Coupon / Core (Note the location (clock face) where the core sample is recovered from, as viewed in the principal direction of flow)	☑ Pipe Sample (Barrel Section)		
☑ Top of Pipe "As Laid" Marked	☑ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings None visible	
Diameter: *(must be measured on site with calliper or circumference tape)* 125mm OD	Material: *(As observed)* Asbestos	Year Installed: *(if it can be read from manufacturers markings)*	
☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)			
☑ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – Top of Pipe to Surface (m) 720mm	☐ Groundwater - Depth from Surface (m) None	
☐ Pipe sample has been cleaned (wastewater only)	☐ Pipe sample is double bagged and sealed		

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway ☐ Sealed Shoulder ☐ Other	☐ Footpath ☑ Grass Berm ☐ Private Property	☐ Natural ☐ Fine Sand ☐ Medium Sand ☐ Coarse Sand ☑ Clay ☐ Fine Gravel	☐ Medium Gravel ☐ Coarse Gravel ☐ Scoria ☐ Organic Matter ☐ Other	☐ Topsoil ☐ Clay ☐ Sand/Gravel ☑ Fill Ap20	☐ Hard Rock ☐ Rotten Rock ☐ Other

☐ Photo of asset location from approximately 20m away, so the location of the excavation can be seen
☐ Photo of pipe first uncovered
☐ Closeup photo of cleaned asset, include manufacturer markings if possible
☐ Other relevant photos, with description

Pipe Sample Details and Notes

- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.

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Simms Rd

AC Sample – Field Form

Asset ID: WNS1M000	Project: W/O 3987747

Location address or GPS Co-ordinates (NZTM): -45.080692 2861511 LAT
170.868855 48 LONG

☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☑ Coupon / Core	☐ Pipe Sample (Barrel Only ~ 300mm long)	☐ Pipe Sample (Pipe & Joint ~ 500mm)	
☐ Top of Pipe "As Laid" Marked	☐ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings	

Diameter: *(must be measured on site with calliper or circumference tape)* 180mm od	Material: *(As observed)* A/C	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)
NO

☑ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – Top of Pipe to Surface (m) 0.5meter	☐ Groundwater - Depth from Surface (m) N/A
☐ Pipe sample has been cleaned (wastewater only)	☐ Pipe sample is double bagged and sealed	

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☐ Footpath	☑ Natural	☐ Medium Gravel	☑ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☑ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☑ Sand/Gravel	☐ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☐ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Pipe Sample Details and Notes

- If asbestos is suspected or known by the Client or Contractor within any products to be delivered to the lab, this must be communicated to the lab, and all applicable legislation must be followed. Bituminous coatings of some pipes (e.g., ST/CLS/CI) can contain asbestos fibres.
- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.
- For all AC gravity sewer pipe samples and pressure pipes samples ≥ DN 250, ensure that there is a section of pipe barrel (cut square at each end) ≈ 300 mm long for crush testing.

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Roundhill Rd.

AC Sample – Field Form

Asset ID: WFROU857B	Project: W/O 393748
Location address or GPS Co-ordinates (NZTM):	-45.0815245 LAT 170.535 71176 Long

☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☐ Coupon / Core	☑ Pipe Sample (Barrel Only ~ 300mm long)	☐ Pipe Sample (Pipe & Joint ~ 500mm)	
☑ Top of Pipe "As Laid" Marked	☑ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings	

Diameter: *(must be measured on site with calliper or circumference tape)* 120mm o/d 90mm i/d	Material: *(As observed)* A/C	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

NO

☑ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – Top of Pipe to Surface (m) 0.5 meter	☐ Groundwater - Depth from Surface (m) N/A
☐ Pipe sample has been cleaned (wastewater only)	☑ Pipe sample is double bagged and sealed	

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☐ Footpath	☑ Natural	☐ Medium Gravel	☑ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☑ Clay	☐ Rotten Rock
☐ Other	☑ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☐ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☑ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☑ Other relevant photos, with description

Pipe Sample Details and Notes

- If asbestos is suspected or known by the Client or Contractor within any products to be delivered to the lab, this must be communicated to the lab, and all applicable legislation must be followed. Bituminous coatings of some pipes (e.g., ST/CLS/CI) can contain asbestos fibres.
- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.
- For all AC gravity sewer pipe samples and pressure pipes samples ≥ DN 250, ensure that there is a section of pipe barrel (cut square at each end) ≈ 300 mm long for crush testing.

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Whiterocks Rd - Essex st

AC Sample – Field Form

Asset ID: WNDIS0000	Project: WO 3985014
Location address or GPS Co-ordinates (NZTM):	-45.09051905 LAT 170.91668345 LONG.

☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☐ Coupon / Core	☑ Pipe Sample (Barrel Only ~ 300mm long)	☐ Pipe Sample (Pipe & Joint ~ 500mm)	
☑ Top of Pipe "As Laid" Marked	☑ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings	

Diameter: *(must be measured on site with calliper or circumference tape)* 122mm o/o	Material: *(As observed)* Asbestos	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

NO

☑ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☑ Cover – Top of Pipe to Surface (m) 0.55 meter	☐ Groundwater - Depth from Surface (m) N/A

☐ Pipe sample has been cleaned (wastewater only)	☐ Pipe sample is double bagged and sealed

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway ☐ Sealed Shoulder ☐ Other	☐ Footpath ☐ Grass Berm ☑ Private Property	☐ Natural ☐ Fine Sand ☐ Medium Sand ☐ Coarse Sand ☑ Clay ☐ Fine Gravel	☐ Medium Gravel ☐ Coarse Gravel ☐ Scoria ☐ Organic Matter ☐ Other	☐ Topsoil ☑ Clay ☐ Sand/Gravel ☐ Fill	☐ Hard Rock ☐ Rotten Rock ☐ Other

☑ Photo of asset location from approximately 20m away, so the location of the excavation can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☑ Other relevant photos, with description

Pipe Sample Details and Notes

- If asbestos is suspected or known by the Client or Contractor within any products to be delivered to the lab, this must be communicated to the lab, and all applicable legislation must be followed. Bituminous coatings of some pipes (e.g., ST/CLS/CI) can contain asbestos fibres.
- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.
- For all AC gravity sewer pipe samples and pressure pipes samples ≥ DN 250, ensure that there is a section of pipe barrel (cut square at each end) ≈ 300 mm long for crush testing.

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Homestead Road

AC Sample – Field Form

Asset ID: WNHOM205	Project: W/O 398503
Location address or GPS Co-ordinates (NZTM):	-45.07637170 LAT 170.93930295 LONG

☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☐ Coupon / Core	☑ Pipe Sample (Barrel Only ~ 300mm long)	☐ Pipe Sample (Pipe & Joint ~ 500mm)	
☑ Top of Pipe "As Laid" Marked	☑ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings	

Diameter: *(must be measured on site with calliper or circumference tape)* 96mm o/d	Material: *(As observed)* AC	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)
NO

☑ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – Top of Pipe to Surface (m) 0.5m	☐ Groundwater - Depth from Surface (m) N/A
☐ Pipe sample has been cleaned (wastewater only)	☑ Pipe sample is double bagged and sealed	

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☑ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☑ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☐ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☑ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☑ Other relevant photos, with description

Pipe Sample Details and Notes

- If asbestos is suspected or known by the Client or Contractor within any products to be delivered to the lab, this must be communicated to the lab, and all applicable legislation must be followed. Bituminous coatings of some pipes (e.g., ST/CLS/CI) can contain asbestos fibres.
- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.
- For all AC gravity sewer pipe samples and pressure pipes samples ≥ DN 250, ensure that there is a section of pipe barrel (cut square at each end) ≈ 300 mm long for crush testing.

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Weston Road

AC Sample – Field Form

Asset ID: WWWES003A	Project: WO 3985000
Location address or GPS Co-ordinates (NZTM):	-45.09931081 LAT 170.94014462 LONG

☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☑ Coupon / Core	☐ Pipe Sample (Barrel Only ~ 300mm long)	☐ Pipe Sample (Pipe & Joint ~ 500mm)	
☐ Top of Pipe "As Laid" Marked	☑ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings	

Diameter: *(must be measured on site with calliper or circumference tape)* 178mm o/d	Material: *(As observed)* Asbestos	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

NO

☐ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – Top of Pipe to Surface (m) 1 meter	☐ Groundwater - Depth from Surface (m) NA

☐ Pipe sample has been cleaned (wastewater only)	☐ Pipe sample is double bagged and sealed

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☑ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☑ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☑ Sand/Gravel	☐ Other
		☑ Coarse Sand	☐ Organic Matter	☐ Fill	
		☑ Clay	☐ Other		
		☐ Fine Gravel			

☐ Photo of asset location from approximately 20m away, so the location of the excavation can be seen

☐ Photo of pipe first uncovered

☐ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Pipe Sample Details and Notes

- If asbestos is suspected or known by the Client or Contractor within any products to be delivered to the lab, this must be communicated to the lab, and all applicable legislation must be followed. Bituminous coatings of some pipes (e.g., ST/CLS/CI) can contain asbestos fibres.
- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.
- For all AC gravity sewer pipe samples and pressure pipes samples ≥ DN 250, ensure that there is a section of pipe barrel (cut square at each end) ≈ 300 mm long for crush testing.

