Infrastructure Strategy

Executive Summary

Council's infrastructure assets such as roads, footpaths, bridges, pump stations, sewer mains, water treatment plants are critical for the everyday lives of Central Otago residents.

Central Otago has $895 million worth of water and roading infrastructure assets. This strategy sets out the 30-year plan for maintaining and improving levels of services for the core activities of water, wastewater and stormwater (Three Waters), and roading. This strategy identifies the most critical issues for these areas in the next 30 years, and Council's options for managing them. This strategy is closely linked to the financial strategy to ensure the Council has sufficient funding available to replace key assets in the future.

Central Otago's relatively small and disperse population can put pressure on the affordability of providing and improving infrastructure. At the same time Council must also meet the challenge of accommodating growth and funding essential improvements for the safety and well-being of the community.

It is expected the district will continue to grow over the next 30 years with the population in 2050 projected to be 34,000 (an increase of 55% from the usual resident population in 2018 of 22,200. This equates to an average annual growth rate of 1.3%.

The key influences facing the delivery of the district's future infrastructure are:

- Government policy direction and legislative changes – The reform programme for Three Waters has resulted in uncertainty about what the future delivery of this service looks like. The community will need three waters services regardless of which entity delivers these in the medium to longer term. This strategy reflects the work needed to meet the required standards, community expectations and growth, and how the work should be prioritised.

- Government investment for the 2021/22 – 2030/31 period for Roading will be guided by four strategic priorities: safety, better travel options, climate change and improving freight connections.

- COVID-19 has had significant social, cultural, and economic implications. The full extent of these implications are not yet known, but changes are already apparent in the lifestyle choices of Kiwis, work patterns and work locations that will have some impact on future delivery of infrastructure services.

- Central Otago is a popular domestic holiday location. With the increased focus on personal health and well-being, increased interest in cycling following COVID-19, combined with the development of the New Zealand Cycle Trail network increased numbers of locals and visitors cycling within the district is expected. Council's plans to undertake projects to improve cyclist's connectivity and safety between town centres and cycle trails in the district.

- Environmental influences – Public and government expectations regarding how Council manages the environmental impacts from infrastructure services has increased over the past decade. This has been evidenced by government freshwater reforms, supporting legislation, changes to regional policies and plans, and increased compliance reporting and monitoring. Improved outcomes and increasing compliance expectations come with an increased cost.

- Climate change and sustainability – The potential impacts of climate change for the district's infrastructure include higher intensity and more frequent extreme rainfall events. This results in flooding and impacts on vulnerable bore sites and water supplies with dirtier source water needing to be treated; and increased frequency of road closures where roads and bridges are below the flood plain.

- Council has been improving its understanding of the impacts of climate change on infrastructure. Council commissioned report by Bodeker Scientific in 2017 and on the basis of this implemented a Sustainability Strategy in 2019. Council has implemented a series of actions (such as more hybrid vehicles in its fleet) to mitigate environmental impacts.

- Resilience – Council prepared an Infrastructure Resilience Plan and an Infrastructure Response Plan in 2020. The Resilience Plan identifies the natural events that would create risks to three waters and roading infrastructure and services, the implications, mitigations, and response.

- Change in demand – as well as a growing population the future looks set to see an increase in our older population in Central Otago. This will affect both the demands on our infrastructure and the affordability of our services to people on fixed incomes in the long-term. An older demographic requires higher levels of service for footpaths and infrastructure that supports accessibility for people with restricted mobility. Funding has been provided to continue to extend the footpath network, and to ensure that all street crossings have cut down kerbs to enable disabled access.

- Responding to growth and anticipated future growth has seen Council embark on a series of spatial planning exercises in the past two years. Infrastructure planning is an integral part of this. Within the 10-year plan roading budgets, financial provision has been made in resealing programmes for an increase of 850m of sealed roads per annum due to new subdivisions.

- A big challenge Council faces is that demand for contractors is high heading into the 2021-31 Long-term Plan period, and this is expected to result in higher construction costs for projects. Council has adjusted project budgets in years 1-3 to recognise this. Demand for limited engineering and construction resources are expected to extend across the initial 10-year period of the infrastructure strategy as a large infrastructure investment programme commences across the public asset portfolio.

Key Issues

Council has identified the following as the key infrastructure issues that sets the prioritisation of work programmes.

- Resilience – climate change is expected to affect the intensity and frequency of natural hazards. A number of potential mitigations have been programmed, such as investigating more secure water sources at Roxburgh, Ranfurly, Naseby and Patearoa, upgrading wastewater pump station storage volumes, and road flooding improvements such as upgrading culverts. In a major earthquake it is likely that many roads will be blocked through landslips and the region may be isolated for some time. Council will review the required functions of 'back country' roads that may be needed as alternate routes if highway closures are prolonged and additional funding has been budgeted to undertake any necessary improvements to these potential lifeline routes.

- Water Safety – completing water treatment upgrades to meet the New Zealand Drinking Water Standards remains a key focus. Within the first three years of this Long-term Plan Council expects all of Council-provided water supplies to be fully compliant with the New Zealand Drinking Water Standards.

- Minimising Environmental Impacts – reducing the environmental impacts of Council's wastewater schemes in line with the Government's essential freshwater programme, and an increased focus on resilience are our key priorities for the wastewater network.

- Council has invested in hydraulic modelling of the wastewater networks to improve understanding of growth impacts. Resilience work is programmed within the next four years to improve pump station capacity, provide emergency generation and reduce the risk of wastewater overflows occurring. Council expects environmental discharge standards for new resource consents for wastewater treatment sites to increase so projects to increases treatment processes to improve discharge quality have been programmed for each site prior to consent expiry.

- Completion of construction of stage 1 of the wastewater reticulation on Clyde will continue into 2021/22. This project will improve the quality of groundwater discharges to the Clutha River. Public consultation on the proposal to construct the Clyde wastewater network in three stages identified that many property owners in Stage 3 wish to be connected sooner. The proposed timing of Stage 2 continues to be in 2029, but Stage 3 has now been programmed to be undertaken with Stage 2.

- Accessibility in the urban centres of Cromwell and Clyde – The growth in population, business, tourism and property development is leading to changes in demand for

parking and the use of public spaces by motorists, cyclists and pedestrians. Council has projects planned to improve safety, and make these spaces more functional and enjoyable.

- The Clyde heritage precinct upgrade proposed in the 2018 Long-term Plan has been delayed to coordinate work with the wastewater reticulation project. Stage 1 of this roading work will now be undertaken in 2021, with stages 2 and 3 completed in the 2021-23 period.

- Council has discussed options with Contact Energy to facilitate the safe access of cyclists into the Clyde Heritage Precinct. Funding has been provided to install traffic lights on the Clyde Bridge as an interim measure, and for investigation and then potential construction of an electric punt.