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Fernbrook Road

AC Sample – Field Form

Asset ID: WVFER034	Project: W/O 3985Ø2
Location address or GPS Co-ordinates (NZTM):	-45.0649143S LAT 170.98898211 LONG

☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☑ Coupon / Core	☐ Pipe Sample (Barrel Only ~ 300mm long)	☐ Pipe Sample (Pipe & Joint ~ 500mm)	
☐ Top of Pipe "As Laid" Marked	☑ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings	

Diameter: *(must be measured on site with calliper or circumference tape)* 180mm OD	Material: *(As observed)* AC	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

NO

☑ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☑ Cover – Top of Pipe to Surface (m) 0.85m	☐ Groundwater - Depth from Surface (m) N/A
☐ Pipe sample has been cleaned (wastewater only)	☑ Pipe sample is double bagged and sealed	

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☑ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☑ Medium Sand	☐ Scoria	☑ Sand/Gravel	☐ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☐ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☑ Other relevant photos, with description

Pipe Sample Details and Notes

- If asbestos is suspected or known by the Client or Contractor within any products to be delivered to the lab, this must be communicated to the lab, and all applicable legislation must be followed. Bituminous coatings of some pipes (e.g., ST/CLS/CI) can contain asbestos fibres.
- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.
- For all AC gravity sewer pipe samples and pressure pipes samples ≥ DN 250, ensure that there is a section of pipe barrel (cut square at each end) ≈ 300 mm long for crush testing.

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Ash Street

AC Sample – Field Form

Asset ID: WNASHØ1Ø	Project: WO 3954498
Location address or GPS Co-ordinates (NZTM):	-45.09836155 NAT 170.94451740 LONG

☑ Water Supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater
☐ Coupon / Core	☑ Pipe Sample (Barrel Only ~ 300mm long)	☐ Pipe Sample (Pipe & Joint ~ 500mm)	
☑ Top of Pipe "As Laid" Marked	☑ Photos taken of pipe sample recovery	☐ Photos of manufacturer's markings	

Diameter: *(must be measured on site with calliper or circumference tape)* 122mm OD	Material: *(As observed)* Asbestos	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

NO

☑ Bedding Sample Collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☑ Cover – Top of Pipe to Surface (m) Ø.9mtr	☐ Groundwater - Depth from Surface (m) N/A
☐ Pipe sample has been cleaned (wastewater only)	☑ Pipe sample is double bagged and sealed	

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☑ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☑ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☐ Other
		☑ Coarse Sand	☐ Organic Matter	☐ Fill	
		☐ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☑ Other relevant photos, with description

Pipe Sample Details and Notes

- If asbestos is suspected or known by the Client or Contractor within any products to be delivered to the lab, this must be communicated to the lab, and all applicable legislation must be followed. Bituminous coatings of some pipes (e.g., ST/CLS/CI) can contain asbestos fibres.
- Pipe sample should be marked on top with spray paint or crayon before cutting pipe sample section from the pipeline.
- For all AC gravity sewer pipe samples and pressure pipes samples ≥ DN 250, ensure that there is a section of pipe barrel (cut square at each end) ≈ 300 mm long for crush testing.

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UT Scan – Field Form

Asset ID: VNREEC61	Project: Reed st Density test
Location address or GPS co-ordinates (NZTM): Intersection of Reed + Ash st	

☑ Water supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater

Diameter: Fluted Reducer *(must be measured on site with calliper or circumference tape)* 175 - 250mm	Material: CI *(As observed)*	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

☑ Bedding sample collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☑ Cover – top of pipe to surface (m) 0.580	☐ Groundwater depth from surface (m) NA

Surface Type		Bedding Material		Soil / Backfill Material	
☑ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☑ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☑ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation / scan can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Contractor's name: Scott	Signature: SMH

Job completed: (Yes) / No *(If no describe what is required to complete)*	Date: 9/3/26	Time: 10:00

Supporting documents/images: (attach to word doc here, or describe here and send as separate files to oliver.modricker@projectmax.co.nz)

ProjectMax
Helping water utilities invest wisely in their community's water infrastructure

UT Scan – Field Form

Asset ID: WVREEO68	Project: Reed st Density test
Location address or GPS co-ordinates (NZTM): Intersection of Reed – Usk st	

☑ Water supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater

Diameter: 250mm *(must be measured on site with calliper or circumference tape)*	Material: CI *(As observed)*	Year Installed: *(if it can be read from manufacturers markings)*

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

☑ Bedding sample collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – top of pipe to surface (m) 0.550	☐ Groundwater depth from surface (m) NA

Surface Type		Bedding Material		Soil / Backfill Material	
☑ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☑ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☑ Clay	☐ Other		
		☐ Fine Gravel			

☑ Photo of asset location from approximately 20m away, so the location of the excavation / scan can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Contractor's name: Scott	Signature:

Job completed: (Yes) / No *(If no describe what is required to complete)*	Date: 9/3/26	Time: 10:30

Supporting documents/images: (attach to word doc here, or describe here and send as separate files to oliver.modricker@projectmax.co.nz)

SGS New Zealand Ltd, NDT & Materials Services
22 Vestey Drive, Mt Wellington, PO Box 13518, Onehunga, Auckland
Tel: 64 9 634 3637 or 0800 SGS NDT
Email: NZ.NDT.Enquiries@sgs.com Web: www.sgs.com/en-nz

TEST CERTIFICATE No.: INZ87330-01

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe ring sample
Identification:	Pipe WFROU857B, Location: Roundhill Road
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 120mm; Nominal Thickness: 16mm

Results: No change in colour was observed for pipe wall thickness as shown in Fig 1.
The pipe has experienced through-thickness deterioration.

Fig 1: represents pipe asset ID WFROU857B

Tested by:	M. Bhatt	Reviewed By:	Leonard Kong	Authorised By:	Kelvin Chin
Date:	9-Apr-26	20-Apr-26		20-Apr-26	

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TEST CERTIFICATE No.: INZ87330-02

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe ring sample
Identification:	Pipe WNDISØØØ; Location: Whiterocks road-Essex Street
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 122mm; Nominal Thickness: 13mm

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2	3	4	5	6
Measured Wall Thickness(mm)	12.9	13.1	12.9	13.1	13.3	12.8
Internal Deterioration(mm)	3.6	5.1	4.7	3.7	3.5	5.0
External Deterioration(mm)	1.7	*	2.6	2.7	*	*

Notes: (*) Stands for no deterioration at that location.

Min. wall thickness(mm): 12.8

Max. Internal deterioration(mm): 5.1

Max. External deterioration(mm): 2.7

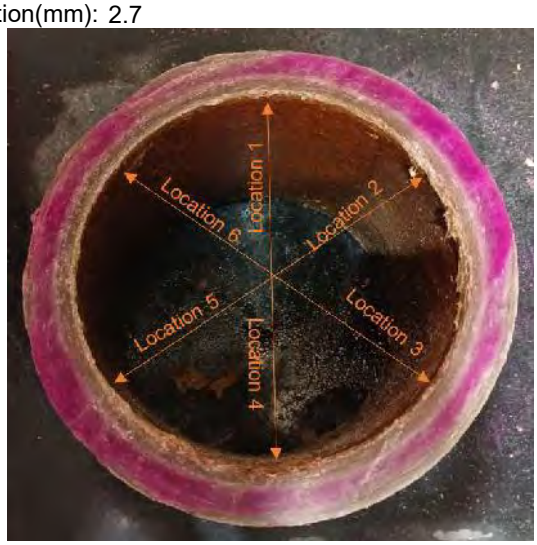

Fig 1: represents pipe asset ID WNDISØØØ

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

SGS New Zealand Ltd, NDT & Materials Services
22 Vestey Drive, Mt Wellington, PO Box 13518, Onehunga, Auckland
Tel: 64 9 634 3637 or 0800 SGS NDT
Email: NZ.NDT.Enquiries@sgs.com Web: www.sgs.com/en-nz

TEST CERTIFICATE No.: INZ87330-03

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe ring sample
Identification:	Pipe WVOAK003-WNOAKO21A; Project: Rydel Main, Oamaru urban contract
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 71mm; Nominal Thickness: 11mm

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2	3	4	5	6
Measured Wall Thickness(mm)	11.5	11.3	11.1	9.8	11.0	11.3
Internal Deterioration(mm)	*	*	*	*	*	*
External Deterioration(mm)	1.5	2.2	2.2	*	2.0	*

Notes: (*) stands for no deterioration at that location.

Min. wall thickness(mm): 9.8
Max. Internal deterioration(mm): 0.0
Max. External deterioration(mm): 2.2

Fig 1: represents pipe asset ID WVOAK003-WNOAKO21A

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

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TEST CERTIFICATE No.: INZ87330-04

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe ring sample
Identification:	Pipe WVOAK005 - WNOAK021; Project: Main, Oamaru urban contract
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 125mm; Nominal Thickness: 14mm

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2	3	4	5	6
Measured Wall Thickness(mm)	14.5	13.7	14.2	14.1	14.3	14.0
Internal Deterioration(mm)	5.2	5.3	5.0	5.9	4.7	6.9
External Deterioration(mm)	1.2	0.3	0.6	*	1.4	*

Notes: (*) stands for no deterioration at that location.

Min. wall thickness(mm): 13.7

Max. Internal deterioration(mm): 6.9

Max. External deterioration(mm): 1.4

Fig 1: represents pipe asset ID WVOAK005 - WNOAK021

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

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TEST CERTIFICATE No.: INZ87330-05

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe ring sample
Identification:	Pipe WNHOM205; Location: Homestead Road
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 96mm

Results: No change in colour was observed for pipe wall thickness as shown in Fig 1.
The pipe has experienced through-thickness deterioration.

Fig 1: represents pipe asset ID WNHOM205

Tested by:	M. Bhatt	Reviewed By:	Leonard Kong	Authorised By:	Kelvin Chin
Date:	9-Apr-26	20-Apr-26		20-Apr-26	

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TEST CERTIFICATE No.: INZ87330-06

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe ring sample
Identification:	Pipe WNLASHØ1Ø, Location: Ash Street
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 122mm; Nominal Thickness: 14mm

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2	3	4	5	6
Measured Wall Thickness(mm)	13.7	13.8	13.9	13.2	13.8	13.5
Internal Deterioration(mm)	*	*	*	*	*	*
External Deterioration(mm)	*	*	5.6	4.6	*	*

Notes: (*) stands for no deterioration at that location.

Min. wall thickness(mm): 13.2

Max. Internal deterioration(mm): 0.0

Max. External deterioration(mm): 5.6

Fig 1: represents pipe asset ID WNLASHØ1Ø

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

SGS New Zealand Ltd, NDT & Materials Services
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TEST CERTIFICATE No.: INZ87330-07

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe ring sample
Identification:	Pipe WFAUS001, Location: Gilligen street
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 125mm; Nominal Thickness: 13mm

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2	3	4	5	6
Measured Wall Thickness(mm)	12.9	12.8	13.0	13.0	13.0	12.8
Internal Deterioration(mm)	*	4.9	5.0	*	*	*
External Deterioration(mm)	*	4.2	4.7	*	*	*

Notes: (*) stands for through-thickness deterioration.

Min. wall thickness(mm): 12.8

Max. Internal deterioration(mm): 5.0

Max. External deterioration(mm): 4.7

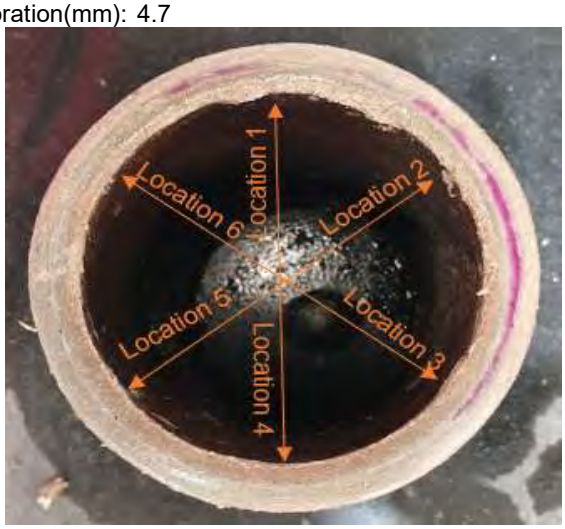

Fig 1: represents pipe asset ID WFAUS001 palmeston

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

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TEST CERTIFICATE No.: INZ87330-08

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe core sample
Identification:	Pipe core: WVWESØØ3A, Location: Weston Road
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 178mm (Info supplied by client).

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2
Measured Wall Thickness(mm)	13.5	15.9
Internal Deterioration(mm)	*	*
External Deterioration(mm)	2.7	2.7

Notes: (*) stands for no deterioration at that location.
Location1 and Location2 are taken 90 degree apart.

Min. wall thickness(mm): 13.5
Max. Internal deterioration(mm): 0.0
Max. External deterioration(mm): 2.7

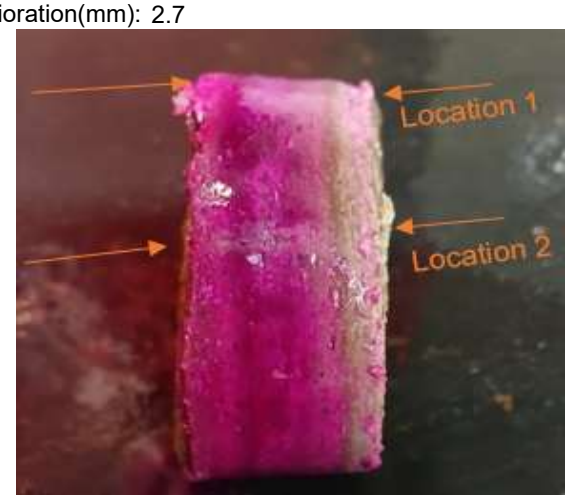

Fig 1: represents pipe core asset ID WVWESØØ3A

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

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TEST CERTIFICATE No.: INZ87330-09

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe core sample
Identification:	Pipe core: WVFERØ34, Location: Fernbrook Road
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 180mm (Info supplied by client).

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2
Measured Wall Thickness(mm)	16.7	16.6
Internal Deterioration(mm)	4.6	3.8
External Deterioration(mm)	5.4	5.7

Location1 and Location2 are taken 90 degree apart.

Min. wall thickness(mm): 16.6

Max. Internal deterioration(mm): 4.6

Max. External deterioration(mm): 5.7

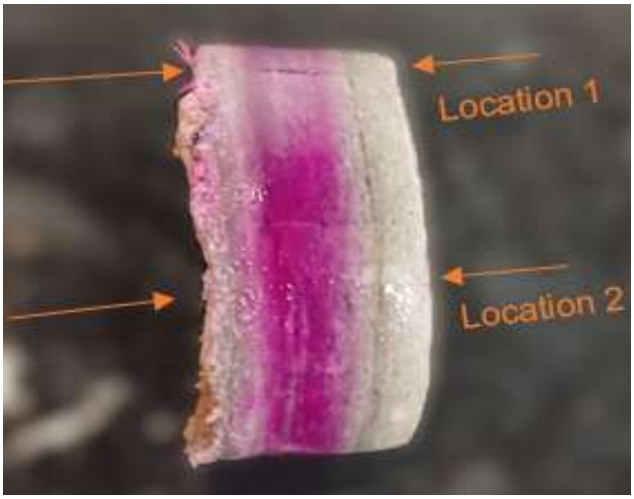

Fig 1: represents pipe core asset ID WVFERØ34

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

SGS New Zealand Ltd, NDT & Materials Services
22 Vestey Drive, Mt Wellington, PO Box 13518, Onehunga, Auckland
Tel: 64 9 634 3637 or 0800 SGS NDT
Email: NZ.NDT.Enquiries@sgs.com Web: www.sgs.com/en-nz

TEST CERTIFICATE No.: INZ87330-10

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe core sample
Identification:	Pipe core: WNSTRØ42, Location: Stronsa street
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 235mm (Info supplied by client).

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2
Measured Wall Thickness(mm)	20.4	20.9
Internal Deterioration(mm)	5.6	5.6
External Deterioration(mm)	2.0	2.1

Location1 and Location2 are taken 90 degree apart.

Min. wall thickness(mm): 20.4

Max. Internal deterioration(mm): 5.6

Max. External deterioration(mm): 2.1

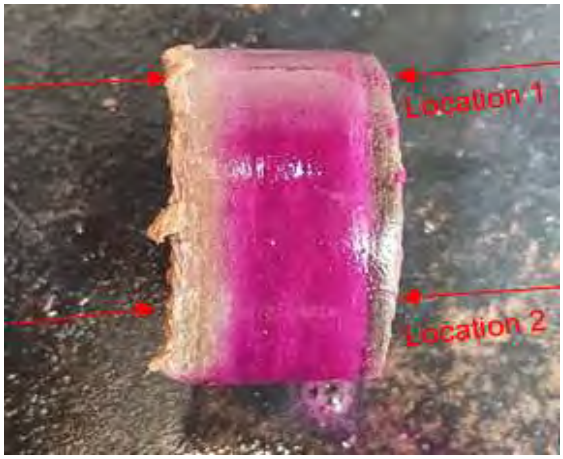

Fig 1: represents pipe core asset ID WNSTRØ42

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

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TEST CERTIFICATE No.: INZ87330-11

Client:	ProjectMax Limited
Order No.:	Not specified
Sample Description:	Asbestos cement pipe core sample
Identification:	Pipe core: WNCOR000B, Location: Simms road
Material Specification:	Asbestos cement
Tested in accordance with:	Volume 1 & Volume 2 National Asbestos Cement Pressure Pipe Manual
Acceptance Criteria:	Report Findings

Test: Phenolphthalein test on asbestos cement pipes.

Equipment: Digital callipers: Mitutoyo S/N 05662947

Sample Prep: Hand polish with 120 grit sandpaper.

Pipe Dimensions: Nominal OD: 180mm (Info supplied by client).

Results: Change in colour was observed for pipe wall thickness as shown in Fig 1.

#Location	1	2
Measured Wall Thickness(mm)	13.2	11.1
Internal Deterioration(mm)	*	*
External Deterioration(mm)	2.0	2.9

Notes: (*) stands for no deterioration at that location.
Location1 and Location2 are taken 90 degree apart.