- The Cromwell Masterplan is supported by intersection, pedestrian and cycling improvements from 2022. This will improve the flow and safety of traffic, pedestrians and cyclists within the town centre.

- Stimulus Delivery Funding – the $9.46 million that the Council received from Tranche 1 of the Water Stimulus Funding has enabled $5.49 million of projects that were in years 2022 to 2027 of the 2018 Long-term Plan to be brought forward. This work will be completed by March 2022. This work includes $3.8 million for increased reservoir capacity at Alexandra and Naseby, and $2.9 million for resilience upgrades and $1.8 million on increasing the capacity of the Melmore Terrace and Alpha Street pump stations in Cromwell.

- If further funding packages eventuate, then Council will bring forward work planned in later years of the long-term plan. Funding has been provided in year one of the 2021-31 Long-term Plan to undertake the necessary investigation work on a number of water and wastewater projects that are in years four to ten of the programme.

- Capacity of Cromwell Water Network to meet growth demands – projects to improve water treatment, operational performance, and distribution of water to Bannockburn and Pisa are included in the long-term plan. These projects include additional capacity to meet future population growth. Hydraulic modelling will be undertaken in 2021 to inform project planning for pipe replacements and reservoir upgrades, which are scheduled for 2027/28.

Introduction

This is Central Otago District Council's third infrastructure strategy and has been prepared to meet the requirements of section 101B of the Local Government Act 2002.

The purpose of the infrastructure strategy is prescribed by the Local Government Act. The infrastructure strategy must identify the significant infrastructure issues for the Central Otago District for the next 30 years, the options for managing those issues, and the implications of the options.

Council must take into account the need to –

- renew or replace existing assets;
- respond to growth or decline in the demand for services;
- allow for planned increases or decreases in levels of service;
- maintain or improve public health and environmental outcomes or mitigate adverse effects on them;
- provide for the resilience of infrastructure assets by identifying and managing risks relating to natural hazards and by making appropriate financial provision for those risks.

The infrastructure strategy provides the strategic framework for the more detailed activity management plans. It is reviewed every three years and is a guiding document for the Long-term Plan.

The strategy covers the 30-year period of 2021 to 2050 and includes the following groups of the council's activities:

- water supply;
- sewerage and the treatment and disposal of sewage (wastewater);
- stormwater drainage;
- roads and footpaths.

Central Otago District Council does not manage any flood protection and control works. The Otago Regional Council manages these activities within the Central Otago area. There are private water supplies within Central Otago that are not managed by the council. These water supplies are not included within the scope of this plan.

Community facilities, parks and properties have not been included in the infrastructure strategy. These may be considered for inclusion in the next review of the Strategy.

The issues discussed reflect the current legislative environment and the communities' priorities. The financial forecasts are estimates and the reliability of the forecasts decreases beyond ten years and towards the 30-year planning horizon.

The Infrastructure Strategy should be read alongside the Council's Financial Strategy, which provides the context and guidelines for Council's proposed expenditure. Detail about how Council intends to fund its activities can be found in the Revenue and Finance Policy.

This Infrastructure Strategy has been structured as shown in the diagram below.

Section 1 – Where We Are Now

Central Otago is New Zealand's most inland region, located in the southern half of the South Island. It's breathtakingly different from the rest of New Zealand, with vast undulating landscapes, rugged snow-capped mountains, clear blue rivers and lake, deep gorges, and tussock-clad hills.

Central Otago covers an area of 9,969km2 and has one of the lowest population densities per square kilometre in New Zealand. This, together with the landscape, gives Central Otago its character.

The community consists of a variety of small towns that offer a wide range of services. It is a popular holiday destination, and the population swells over the summer months.

Central Otago has experienced a prolonged period of population growth. Between the 2001 and 2013 censuses the usual resident population grew by 25% from 14,750 to 18,500. The resident population grew by a further 17% in the five years between the 2013 and 2018 censuses, from 18,500 to 21,558.

The 2020 estimated usual resident population of the district was 23,528 people. This swells to 45,697 in the summer. Half of the population lives in the townships of Cromwell, Alexandra, and Clyde.

There is a cohort of younger people between 15 and 24 who leave the district for other opportunities such as education and employment. Since 2013, there has been an influx of those between 25 and 35, particularly in Cromwell due to the growing construction and horticultural industries. There is a high proportion of population between 55 and 65 years that move to the area later in their career or for retirement. Elderly people (over 70) leave the area, possibly in search of better healthcare.

	2020 Usual Resident Population	2020 Peak Population
Total District	23,528	45,697
Total Urban	17,765	23,152
Alexandra	6,242	7,869
Cromwell	7,105	8,796
Clyde	1,327	1,805
Omakau and Ophir	430	707
Naseby	306	902
Ranfurly	778	927
Patearoa	143	196
Roxburgh and Lake Roxburgh Village	754	1,025
Pisa Village	680	925

Table 3.0.1 Central Otago Population 2020

The Central Otago economy has a strong primary sector, with construction, tourism, hydroelectricity, and professional services other significant contributors. Traditional sheep and beef industries are strong; there is a growing and thriving horticultural sector. Stone fruit, viticulture and apples are key horticultural growth areas.

Construction is the second largest sector and is currently driven by high demand for housing and industrial premises in both Central Otago and the neighbouring Queenstown Lakes area.

The professional, scientific, and technical sector is developing. Improved communication infrastructure and air services from Queenstown and Dunedin are enabling individuals and companies to service national and international clients while opting for the Central Otago lifestyle.

Almost a quarter of Central Otago workers are self-employed, which is significantly higher than the national average. Central Otago has maintained its high levels of employment over time and the rate of people not in employment, education or training in mid- 2020 was 8.2%.

Data from Ministry of Business, Innovation and Employment monthly regional tourism estimates shows the value of tourism in the Central Otago District had grown by 37% over a five year period, from $155 million in 2015 to $213 million in 2019. This was higher than the national average (+25%) and of neighbouring Dunedin at 17%. Queenstown Lakes District (including Wanaka) had growth of 40%.

COVID-19 has impacted on tourism in 2020, with Central Otago 10% down for 2020. While no one can know exactly when the border may reopen and the true speed at which visitors will return to New Zealand, Central Otago Tourism Advisory Board forecasts suggest Central Otago will return to positive growth within 12 months of borders reopening.

Growing concern at the speed of tourism growth up to 2019 was the catalyst for Central Otago District Council initiating the development of a destination management plan for Central Otago. The goal of the plan is to ensure the Central Otago visitor economy develops over time in a way that communities are enriched, and the natural environment enhanced by attracting visitors to Central Otago. The destination management plan will help identify infrastructure needs and impacts of the visitor economy short, medium, and long term to support these goals.

Central Otago's relatively small and disperse population can put pressure on the affordability of providing and improving infrastructure. At the same time Council must also meet the challenge of accommodating growth and funding essential improvements for the safety and wellbeing of our community.