Min. wall thickness(mm): 11.1
Side 1 Max. deterioration(mm): 0.0
Side 2 Max. deterioration(mm): 2.9

Fig 1: represents pipe core asset ID WNCOR000B

Tested by: M. Bhatt	Reviewed By: Leonard Kong	Authorised By: Kelvin Chin
Date: 9-Apr-26	20-Apr-26	20-Apr-26

8 Appendix 2 – UT Inspection Measurement Reports

ProjectMax

Helping water utilities invest wisely in their community's water infrastructure

UT Scan – Field Form 1.1

Asset ID:	Project:
Location address or GPS co-ordinates (NZTM):	Reed st / Usk st Intersection, Oamaru

☑ Water supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater

Diameter: *(must be measured on site with calliper or circumference tape)*	Material: *(As observed)*	Year Installed: *(if it can be read from manufacturers markings)*
Circ = 82 cm Dia = 26.1 cm (Diameter reduces down, lowest smallest diameter not measured.	Cast Iron	

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

☐ Bedding sample collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – top of pipe to surface (m)	☐ Groundwater depth from surface (m)

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☐ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☐ Clay	☐ Other		
		☐ Fine Gravel			

☐ Photo of asset location from approximately 20m away, so the location of the excavation / scan can be seen

☑ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Contractor's name: Adrian Naudé SLS	Signature:

Job completed: (Yes) / No *(If no describe what is required to complete)*	Date: 9/3/2026	Time: 12:00

Supporting documents/images: (attach to word doc here, or describe here and send as separate files to oliver.modricker@projectmax.co.nz)

ProjectMax
helping water utilities achieve
value in their community's
water infrastructure

UT Scan – Field Form

1.2

Asset ID:	Project:

Location address or GPS co-ordinates (NZTM): Reed st/Usk st Intersection, Oamaru.

☑ Water supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater

Diameter: *(must be measured on site with calliper or circumference tape)*	Material: *(As observed)*	Year Installed: *(if it can be read from manufacturers markings)*
Circ = 39 cm Dia = 12.4 cm	~~Carbon Steel~~ Cast iron	

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

☐ Bedding sample collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover – top of pipe to surface (m)	☐ Groundwater depth from surface (m)

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☐ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☐ Clay	☐ Other		
		☐ Fine Gravel			

☐ Photo of asset location from approximately 20m away, so the location of the excavation / scan can be seen

☐ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Contractor's name:	Signature:
Adriaan Naudé SGS	

Job completed: Yes / No *(If no describe what is required to complete)*	Date:	Time:
	9/3/2026	13:00

Supporting documents/images: (attach to word doc here, or describe here and send as separate files to oliver.modricker@projectmax.co.nz)

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Helping water utilities invest wisely in their community's water infrastructure

UT Scan – Field Form 1.3 ~~1.2~~

Asset ID:	Project:
Location address or GPS co-ordinates (NZTM):	Reed st / Usk st Intersection, Oamaru

☑ Water supply	☐ Wastewater (Pressure)	☐ Wastewater (Gravity)	☐ Stormwater

Diameter: *(must be measured on site with calliper or circumference tape)*	Material: *(As observed)*	Year Installed: *(if it can be read from manufacturers markings)*
Circ = 82 cm Dia = 26.1 cm	~~Carbon steel~~ Cast iron	

☐ Any differences from GIS observed? (Location / Diameter / Material / etc.)

☐ Bedding sample collected (minimum 5 litre representative sample of the material immediately surrounding the pipe, double bagged and labelled. Store in yard for 6 months in case needed for lab analysis)	☐ Cover -- top of pipe to surface (m)	☐ Groundwater depth from surface (m)

Surface Type		Bedding Material		Soil / Backfill Material	
☐ Carriageway	☐ Footpath	☐ Natural	☐ Medium Gravel	☐ Topsoil	☐ Hard Rock
☐ Sealed Shoulder	☐ Grass Berm	☐ Fine Sand	☐ Coarse Gravel	☐ Clay	☐ Rotten Rock
☐ Other	☐ Private Property	☐ Medium Sand	☐ Scoria	☐ Sand/Gravel	☐ Other
		☐ Coarse Sand	☐ Organic Matter	☐ Fill	
		☐ Clay	☐ Other		
		☐ Fine Gravel			

☐ Photo of asset location from approximately 20m away, so the location of the excavation / scan can be seen

☐ Photo of pipe first uncovered

☑ Closeup photo of cleaned asset, include manufacturer markings if possible

☐ Other relevant photos, with description

Contractor's name: Adrian Naudé SLS	Signature:

Job completed: (Yes) / No *(if no describe what is required to complete)*	Date: 9/3/2026	Time: 14:00

Supporting documents/images: (attach to word doc here, or describe here and send as separate files to oliver.modricker@projectmax.co.nz)

SGS New Zealand Ltd, NDT & Materials Services
159 Waterloo Road, Hornby, P.O.Box 8032, Riccarton, Christchurch
Tel:+64 3 344 4510 or 0800 SGS NDT
Email: NZ.NDT.Enquiries@sgs.com Web: www.sgs.com/en-nz

Ultrasonic Thickness Inspection Report

○ Draft ○ Final ◉ Endorsed

Client:	ProjectMax	**Location:**	Reed Str, Oamaru
Project:	Oamaru Water Supply	**Order No:**	TBC
Plant Name:	N/A	**Contact:**	Aaron Prince
Equipment Name:	N/A	**Item Tested:**	Pipe
Job Description:	Ultrasonic thickness testing of water supply pipework		
Inspection Spec:	ISO 16809: 2025	**Acceptance Criteria:**	Report Findings
SGS Procedure:	ITP415	**Welding Process:**	N/A
Surface Condition:	Cleaned, Rough	**Heat Treatment:**	N/A
Material Type:	Cast Iron	**Equipment:**	USM100 S/N: 24030058
Nominal Thickness:	Unknown	**Test Blocks:**	Stepw edge S/N: 17-2236
Technique:	Single Spot - Single Measurement (SS)	**Couplant:**	UCA-7
Calibration:	Comp 5920 m/s	**Order Of Accuracy:**	± 0.25 mm
Test Restrictions:	None	**Date of Test:**	9 Mar 2026

Ultrasonic Scan	Probe	Probe S/N	Type	Size (mm)	Angle (°)	Freq. (Mhz)	Reading Achieved	Eval (dB)
Parent metal	DA301	56904-58851	Tw in	12	0	5	1st BWE	82

Test Results:

Ultrasonic thickness inspection of water supply pipework located in Reed Str, Oamaru.

Locations of inspections as follows:
1.1 Reed Str / Usk Str intersection – North
1.2 Reed Str / Usk Str intersection – Looking down Usk Str
1.3 Reed Str / Usk Str intersection – South
2. 19 Reed Str

Surface of testing areas were water blasted from top accessible areas to remove majority of dirt/soil.
Surfaces were rough and irregular due to a mixture of uneven manufacturing and deterioration from age and environment.
The areas where thicknesses were recorded was not always on the exact grid increment due to difficulty in getting reliable results from external surface, internal surface and/or internal voids.

Technician: Adriaan Naudé AINDT UT2

Reviewed By:Stephan Lloyd
13-Mar-26

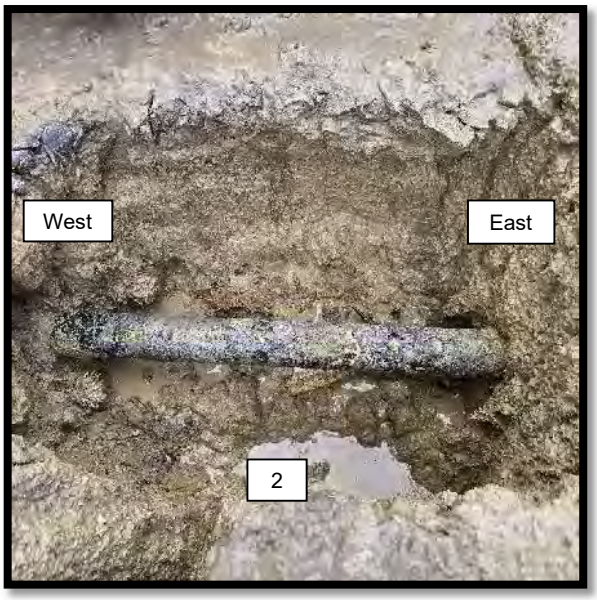
Authorised By:Adriaan Naude
13-Mar-26

SGS New Zealand Ltd, NDT & Materials Services

Test Results (continued) **Ultrasonic Thickness Inspection Report**

Photo below for location purpose of pipework located at Reed / Usk intersection.

Photo below for pipe located at 19 Reed Str



Grid size used on pipework is 100x100mm
Columns around circumference of pipe labelled as A, B, C… etc.
Rows along length of pipe labelled as 1, 2, 3… etc.
For pipe sections 1.1, 1.2, 1.3 the direction of flow was unknown, so numbering progression was done away from T-section. Meaning number 1 of the grid will be closest to T-section.
Direction of numbering for pipe section 2 was from east to west.

SGS New Zealand Ltd, NDT & Materials Services

Test Results (continued) **Ultrasonic Thickness Inspection Report**

1.1 Reed Str / Usk Str intersection – North

Position	A	B	C	D	E	F	G	H	Min:	Max:	Ave:
1	20.83	21.59	21.10	20.74	21.36	20.18	20.02	22.75	20.02	22.75	21.07
2	19.65	21.15	21.73	20.62	21.44	19.37	18.75	23.14	18.75	23.14	20.73
3	17.91	21.76	21.99	21.58	20.42	20.97	19.13	21.55	17.91	21.99	20.66
4	20.36	22.44	21.39	20.17	21.08	18.54	17.96	20.38	17.96	22.44	20.29
5	20.66	20.03	22.33	21.77	19.68	18.93	15.87	17.79	15.87	22.33	19.63
6	21.28	20.05	22.06	21.12	20.34	16.89	12.74	18.04	12.74	22.06	19.07
7	20.94	19.76	20.80	19.95	18.11	17.42	14.42	17.78	14.42	20.94	18.65
8	22.02	19.42	19.64	18.73	17.89	14.96	12.52	18.58	12.52	22.02	17.97
9	18.31	17.67	20.22	18.92	19.41	16.03	14.02	17.44	14.02	20.22	17.75
10	14.77	16.13	15.87	15.21	16.04	14.58	14.65	15.34	14.58	16.13	15.32
All values in mm									12.52	23.14	19.11

SGS New Zealand Ltd, NDT & Materials Services

Test Results (continued) **Ultrasonic Thickness Inspection Report**

1.2 Reed Str / Usk Str intersection – Looking down Usk Str

Position	A	B	C	D	Min:	Max:	Ave:
1	15.55	13.24	13.09	14.67	13.09	15.55	14.14
2	13.43	13.47	12.08	14.11	12.08	14.11	13.27
3	14.01	13.43	11.01	13.76	11.01	14.01	13.05
4	13.73	14.23	10.14	14.60	10.14	14.60	13.18
5	13.47	14.29	10.84	13.99	10.84	14.29	13.15
6	11.89	13.87	11.09	13.16	11.09	13.87	12.50
7	10.93	11.19	10.93	12.10	10.93	12.10	11.29
8	12.19	12.81	13.63	11.61	11.61	13.63	12.56
9	12.55	14.15	14.21	10.79	10.79	14.21	12.93
10	11.03	13.41	12.14	11.67	11.03	13.41	12.06
All values in mm					10.14	15.55	12.81

SGS New Zealand Ltd, NDT & Materials Services

Test Results (continued) **Ultrasonic Thickness Inspection Report**

1.3 Reed Str / Usk Str intersection – South

Position	A	B	C	D	E	F	G	H	Min:	Max:	Ave:
1	18.45	20.31	17.21	16.73	17.58	16.94	18.02	17.36	16.73	20.31	17.83
2	17.60	16.52	17.34	15.96	16.88	16.27	17.12	16.41	15.96	17.60	16.76
3	17.59	15.49	16.36	16.27	16.92	16.03	17.21	16.48	15.49	17.59	16.54
4	17.34	15.44	14.48	16.64	15.72	16.89	16.21	17.02	14.48	17.34	16.22
5	17.08	15.63	17.07	14.41	16.11	15.32	16.44	16.02	14.41	17.08	16.01
6	16.84	16.88	16.88	15.31	16.42	15.97	16.73	16.08	15.31	16.88	16.39
7	17.07	16.53	16.35	15.54	16.22	15.91	16.68	16.12	15.54	17.07	16.30
8	16.56	17.16	17.34	15.13	16.09	15.72	16.44	15.98	15.13	17.34	16.30
9	16.58	16.44	13.42	16.39	14.92	15.71	15.96	16.21	13.42	16.58	15.70
10	16.56	16.87	12.35	17.76	14.88	15.92	16.24	16.03	12.35	17.76	15.83
11	16.74	17.47	16.69	18.08	17.22	16.58	17.41	16.95	16.58	18.08	17.14
All values in mm									12.35	20.31	16.46

Appendix 7 – Asset management maturity assessment

Waitaki District Council

3 Waters

Asset Management Maturity Assessment 2026

REPORT

WAUGH

ideas | analysis | solutions

Quality Record

Waitaki District Council

Asset Management Maturity Assessment 2026

Waugh Infrastructure Management Ltd have prepared this Assessment Management Maturity Assessment Report at the request of Waitaki District Council.

Issue Information	
Issue Purpose	Support development of asset management planning and a Water Services Delivery Plan
Issue Date	2 March 2026
Version Number	1.0

Authorisation	
WDC	Paul Hayes
Prepared By	Andrea Kydd-Law, WIML
Reviewed By	Ross Waugh, WIML
Date	2 March 2026

Table of Contents

1.0 INTRODUCTION

1.1 Asset Management Maturity Assessment objectives

The Asset Management Maturity Assessment process uses industry-standard methodology (refer 4.1).

The assessment is intended to support Waitaki District Council (WDC) asset managers in asset management (AM) planning and practices to ensure Council's 3 waters infrastructure (water supply, wastewater and stormwater) are efficiently, cost-effectively and sustainably managed over the long term. It aims to provide:

- Assurance that AM practices align with industry standards and best practice;
- Assurance that practices are consistent with the AM maturity level agreed in Council's policy
- Suggested improvements to address any inconsistencies (in addition to improvements identified in current AM plans);
- Surety that asset management practices align with and can contribute to Council's broader strategic planning and compliance framework;
- Feedback to assist in improving future AM plans and AM practice;
- A basis for continuing to develop a strong AM platform;
- Benchmarking to support tracking of progress over time.

1.2 Assessment scope and report structure

In addition to a standard maturity assessment using the Āpōpō tool, asset management practices have been considered against the following review components:

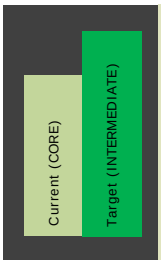
Review component	What is assessed
Industry standards and best practice	The extent to which the Asset Management practices align with the standards, maturity levels and best practice approaches (the Āpōpō Guide, IIMM 2024 ISO 55001, GFMAM).
Audit NZ focus areas	The extent to which the Asset Management Plan and supporting practices address key issues and recommendations outlined in recent Audit NZ reports on sector-wide asset management planning.

Report structure

Overall summary	Review component summaries	Appendices
A one-page snapshot of WDC's asset management maturity and overall performance against the review components outlined above, with key development areas noted.	A breakdown of review components, with summary information providing more insight into WDC's performance against specific review criteria for each component (key strengths and areas for further development).	A summary of the review methodology and other relevant background information.

2.0 SUMMARY ASSESSMENT

Overall assessment of WDC's Asset Management practices for 3 Waters



In our opinion, WDC's asset management practices for Water, Wastewater and Stormwater activities generally meet the IIMM maturity level of CORE. While the assessed maturity level does not meet WDC's targeted practice level of INTERMEDIATE*, ongoing application of current training and implementation of recommended improvements across AM system components is expected to bring scores to target levels in the shorter term.

*Under WDC's Asset management Policy 2025, advanced practice is targeted for regulator driver additional requirements, although these areas are not specified within the AM Policy.

Assessment considerations

The context within which this assessment has been undertaken should be considered in reading this assessment. WDC has recently undergone a 'Transformation' programme. This has significantly altered the organisational design underpinning asset management practice – from planning through to operations and capital programme implementation. This is still being embedded and has impacted on some aspects of practice development. Additonally, general uncertainty within the sector and Council's recent decision to move 3 Waters to Southern Waters adds uncertainty and complexity.

General assessment considerations

Consistency	Credibility	Clarity
Are the AM practices and documentation consistent with industry standards? Are the practices consistent with the maturity level agreed within its WDC's AM Policy? Do the AMPS/practices align with Council's strategic framework and key WDC documents (LTP/IS)?	Do WDC's AM practices inform and support the approach to asset management, programmed work and level of investment outlined in the AM Policy and AM Plans? Does the data, information and analysis demonstrate that the planning is reliable? Is it backed up by sound asset management practices and systems? Are there gaps?	Have the key issues been clearly emphasised upfront in the AMP and other planning documents? Is the narrative, information and supporting data easy for the reader to understand? Is it relatively easy to make links between asset management drivers, planned responses and asset management enablers?