The average annual earnings in Central Otago in 2020 was $54,080, which is 14% less than the New Zealand average of $62,774. Ratepayers' ability to absorb rate rises will be affected as an increasing proportion of residents become over 65 years of age and potentially on fixed incomes.

Central Otago District Council

The Central Otago District Council was formed in 1989, and amalgamated the Vincent County Council, Cromwell Borough Council, Alexandra Borough Council, Maniototo County Council, and part of the Tuapeka County Council.

The Council's primary office is located in Alexandra, with service centres located in Ranfurly, Roxburgh and Cromwell. Council employs 163 full time equivalents, and has an annual operating revenue of $48 million.

The Council is led by the Mayor, with 11 elected councillors. There are four community boards: Vincent, Cromwell, Teviot Valley, and Maniototo.

Core infrastructure is funded and managed at a district wide level, and all governance decisions are made by Council. Individual councillors are appointed as the portfolio lead and deputy lead for Roading, Three Waters and Waste, and Sustainable Practices.

Council also has an Audit and Risk Committee that consists of the Mayor, three councillors, and an independent representative as chair. The objective of the Audit and Risk Committee is to provide governance and oversight to ensure systems and practices are of a standard to provide assurance that there is sufficient risk identification and mitigation in place. The Audit and Risk Committee provides feedback to the council on a broad range of matters, including strategic management and operational performance.

The Infrastructure Assets

The 2020 replacement value for the infrastructure assets covered in this strategy is $895 million.

Asset	Description	Replacement Value	% of total
Water	Water extraction, treatment, and distribution	$113 M	13%
Wastewater	Wastewater collection, treatment, and discharge	$98 M *	10% *
Stormwater	Stormwater collection and discharge	$41 M	5%
Roads and footpaths	Roads, bridges, footpaths and carparks and associated assets.	$643 M	72%
TOTAL		**$895 M**	**100%**

Table 3.2.1 2020 replacement value for the infrastructure assets

Central Otago District Council's potable water supply network comprises of 340km of water mains and 79km of service connections. There are approximately 10,000 connections which are metered (or operate on a restricted maximum flow). Council has ten water treatment plants, six booster pump stations and 15 storage facilities for treated water.

The wastewater reticulated main sewer network measures 188km, with a further 57km of lateral sewer connections. There are six wastewater treatment plants (this excludes the Bannockburn site which is in the process of being fully decommissioned) and 37 wastewater pump stations.

There are five reticulated stormwater networks. The stormwater reticulated pipe network measures 74km. The remaining stormwater assets which are not part of reticulated networks are included within the roading asset data and valuation.

The roading assets include 1,935km of maintained roads, 179km of formed footpaths, and 179 bridges (including five footbridges maintained by Council). There are 1,779km of rural roads and 158km of urban streets. 72% of our roads are unsealed, a total length of 1,407km. There are approximately 6.5 hectares of formed cark parks across the district that are owned and maintained by council.

Asset Management Policy

An Asset Management Maturity Assessment was completed in October 2018. The purpose was to assess the effectiveness of the management of Council's assets and asset-related service through:

- Assessment of council's current asset management maturity;
- Confirming the appropriate' levels of asset management maturity for council's main asset-related services;
- Supporting an ongoing programme of asset management improvement;
- Providing confidence to council in its asset management practices.

This Asset Management Maturity Assessment has resulted in the council's Asset Management Policy being reviewed in November 2020. This policy aims to provide a structured framework for Central Otago District Council to manage its assets and asset-related services effectively.

The Council is committed to ensuring that assets meet the service needs of the community over the long term. This will be achieved through consistent application of sustainable and appropriate asset management practices which provide:

- Achievable benchmarked levels of asset management maturity, in line with council's objectives;
- Transparent and effective asset management planning and decision-making.
- Infrastructure services managed by council on behalf of our communities that deliver on the overarching principles;
- Minimised lifecycle costs in maintaining the required levels of service at understood and managed levels of risk.

Council expects asset management plans and practices to meet an advanced level of maturity for roads and footpath s, an intermediate to advanced level for water and wastewater services, and a core to intermediate level for stormwater assets.

Quality of Asset Data

The International Infrastructure Management Manual data confidence grading system is used. The following table indicates the level of confidence held in Council's data for roading and water services assets, where the confidence grades have the following meanings:

A. **Highly Reliable** – Data based on sound records, procedure, investigations and analysis which is properly documented and recognised as the best method of assessment. Dataset is complete and estimated to be accurate to ±2%.
B. **Reliable** – Data based on sound records, procedures, investigations and analysis which is properly documented but has minor shortcomings; for example the data is old, some documentation is missing and reliance is placed on unconfirmed reports or some extrapolation. Dataset is complete and estimated to be accurate to ±10%.
C. **Uncertain** – Data based on sound records, procedures, investigations and analysis that is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data is available. Dataset is substantially complete, but up to 50% of data is extrapolated and estimated to be accurate to ±25%.
D. **Very Uncertain** – Data based on unconfirmed verbal reports and/or cursory inspection and analysis. Dataset may not be complete, and most data is extrapolated or estimated. Dataset accuracy of ±40%.
E. **Unknown** – No data, or very limited information, held.

The effect of data confidence on individual asset groups on the financial forecasts is defined as follows:

- Nil – no effect
- Minimal – data quality has approximately ±5% impact on budgets for this item
- Minor – data quality has ±15% impact on budget impact on budgets for this item
- Moderate - data quality has ±25% impact on budget impact on budgets for this item

Asset Group	Asset Register	Replacement Costs	Asset Lifecycle	Condition Grade	Data Confidence Effect on Forecast	Source of Rating
Land	B	B	N/A	N/A	Nil	
Sealed Road Surfaces	A	A	A	A	Nil	Condition rating, and high speed data collection undertaken every 3 years
Sealed Pavement Structures	B	B	A	B	Minimal	Condition rating, high speed data, and falling weight deflectometer testing undertaken every 3 years
Unsealed Roads	A	B	B	B	Minimal	Annual inspections, and annual roughness survey
Drainage Assets	B	B	B	C	Minor	Visual inspection
Footpaths	A	A	B	A	Minimal	Annual roughness survey
Signs & Railings	B	A	B	B	Minimal	Visual inspection
Bridges and Structures	B	C	C	B	Moderate	Visual inspection
Streetlights	A	A	B	A	Nil	Independent electricity supplier audit of asset data
Water Supply						
Plant (Treatment) Assets	B	C	C	C	Moderate	No site validation for last 5 years
Non-Pipe Assets	B	B	C	B	Minor	Visual inspection
Pipe Assets	B	A	B	C	Minor	Review of historic records
Wastewater						
Plant (Treatment) Assets	B	C	C	C	Moderate	No site validation for last 5 years
Non-Pipe Assets	B	B	C	B	Minor	Visual inspection
Pipe Assets	B	A	B	B	Minimal	CCTV and review of historic records
Stormwater						
Non-Pipe Assets	B	B	B	B	Minimal	Visual inspection
Pipe Assets	B	A	B	B	Minimal	Review of historic records

Table 9.1.2 Data Confidence

Data Improvement Plan

Council acknowledges there are limitations with the asset and remaining life data that affect decision-making. Council will continue to undertake the following activities to ensure accurate data is available to support robust decision making:

- Update condition assessments for all assets which have not been reviewed in the past 3 years.
- Implement 3 yearly condition assessment programmes for samples of all asset groups.
- Review asset life assumptions annually based on condition, construction date, existing age, and historical replacements.
- Use non-destructive and destructive materials testing programmes to inform advanced deterioration modelling.
- Populate asset data for fields where age, or material is unknown.
- Use water balance reporting in assessing network-level performance for the council's water supply schemes. Implement additional tools to provide greater access and visibility of SCADA datasets for operations management and planning.
- Undertake advanced deterioration modelling for the water reticulation network, sealed surfaces and pavements, unsealed roads, and footpath assets. Implement deterioration modelling for bridge assets.
- Update hydraulic models to include new developments, residential zoned land, and growth forecasts.
- Review asset inventories for completeness during site inspections.
- Collect and record demand data.

In addition to continuing the above tasks, flow meters will be installed within the water network to improve capacity information. Sensors will be placed in wastewater discharges to provide real time reporting of discharges.

Section 2 – What is Changing

Change is constant, and council regularly reviews the factors that influence the future demands on infrastructure, and opportunities to deliver services differently as part of the development in the development of each three year review of the Infrastructure Strategy.

The changes that are influencing how council plans for future infrastructure needs have been grouped into six areas:

- Government policy direction and legislative changes
- COVID-19
- Environmental influences
- Climate change and sustainability
- Resilience
- Change in demand

Government Policy and Legislation

There are a number of national policies and plans, and legislation which set the scene for Council's 30-year Infrastructure Strategy. This infrastructure strategy documents Central Otago District Council's response to these national policies, plans, and legislation.

Three Waters Review

The Government is reviewing how to improve the regulation and supply arrangements of drinking water, wastewater and stormwater (three waters) to better support New Zealand's prosperity, health, safety and environment. Most three waters assets and services, but not all, are owned and delivered by local councils.

The Three Waters Review is a cross-government initiative led by the Minister of Local Government. The Review, beginning in mid-2017, ran in parallel to the latter stages of the Government Inquiry into Havelock North Drinking Water, which was set up following the campylobacter outbreak in 2016. Up to 5500 people were ill as a result and four people are thought to have died from associated causes.

The initial findings of the Review were consistent with many of the Havelock North Inquiry's findings, and raised broader questions about the effectiveness of the regulatory regime for the three waters, and the capability and sustainability of water service providers.

Effective three waters services are essential for our communities.

Our health and safety: depends on safe drinking water, safe disposal of wastewater and effective stormwater drainage.

Our prosperity: depends on adequate supply of cost effective three waters services for housing, businesses and community services.

Our environment: depends on well managed extraction of drinking water, and careful disposal of wastewater and stormwater.

Drinking Water Regulation

In August 2019 Government approved a suite of regulatory reforms to help ensure safe drinking water, and deliver improved environmental outcomes from New Zealand's wastewater and stormwater systems. The new regulatory framework for drinking water will include:

- an extension of the regulatory coverage to all drinking water suppliers, except individual household self-suppliers;
- a multi-barrier approach to drinking water safety, including mandatory disinfection of water supplies, with exemptions only in appropriate circumstances;
- stronger obligations on water suppliers and local authorities to manage risks to sources of drinking water; and
- strengthened compliance, monitoring and enforcement of drinking water regulation.

- While regional councils will remain the primary regulators for the environment, there will be stronger central oversight of wastewater and stormwater regulation, including:

    - requirements for wastewater and stormwater operators to report annually on a set of national environmental performance measures;
    - national good practice guidelines for the design and management of wastewater and stormwater networks; and
    - monitoring of emerging contaminants in wastewater and stormwater, and coordinating national responses where necessary.

The Taumata Arowai – Water Services Regulator Act was initiated in September 2019 and was passed in July 2020. This establishes the new drinking water regulator, Taumata Arowai, as an independent Crown entity. As a standalone regulator, Taumata Arowai will have a high degree of focus and independence to strengthen New Zealand's regulatory regime for drinking water. It will also contribute to fresh water outcomes by providing central oversight and guidance for the sector's wastewater and stormwater regulatory functions.

The Water Services Bill was introduced into the House in July 2020 and is expected to be passed in the second half of 2021. Key changes that have been introduced in the Water Services Bill are:

1. There will be a new compliance and accountability regime. All water suppliers, including Council, will have to be accredited to supply drinking water. This means that documented systems, policies, and processes will need to be developed. These will then need to be monitored and audited to a significantly higher standard than currently occurs.

2. There will be an increased range of suppliers that will be regulated. The proposal is that all supplies other than domestic self-suppliers will be regulated. All suppliers will be required to provide safe drinking water, and local authorities will be responsible for ensuring access to safe drinking water for communities in their districts. This will place a much greater level of responsibility on Council for knowing what the supplies are, monitoring them, and providing support for them to meet the new regulatory requirements. Changes to the Local Government Act 2002 are included as part of the water service bill.

   Small suppliers will have up to five years to comply. The proposed legislation will require local authorities to provide safe water to communities where this cannot be achieved by the existing suppliers.

3. Council will also be required to work with key parties to manage risks to drinking water sources. This currently occurs now for Council operated supplies but is likely to be a more broader role in the future to include what are currently privately delivered schemes.

4. There will also be targeted changes to the wastewater and stormwater regulatory regime. The objective is to improve performance monitoring and central oversight, and guidance by the new Water Regulator. The Ministry for the Environment will be consulting on national environmental standard for wastewater discharges and overflows.

The Water Services Bill if passed in its current form will require increased resource capacity and capability within Council and its contractors to meet regulatory requirements to be an accredited water supplier, and to collect the required information regarding private water supplies within the district, and provide support to private suppliers.

Three Waters Service Delivery Reform

In July 2020, the Government announced a funding package of $761 million to provide immediate post-COVID-19 stimulus to local authorities to maintain and improve three waters infrastructure, and to support a three-year programme of reform of local government water services delivery arrangements.

While the Government's starting intention is for publicly-owned multi-regional models for water service delivery, with a preference for local authority ownership, final decisions on a service delivery model will be informed by discussion with the local government sector and the work of the stakeholder Steering Committee.