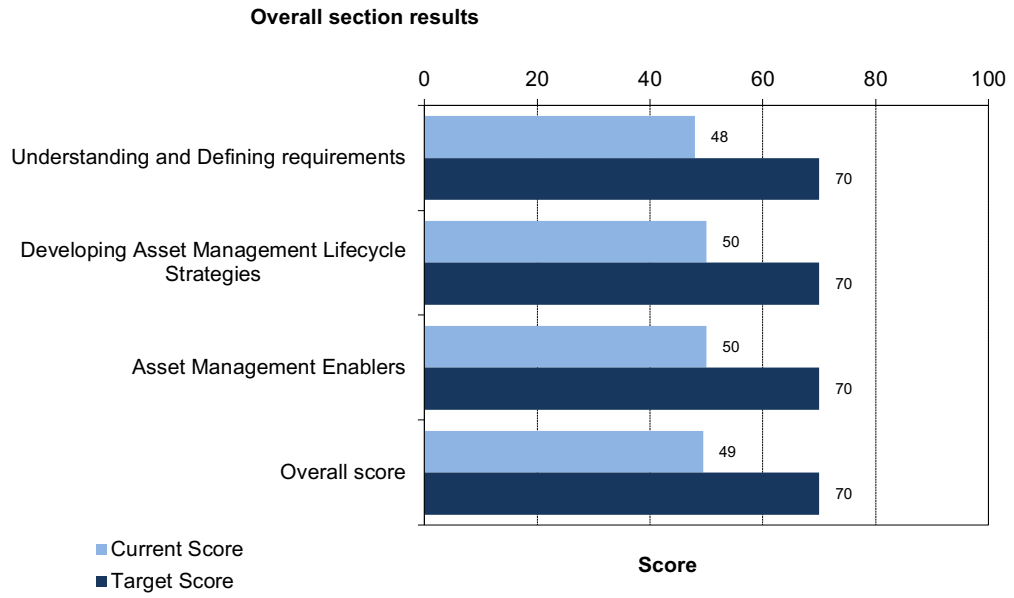
Component	Consistency	Credibility	Clarity	Summary comment
Industry Standards	✓	✓	✓	Overall operating a Core level – key concerns are in the areas of roles and responsibilities, and formalised process development and documentation
Audit NZ focus areas	✓	✓	✓	Some concerns around delivery of capital works programme (capacity / process) Some minor concerns around information and clarity within strategic documents.

Key: Yes/mostly; Needs some attention; Needs significant attention

Overall maturity scoring

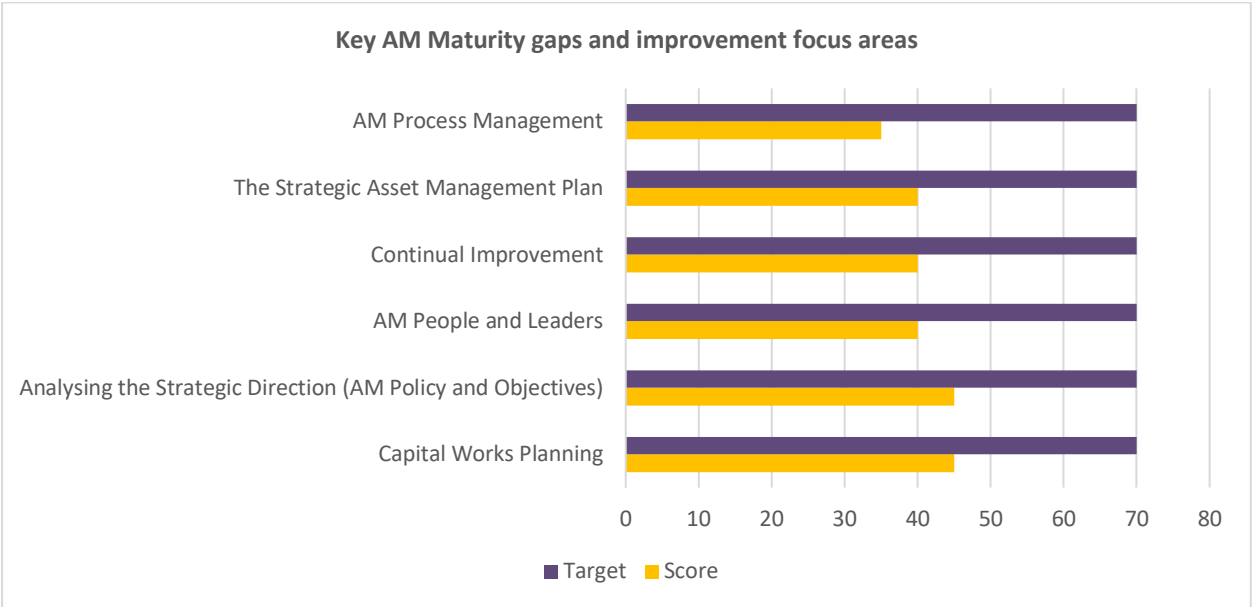
The following chart shows the overall scores for the three asset management system component groupings. Given WDC's overall maturty target is Intermediate, the target used for this assessment is mid-range for this level (70).

The graph shows that overall, WDC is operating at CORE maturity level, with consistent overall scoring in the AM system component groupings.



Key improvement opportunities at system component levels

The 3 Waters AM areas with the largest maturity gaps are summarised in the chart below. Improvement planning and prioritisation in these areas will have the greatest impact in moving WDC's asset management practices to the desired 'Intermediate' maturity level.



3.0 ASSESSMENT BY REVIEW SYSTEM COMPONENTS

3.1 Maturity assessment against industry standards

3.1.1 Methodology

The Āpōpō Asset Management Maturity Assessment Tool spreadsheet (industry best practice and aligned to IIMM) was used by WDC staff to undertake a self-assessment of the maturity of their asset management practices prior to the Waugh assessment using the same tool. The full scope and methodology used for the assessment – including WDC's self-assessment - is outlined in detail in Section 4.1 of this report.

Maturity assessment scores compared to target maturity levels (appropriate levels) for each maturity component are outlined in the tables and charts below.

3.1.2 Maturity assessment scoring summary

The full scoring assessment across the activities is included as Appendix 1 to this report. Note that while some components did not meet all the CORE level requirements, the scoring was lifted within that level to reflect that some practice within the component is meeting Intermediate requirements.

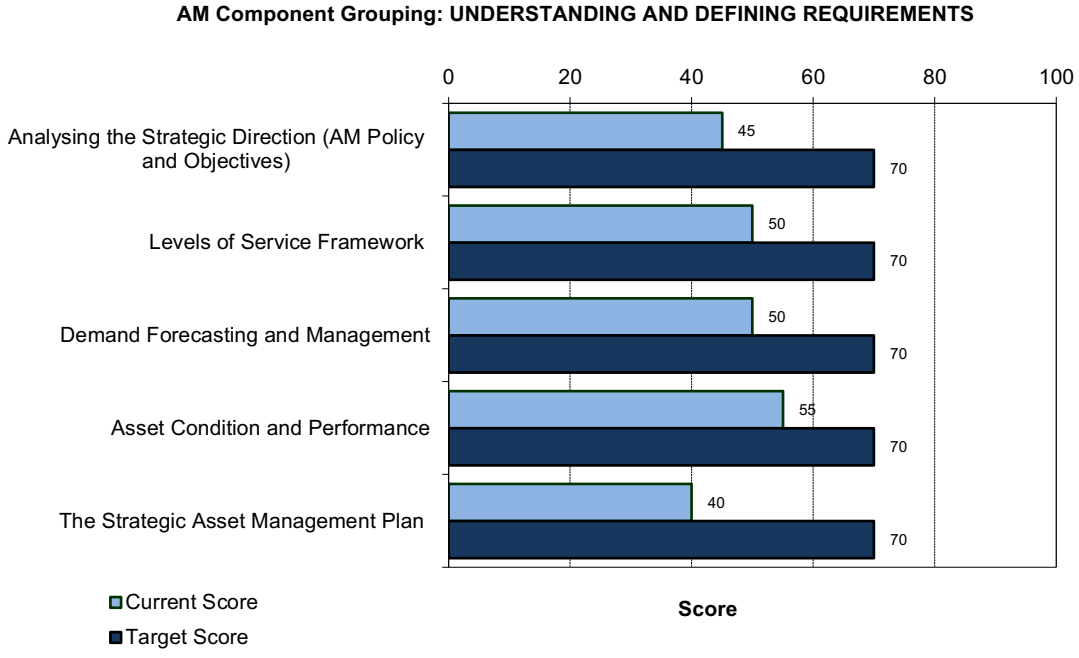
The target range has been set at the Intermediate maturity level range of 61-80.

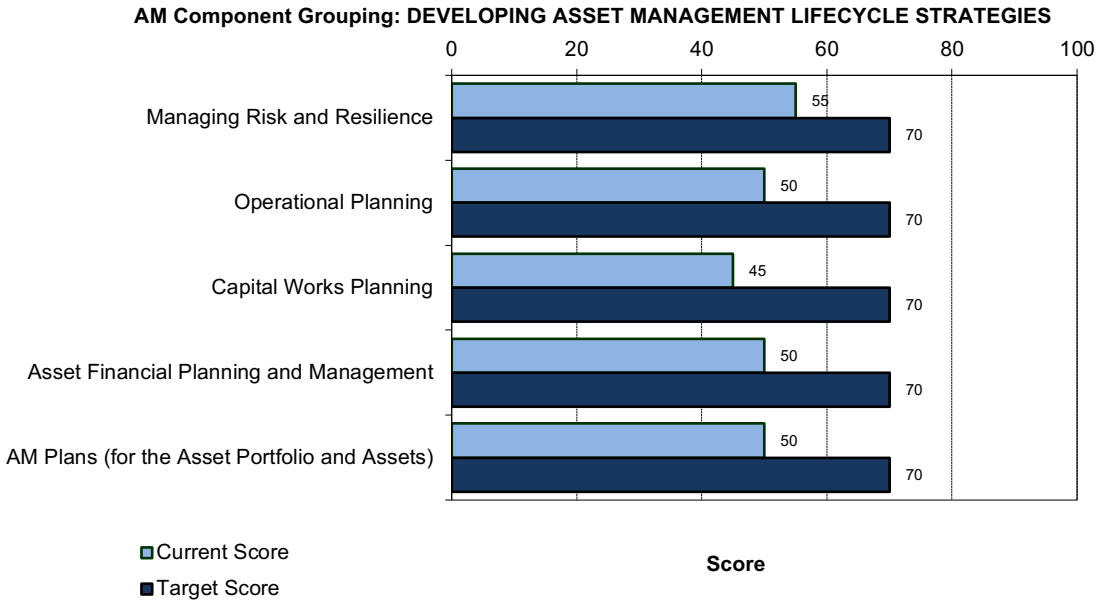
Table 3-1: Scoring summary by assessment components