Funding from the stimulus package was provided to councils that signed up to a Memorandum of Understanding, and associated Funding Agreement and Delivery Plan for the first stage of the Three Waters Services Reform Programme. Government has indicated the possibility of further tranches of stimulus funding for councils that continue to work collaboratively with the Government on the water reform programme. Councils that committed to Tranche 1 are able to opt-out of the reform process at later staged if they do not want to continue.

Central Otago District Council signed the Memorandum of Understanding for Tranche 1 of the funding, and received $9.46 million for operational and capital improvements to water and wastewater services. This work is required to be completed by 30 March 2022.

Council was required to complete a Request for Information by 1 February 2021 to enable national analysis of regional models for water service delivery. The amount of information provided is significant, and will be used to provide information to the community later in 2021 regarding the case for change.

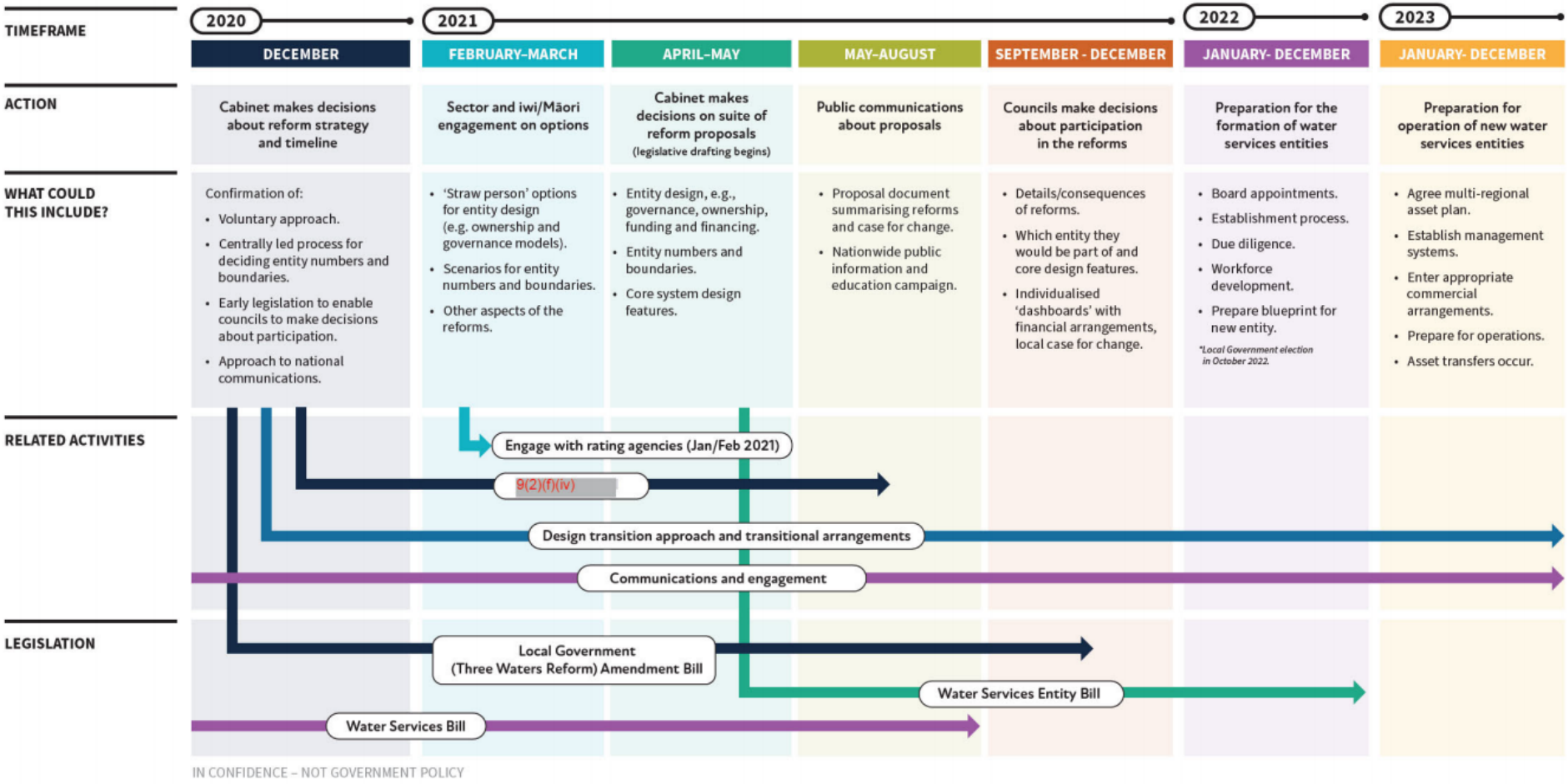
Council expects to consider proposals to continue with, or opt out of participating in further delivery reform proposals in late 2021. If a decision is made to continue to participate then this is likely to come into effect in the 2023/24 financial year.

The community will need three waters services regardless of which entity delivers these in the medium to longer term. The forecasts that have been included in this Infrastructure Strategy reflect an assessment of the work that will be required to be undertaken.

Government has indicated that there may be further tranches of funding for councils which continue in the reform process, and that the new entities will commence operation in mid-2022 prior to local government elections.

Three waters services delivery reform programme

Proposed reform strategy and timeline



IN CONFIDENCE – NOT GOVERNMENT POLICY

The water reform program is creating significant uncertainty regarding responsibility for delivery of three waters services beyond year 3 of the 2021-31 Long-term Plan. If Council is not directly responsible for three waters in the future, these services will still need to be delivered by publicly owned entities, which Council may have an ownership interest in.

The 30 year programme of work that has been developed for the 2021 Infrastructure Strategy identifies the programme of work that is required to be undertaken to meet the required standards, community expectations and growth, and funded, regardless of ownership structure.

The investment programme has been funded based on what is most important to deliver these services to the community in the face of a changing world. Council has followed advice from the Taituarā Managers, in preparing this Infrastructure Strategy.

Essential Freshwater Work Programme

In 2018 the Government announced its plan to restore and protect New Zealand's freshwater. The plan's objectives are to:

- stop further degradation of New Zealand's freshwater resources and start making immediate improvements so that water quality is materially improving within five years
- reverse past damage to bring New Zealand's freshwater resources, waterways and ecosystems to a healthy state within a generation, and
- address water allocation issues, by working to achieve efficient and fair allocation of freshwater resources, having regard to all interests including Māori, and existing and potential new users.

The Essential Freshwater package introduces new rules and regulations to:

- stop further degradation of New Zealand's freshwater resources and improve water quality within five years
- reverse past damage and bring New Zealand's freshwater resources, waterways, and ecosystems to a healthy state within a generation.

New National Environmental Standards for Freshwater and a new National Policy Statement for Freshwater Management came into force on 3 September 2020.

The National Policy Statement for Freshwater Management 2020 provides direction on how local authorities should carry out their responsibilities under the Resource Management Act 1991 for managing fresh water. It also provides for amendments to the Resource Management Act 1991 to give effect to Te Mana o te Wai in regional policies, plans and decision-making.

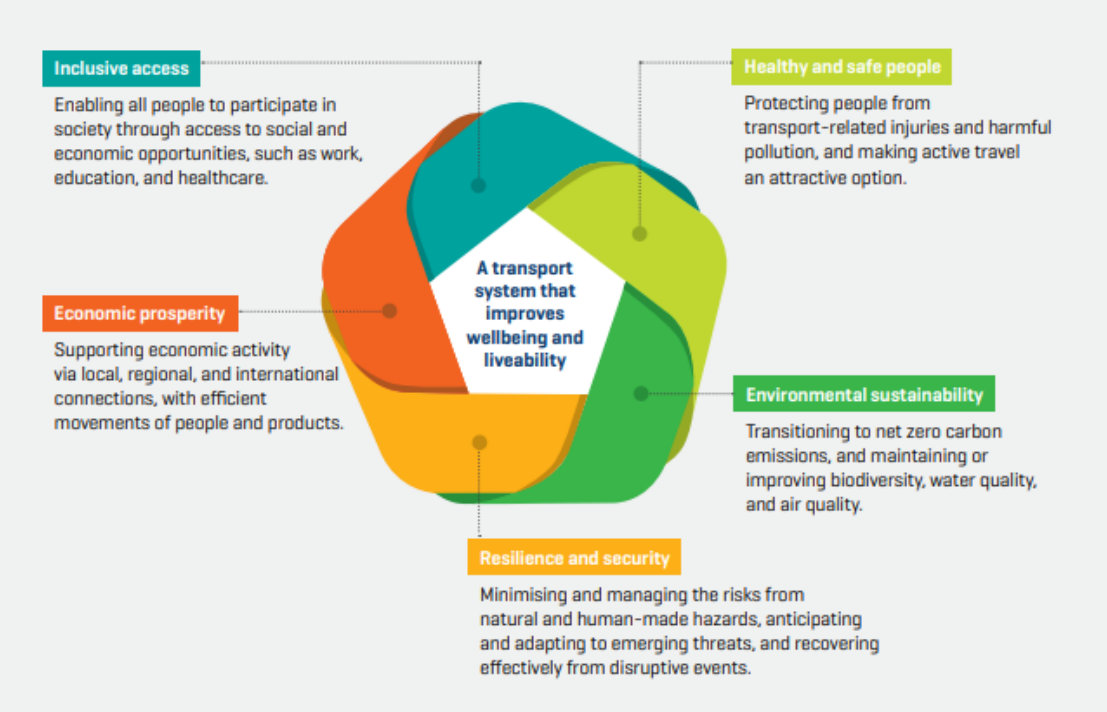
There are six principles of Te Mana o te Wai, which place obligations on every organisation managing freshwater resource to prioritise:

- The health and well-being of water resources (Mana whakahaere)
- The health of the people of New Zealand (Kaitiakitanga)
- The ability of people and communities to provide for this health and well-being (Manaakitanga);
- Governance;
- Stewardship;
- Care and respect for freshwater by all New Zealanders.

Government Policy Statement on Land Transport

The Government Policy Statement on land transport 2021/22 – 2030/31 sets out how money from the National Land Transport Fund is allocated towards achieving the Government's transport priorities. It sets out ranges for funding for activities such as public transport, state highway improvements, local and regional roads and road safety. Each Government Policy Statement sets out the priorities for the following 10-year period, and is reviewed and updated every three years.

Government investment for the 2021/22 – 2030/31 period will be guided by four strategic priorities of safety, better travel options, climate change, and improving freight connections. The four strategic priorities are supported by a Transport Outcomes Framework.



National Infrastructure Strategy

New Zealand's Infrastructure Commission – Te Waihanga, is an autonomous Crown entity that was established on 25 September 2019. The Infrastructure Commission seeks to lift infrastructure planning and delivery to a more strategic level and by doing so, improve New Zealanders' long term economic performance and social wellbeing. The Infrastructure Commission will produce a 30 year infrastructure strategy in 2021 to replace the government's 2015 30 year plan. This will take long-term trends into account, such as climate change, new technologies, and demographic change.

The Infrastructure Commission is also developing the Infrastructure Pipeline to give the market a better view of the timing, sequencing and scale of future credible and committed infrastructure projects. This includes information regarding central and local government work programs, and will enable the industry to plan ahead and enhance co-ordination of resources, capability, and capacity.

Community Well-beings

The Local Government (Community Well-being) Amendment Act was adopted in May 2019. This provides for local authorities to play a broad role in promoting the social, economic, environmental, and cultural well-being of their communities, taking a sustainable development approach. The well-beings have been incorporated into a review of the Central Otago Community Outcomes, which are detailed in Section 3.

COVID-19

COVID-19 was an unplanned event that has had significant social, cultural, and economic implications. The full extent of these implications are not yet known, but there are already changes in the lifestyle choices of New Zealanders, work patterns, and work locations that will have some impact on future delivery of infrastructure services.

Because Central Otago does not have significant commercial centres, the relocation of workers to residential areas will have minimal impact on overall demand for three waters services. There may be some changes in the timing of peak demand during the day if there are larger numbers of people who continue to work from home.

Central Otago is a popular domestic holiday location. The increased focus on personal health and wellbeing, and increased interest in cycling following COVID-19, combined with the development of the New Zealand Cycle Trail network may see increased numbers of locals and visitors cycling within the district. Provision has been made in the 30 year work programme to undertake projects to improve cyclist connectivity and safety between town centres and the significant cycle trails in the district.

Significant economic stimulus funding for construction projects has been provided to Queenstown Lakes District Council which will place pressure on local construction resources. Residential sales are still buoyant, and subdivision construction is still occurring across the region. Demand for contractors is high heading into the 2021-31 Long-term Plan period, and this is expected to result in higher construction costs for projects. Budgets for projects in the first three years of the programme have been adjusted to recognise this. Demand for limited engineering and construction resources are expected to extend across the initial 10 year period of the infrastructure strategy as a large infrastructure investment programme commences across the public asset portfolio.

Environmental Change

Societies expectations regarding mitigation of environmental impacts from infrastructure services has increased over the past decade. Practises that occurred in the past are no longer environmentally, socially or culturally acceptable or tolerated by the community.

This change is supported by government freshwater reforms, supporting legislation, changes to regional policies and plans, and increased compliance reporting and monitoring. Aside from the moral obligations to improve environmental outcomes, and reduce carbon emissions, there are levies and penalties being applied encourage improved performance.

Cost associated with activities which contribute to carbon emissions will continue to increase in the future. This includes the costs to dispose of sludge and screenings from wastewater plants to landfill as national increases to waste levies and the emissions trading scheme are implemented.