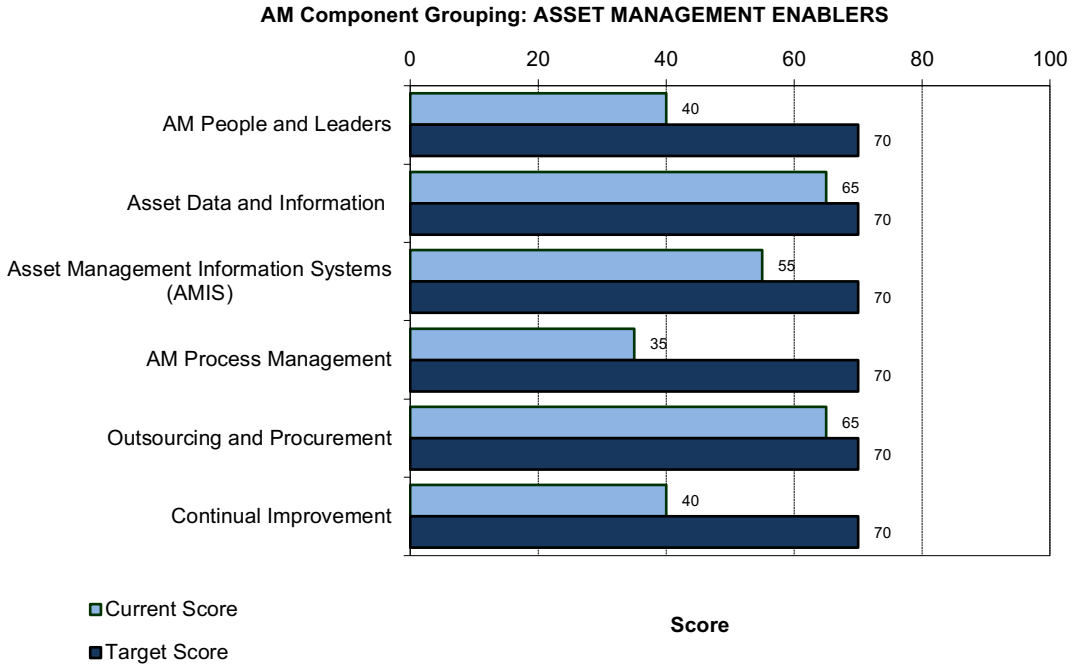
Assessment components	Water	Wastewater	Stormwater	Target range*
2.1 Strategic direction	45	45	40	61-80
2.2 Levels of service (LoS) framework	50	50	45	61-80
2.3 Demand forecasting & management	50	50	45	61-80
2.4 Condition & performance	50	55	45	61-80
2.5 Strategic AMP	40	40	40	61-80
3.2 Managing risk & resilience	55	55	55	61-80
3.3 Operational planning	50	50	50	61-80
3.4 Capital works planning	50	50	45	61-80
3.5 Financial planning & management	50	50	50	61-80
3.6 AMPs	50	50	45	61-80
4.1 People & leaders	40	40	40	61-80
4.2 Data & information	65	65	65	61-80
4.3 Information systems	55	55	55	61-80
4.4 Process management	35	35	35	61-80
4.5 Outsourcing & procurement	65	65	65	61-80
4.6 Continual improvement	35	35	35	61-80
Overall score/range	49	50	49	61-80

3.1.3 Maturity assessment graphs

Due to relative consistency in asset management practices across WDC's 3 waters activities, results have been aggregated into singular graphs.




AM Component Grouping: DEVELOPING ASSET MANAGEMENT LIFECYCLE STRATEGIES
0
20
40
60
80
100
Managing Risk and Resilience
55
70
Operational Planning
50
70
Capital Works Planning
45
70
Asset Financial Planning and Management
50
70
AM Plans (for the Asset Portfolio and Assets)
50
70
Current Score
Target Score
Score


AM Component Grouping: ASSET MANAGEMENT ENABLERS
0
20
40
60
80
100
AM People and Leaders
40
70
Asset Data and Information
65
70
Asset Management Information Systems (AMIS)
55
70
AM Process Management
35
70
Outsourcing and Procurement
65
70
Continual Improvement
40
70
Current Score
Target Score
Score

3.1.4 Summary of strengths and improvement areas across AM practices

Improvement items have been identified for all AM components to help inform improvement planning and close AM practice maturity gaps. Prioritisation of these should be considered on the basis of the scale of maturity level gaps and level of risk:

Key: Focus area for improvement Area of strength

AM component	Key strengths	Key areas for improvement
2.1 Strategic direction	Information generally consistent across documents AM Policy maturity target informed by analysis report	Developing structure and alignment across documents to give cohesive view of AM strategic direction Including missing key information in the next AM Policy update – notably around AM objectives, and roles and responsibilities Including specific targets for each AM system component in next AM Policy update
2.2 Levels of service (LoS) framework	Sound use of technical measures to support LoS monitoring	Understanding and documenting the levels of service and cost relationships in the AMPS
2.3 Demand forecasting & management	Asset (technical) performance measures are included in the AMPs and aligned to service (customer) performance measures.	Documenting customer groups and needs in the AMPS based on what is currently analysed and understood through CRMS, use, surveys etc. Analysis and description of LoS and cost relationship for inclusion in future AMPs
2.4 Condition & performance	Currently have 20-years of detailed information of breaks and blockages to inform planning Good awareness of issues, programmes in place to address the unknown.	Further developing condition monitoring programmes for both above and below ground assets
2.5 Strategic AMP	The IS and AMPs generally cover key elements of the SAMP	Ensuring future IS and AMP documents are aligned and include and/or improve key elements of a SAMP, notably: • Scope and description of the AM system/framework • Structure for AM teams, roles and responsibilities (including governance and leadership)
3.2 Managing risk & resilience	Sound, well-resourced corporate risk framework in place with good monitoring and controls in place	Assessing, monitoring and managing risk across 3 waters specifically (given the extent of impact of risks within these activities) more consistently and regularly Ensuring all key 3 waters risk documents are regularly reviewed, up to date and monitored
3.3 Operational planning	Audits completed for critical spares, inventories of spares. Staff and operators/contractors well informed on inventory and where to locate items	Documenting alignment of maintenance and operation strategies to AM objectives in AMP Ensuring operational activities are properly resourced and there is coordination with other AM activities

AM component	Key strengths	Key areas for improvement
3.4 Capital works planning	Framework in place for capital project management (Project Management Office) Issues and Options reports completed for decision-making	Scoping out capital projects within first 3 years of the LTP as much as possible to inform budgets and ensure deliverability (and also for all large capital works beyond 3 years) Addressing the gap between the initial planning stage and the project delivery - unclear where optioneering, various design stages should fit, so flow through the project cycle is not smooth (lack of portfolio and programme level delivery structures)
3.5 Financial planning & management	Robust asset valuation process and documentation in place Replacement costs are used in renewals modelling	Including consequential OPEX for all new assets in OPEX forecasts
3.6 AMPs	Size of AMPs has been scaled back during last review	3W AMPs will need to fit with Commerce Commission requirements from 2026 Integrating AMP planning processes and inputs from across lifecycle management portfolios
4.1 People & leaders	Commitment to improving AM planning capability through training for 3x staff through Otago Polytech (2025) and x1 staff planned in 2026 Āpōpō memberships Adoption of AM Policy, AM portfolios, this AMMA, wider participation in AM review workshops	Defining roles and responsibilities better across the whole asset management lifecycle (not just AM planning) Establishing the coordination and integration required across the asset management lifecycle and practice components to ensure appropriate AM practices are applied across asset lifecycles
4.2 Data & information	Data being used for analysis of renewals models etc. and potential for taking this analysis further for predictive condition modelling of pumps etc. Relatively few data anomalies in the reticulation network, and use of reliability tags	Formalising existing data management approaches and processes
4.3 Information systems	Industry-recognised AMIS and other systems in place with generally good capabilities and integration	Exploring Utility Network add-on in ArcGIS

AM component	Key strengths	Key areas for improvement
4.4 Process management	Good information process application and management at individual staff level	Reviewing key process requirements, prioritise based on risk and confirm a realistic programme based on resources available for documenting and communicated these Ensure existing documented processes are kept up to date and easily located by staff Focus on integrating processes across asset management system to ensure alignment and integrated risk management
4.5 Outsourcing & procurement	Policies and guidelines in place and successful annual audits completed Checks and balances throughout process Professionalisation and standardisation of procurement through the PMO procurement staff	Prioritising and preparing projects from the capital works progarmme to get out to market as soon as possible Developming a Contract Administration Manual
4.6 Continual improvement	Improvement Pan included in the AMPs Ad hoc improvements being made	Structuring Improvement Plan around asset management system components with a brief rationale provided for each improvement item (the 'why') and prioritising base on key AM maturity gaps Developing a prioritised annual programme and specified budget and staff resourcing to implement

3.1.1 General Reviewer Observations

The following points summarise some key general peer reviewer observations from the assessment:

- While not meeting the targeted asset management maturity level of Intermediate, WDC has generally maintained mid-to-upper Core level in the face of significant organisational design changes and loss of some key staff during introduction of the Transformation process over the past 18 months. As Transformation is embedded further, AM improvement opportunities are becoming available.