Increased treatment costs will occur to upgrade wastewater treatment plants to meet new freshwater standards, and to maintain these more technologically advance treatment processes.

A higher level of scrutiny of compliance with national and regional standards and consent conditions is occurring. Council is required to meet the increased monitoring costs of the regulatory authorities which undertaken this work, as well as meet its own costs of increased compliance testing, monitoring, and reporting.

Climate Change

Council commissioned Bodeker Scientific to undertake analysis and prepare a report of climate change impacts on the Central Otago District in 2017. This includes the scenario under the worst case or highest warming scenario, as well as the implications this may have for the district. The worst-case scenario is based on no behaviour change occurring to lessen the impacts of climate change.

The Otago Regional Council has engaged Tonkin and Taylor to undertake analysis of the expected impacts of climate change on the wider Otago Region. The implications of climate change on Central Otago presented in the Tonkin and Taylor report are similar to those in the Bodeker Scientific report. Council staff have also worked with the Otago Regional Council and other Otago councils to identify critical assets and services that will be vulnerable to the impacts of climate change in Otago. The Otago Regional Council has not yet published this work.

The Bodeker Scientific, and Tonkin and Taylor reports provide a common base for long term planning across Council activity areas.

Central Otago District is predicted to warm by several degrees by the end of the century. Total precipitation is not projected to change much in the district, however; the distribution and intensity of rainfall is likely to alter, with a greater likelihood of more frequent extreme rainfall events. These events have occurred infrequently in the past, which provides valuable information regarding the consequences of these events to improve planning for the future.

The potential impacts of climate change for infrastructure include:

- Higher intensity and more frequent extreme rainfall events the headwaters of the Otago lakes, and rivers will lead to increased frequency of flooding in the Clutha and Manuherekia River catchments. This will impact on water supplies due to dirtier water needing to be treated, and flooding of vulnerable bore sites. Affected treatment sites are located at Roxburgh, Alexandra, Clyde, Omakau and to a lesser extent, Cromwell. The Omakau wastewater treatment site is also at risk of flooding from extreme events in the Manuherekia catchment.
- Higher intensity and more frequent extreme rainfall will lead to increased frequency of road closures in locations where roads and bridges are below the flood plain. There is also increased risk of landslides in the Nevis, Danseys Pass, and Beaumont areas, and damage from alluvial fans in the Teviot area. More frequent damage to bridge approaches is expected from flooded rivers, particularly in the Maniototo and Manuherekia areas.
- Increased frequency of drought, particularly in the Maniototo area. This has implications for the resilience of water supply for towns in the Maniototo.
- Higher summer temperatures have implications for fire risk, particularly associated with road maintenance work, and heat stress for workers outside. High temperatures will also cause bitumen to melt, causing damage to sealed roads.
- Storm events during winter may result in very high snowfall - with implications for road availability and management, and access to treatment plants.
- A reduction in the number of winter frost days is likely to see a reduced hazard from ice on roads and freeze thaw issues on unsealed roads.

Council has improving its understanding of the impacts of climate change on infrastructure, and planning to respond to these since the Bodeker Report was commissioned in 2017. Details regarding this response is discussed under the Resilience section.

Sustainability and Carbon Reduction

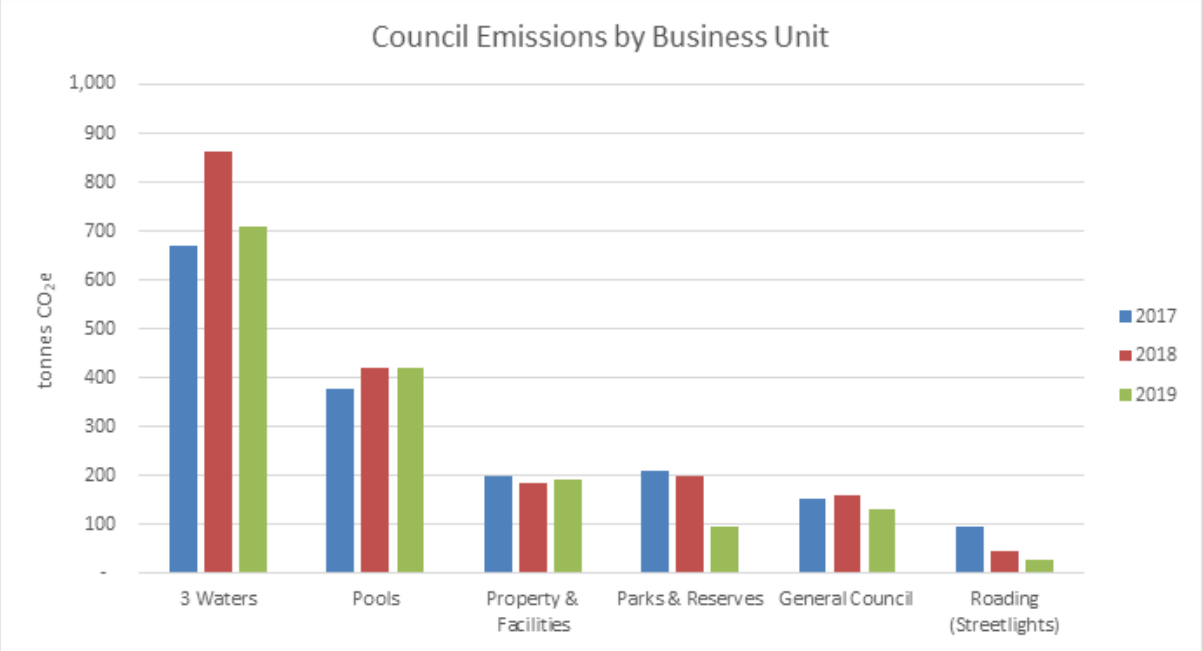
A Sustainability Strategy has been developed and adopted by Council in 2019. The strategy builds on the community outcomes and well-beings and incorporates the United Nations Sustainability Goals. The strategy refines the council's focus on sustainability to issues it directly controls, in the first instance. This acknowledges that improvements can be made. By getting our own house in order first, we can better lead the community in wider sustainability discussions.

An organisational sustainability team was established in 2019 to provide a greater environmental consciousness withing the organisational culture. This group has failed to gain traction during 2020 due to workload and capacity constraints. Increased resourcing capacity in 2020 and 2021 will enable this group to gain momentum in 2021.

Council declared a climate crisis in September 2019.

Council has joined the Toitū carbon reduce certification scheme which measures, manage and reduce it's greenhouse gas emissions. This is a key strategic focus of Council's Sustainability Strategy.

The emission sources that Council is responsible for have been measured for the 2017/18, 2018/19, and 2019/20 financial years. Emissions are broken down into three categories by the Greenhouse Gas Protocol, and by council activity in order to better understand the source. These will be audited prior to July 2021, along with Council's emissions management and reduction plan.