- Overall, strategic and generic information is consistent across the Infrastructure Strategy, LTP and 3 Waters AMP documents. The structure and alignment of this information could be improved to provide a more cohesive view of Council's strategic approach to asset management

- There is generally good understanding and implementation of AM practice requirements, however, further documentation is needed to support this – notably asset management practices, roles and responsibilities for asset management across the system, and processes to ensure accountability across teams. This is an organisational risk in the event of staff changes and could impact business continuity.

- Deliverability of the capital works programme is a key concern noted through this review and should be addressed as a priority.

- WDC is to be commended for the scope of input from across the organisation into the asset management maturity self-assessment and also recent investment into professional development for key Asset Planning team staff through the Otago Polytechnic. This reflects a commitment to improving AM practice. Some broader AM training should be considered for staff in other teams responsible for asset management across the 3 waters asset lifecycle – including operations and capital works management.

3.2 Assessment against Audit NZ focus areas

The assessment also considered the most recent focus areas for AMPs/asset management practice outlined in recent Audit NZ reports on long term asset management planning across New Zealand's local government sector.

Audit focus area	WDC AMPs / AM practice
Reliability of planning	Overall meets Core maturity requirements. Better scoping of capital projects will ensure that capital programme financial forecasts are more reliable and programmes are deliverable.
Clear emphasis of the key issues	The key issues, options and responses are held within the LTP, AMPs and Infrastructure Strategy.
Asset information: o reliability of the asset data o critical assets identified o reliability of data matches significance of decisions required	Asset information is generally reliable, critical assets are identified and recorded. Documentation of Asset Data processes and regular review and reporting would help support this.
Capital programme delivery	Capital programme delivery is a sector-wide issue and has highlighted in OAG and sector reports, specifically in regard to planned water supply upgrades. Risks, constraints and dependencies associated with staffing and contractor resourcing should be considered and factored into planning for major capital works. Processes for further scoping capital works and handing over to project managers need to be developed and implemented.
Collaboration	Section 17A review, regional support agreements, national professional association involvement (Water NZ, Apopo)

3.3 WSDP implementation readiness

In considering Water Service Delivery Plan (WSDP) readiness, it is noted that the WSDP is currently being reviewed and updated to meet recent Council decisions regarding Southern Water and will be resubmitted to DIA for approval.

WSDP component	Relevant WDSP considerations	Supporting observations
Part A: Overview of water services delivery	o Provision made to ensure that all relevant regulatory standards will be met for 3 water networks o Provisions made to ensure that all Drinking Water Quality Standards will be met o Adequate provisions made to support housing growth and urban development	o Water supply upgrades planned and budgeted o Development of WDC compliance resources and supporting processes o Drinking Water Safety Plans in place (require review and updates) o Future development and capacity needs understood/provided for
Part B: Network performance	Clear understanding of the assets, their condition and performance, and current compliance with regulatory standards and requirements	Overall assessment supports WDC has a clear understanding of the assets across the 3 Waters activities, with plans in place to address gaps in condition and other asset information
Part C: Revenue and financing arrangements	Overview of all key financial information	Included in AMPs, IS and LTP
Part D: Financial sustainability assessment	o The revenue applied to the council's delivery of those water services is sufficient to ensure the council's long-term investment in delivering water services (e.g. funding for capital projects and renewal programmes) o That the council is financially able to meet all regulatory standards and requirements for delivery of those services	Review of AMPs/IS supports that revenue is sufficient for planned programmes
Part E: Projected financial statements for water services	o Projected financial statements for each of drinking water, wastewater and stormwater	As above

3.4 Conclusion

In conclusion, our opinion is that the Waitaki District Council's (WDC's) asset management practices generally meet the CORE asset management maturity level.

This assessment has been made using the methodology outlined in 4.1, and is consistent with industry best practice.

Further, our assessment concludes that WDC's current and emerging 3 Waters asset management practices address, or will address in the near future, focus areas highlighted by Audit NZ and support implementation of Council's Water Services Delivery Plan (currently under review for resubmission to DIA).

A completed Āpōpō Asset Management Maturity Assessment Tool spreadsheet and supporting notes have been provided to WDC as separate documents to support this assessment and future planning and assessments.

4.0 ADDITONAL INFORMATION

4.1 Scope and Methodology

This assessment of Waitaki District Council's asset management maturity included the following activities:

- Review of the following relevant WDC documents relevant to its Water, Wastewater and Stormwater activities:
    - Asset Management Plans 2025-34) for Water Supply, Wastewater and Stormwater
    - 2025-34 Long Term Plan
    - Asset Management Policy 2025 (and supporting analysis 2022)
    - Information Management Policy
    - Procurement Policy 2025
    - Risk Management Policy 2024
    - Significance and Engagement Policy 2023

- Completion of the Āpōpō Asset Management Maturity Assessment Tool spreadsheet (industry best practice, aligned to IIMM).
- A peer review of an AM maturity self-assessment undertaken by WDC. This was completed with input from more than 20 staff from across the organisation performing various roles within the asset management system - including planning, operations and human resources. The self-assessment not only played a key role in informing this assessment, it was also a valuable experience for WDC staff and highlights an organisational commitment to improving asset management practice. WDC's assessment of their maturity generally aligned with Waugh's assessment. Where scoring differed between AM components, this was 5 points more or less than the WDC score and reflects WDC's investment into training for asset planning staff.
- Interviews with key WDC staff involved with 3 waters asset management practice across the asset lifecycle to address items requiring clarity or additional supporting evidence.
- A general high-level review of AM practices and documentation against recent Audit NZ reports on asset management planning in the local government sector
- A general high-level review of AM practices and documentation against Water Service Delivery Plan requirements

4.2 Scoring methodology

The scoring framework is based on the IIMM Asset Management Maturity Index outlined in the table below:

Table 4.1: IIMM AM Maturity Index

Aware	Basic	Core	Intermediate	Advanced
0-20	21-40	41-60	61-80	81-100

4.2.1 Waitaki District Council asset management maturity targeted level

Waitaki District Council has an adopted Asset Management Policy (July 2025). The current approach sets the level of asset management practice for Council's 3 Waters activities as 'Intermediate', while targeting 'advanced' practices for some AM systems components.

'Intermediate' Asset Management
'Intermediate' asset management practice is undertaken at a level between 'Core' and 'Advanced' practice. The focus is to build on the basic technical asset management planning of 'Core' practice by introducing improved maintenance management and more comprehensive asset management techniques (as appropriate). Further use is made of risk management, asset lifecycle management, and service standard optimisation techniques.

From WDC's AM Policy:

> Council shall align its infrastructure asset management practice by activity type to a minimum of the following levels:

Activity / AM Level	Roads and Footpaths	Water, Wastewater and Stormwater	Waste Management and Minimisation	Parks, Reserves and Recreation Services	Property and Facilities
Advanced	*Waka Kotahi driven additional requirements*	*Regulator driven additional requirements*			
Core Plus / Intermediate					
Core					

> Notwithstanding the above, the minimum NZ Transport Agency requirements relating to the Transport Activity, and regulator requirements for Water, Wastewater and Stormwater shall be met.

4.1 Statement of code of ethics

4.1.1 Statement of Code of Ethics

In undertaking this Peer Review, Waugh Infrastructure Management Limited Management, Staff and Associates recognise the professional responsibilities integral to undertaking a review of another professional's work.

The review has been undertaken with particular regard to the following.

4.1.2 INGENIUM Code of Ethics

Clause 2 PROFESSIONALISM AND INTEGRITY

INGENIUM members shall undertake their duties with professionalism and integrity and shall work within their levels of competence.

Guidelines - Members need to:

- Exercise initiative, skill and judgement to the best of their ability at all times for the benefit of their employer and/or client
- Give decisions, recommendations or opinions that are honest, objective and factual. If these are ignored or rejected, they should ensure that those affected are made aware of the possible consequences
- Accept personal responsibility for their work and work done under their supervision or direction
- Ensure that they do not misrepresent their areas or levels of experience or competence
- Take care not to disclose confidential information relating to their work or knowledge of their employer or client without the agreement of those parties
- Disclose any financial or other interest that may, or may be seen to, impair their professional judgment
- Ensure that they do not promise to, give to, or accept from any third party anything of substantial value by way of inducement
- First inform another member before reviewing their work and refrain from criticising the work of other professionals without due cause
- Uphold the reputation of INGENIUM and its members, and support other members as they seek to comply with the Code of Ethics

IPENZ Code of Ethics

Obligations owed to other engineers:

Clause 11: Not review other Engineers' work without taking reasonable steps to inform them and investigate.

Waugh Infrastructure Management Limited acknowledges the cooperation of the AMMA Sponsor in undertaking this assessment.