These graphs include the greenhouse-gas emissions from the disposal of sludge, but do not include greenhouse gas emissions from the treatment of wastewater, and the disposal of treated wastewater.

The emissions for three waters will more than double once the carbon implications from treatment processes and wastewater disposal are added.

Projects have been included in the 2021 to 2024 period to change the fuel sources used for Council pools and property to lower carbon alternatives.

Projects to achieve emissions reductions that are included in current and future funding programmes are:

- Replacing gas fired heating at the Cromwell Pool
- Replacing the coal fired heating at the William Fraser Building.
- Replacement of Council vehicles with hybrids and electric vehicles.
- Encouraging walking and cycling
- Reducing water demand
- Reducing waste to landfill, including sludge

A sludge drying facility will be included in the Alexandra wastewater treatment plant upgrade in the 2025-2028 period. This will reduce the volume of sludge that is taken to landfill by a factor of 6.

Funding has been included to enable a public education campaign to be undertaken to reduce water demand. A stormwater infiltration management programme has also been included to reduce demand on wastewater treatment plants.

A significant reduction in electricity consumption for street lighting occurred in 2019 when LED street lights were installed. Council has been supporting the installation of electric vehicle charging stations by enabling these to be placed on Council land. Investment in improved walking and cycling facilities will continue to encourage modal shift.

Council is investing in a glass crushing facility to enable mixed colour glass to be diverted from landfill and used in construction projects. Council specifications for projects support the re-use of this material. Consideration to sustainable practises in construction is also included in the procurement process for Council infrastructure projects.

Resilience

Council prepared an Infrastructure Resilience Plan and an Infrastructure Response Plan in 2020. The Resilience Plan identifies the natural events that will create risks to three waters and roading infrastructure and services, and the likelihood and consequence of these events occurring. The implications of climate change on the frequency and severity of natural hazards was included in the consideration. The implications to infrastructure, mitigations, and response to seismic events is also included in the resilience plan. This included a review of the seismic resilience of bridges.

The actions council is taking to provide resilient infrastructure services, and prepare for climate events is discussed in this section under Resilience and the Reliability section.

A pandemic plan was developed in March 2020 to ensure safe delivery of critical services during the COVID-19 restrictions. All but critical maintenance work to ensure public health and safety was placed on hold during the Level 4 lockdown. Critical maintenance staff, such as treatment plant operators worked in separate bubbles to reduce the risk of transmission across the wider group. Normal maintenance work resumed in Level 3 with hygiene and separation protocols in place. These plans now exist for any future events.

Council has typically managed its infrastructure services from small activity based teams of five staff for each activity. These are small teams relative to those in similar sized councils. 25% of the infrastructure services team is approaching retirement. This combined with the normal staff turnover due to personal factors places a high level or risk on the continuity of delivery of service, and institutional knowledge of the networks.

Council has been undertaking a review of salaries in 2020 to align existing staff salaries with the industry standard for councils in the South Island, and of a similar size to Central Otago. There is a high demand within New Zealand for both experienced and inexperienced engineering professionals. It takes an average of six months to recruit new engineering staff, and bring them on board. These gaps cause significant additional workload on the remaining staff. The alignment of salaries to industry standards has been required to reduce the likelihood of staff leaving to take up more lucrative positions elsewhere. Salary alignment is being supported by organisation culture, staff development opportunities, and improved working conditions to attract and retain capable and experienced staff.

Within New Zealand there is a shortage of water engineers, and the current uncertainty regarding future employment is adding to the difficulty of attracting applicants to roles within the regions. Council will consider alternative delivery contract models for water services in 2021 to ensure there is adequate resourcing to deliver operational and strategic planning needs during the water reform period.

Change in Demand

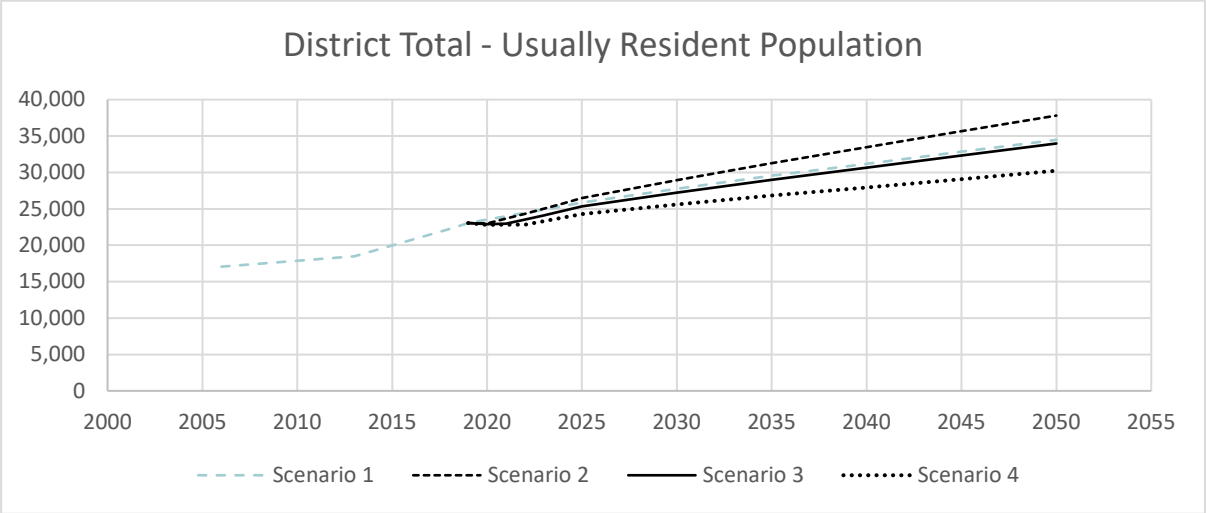
Population and Demographic change

Council's growth model uses the Statistics New Zealand population projections as the basis for forecasting growth in the district. Data Ventures are a branch of Statistics New Zealand that work with cell phone providers to provide near real- time population insights to township. Ward, and district level. This information was made available Central Otago District Council following COVID-19 to help inform the health of the economy and assist in strategic planning. The growth projections were revised in June 2020, and updated again in December 2020.

Projections through to 2050 are made for the following categories:

- usually resident population
- employment
- number of dwellings
- rating units
- visitors

As seen in the graph below, Council has far exceeded the growth expected when the last growth projections were completed in 2016. The previous projections were modelled using Statistics New Zealand projections as a starting point. However, due to the delayed release of the 2018 census data, the somewhat conservative nature of these projections, and their failure to predict the growth that occurred, a new methodology has been used for the 2020 growth projections.



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The 2020 projections have been developed using a bottom up approach. Individual growth drivers for each Statistical Area 2 (SA2), Alexandra and Cromwell have been developed using employment and job growth as the basis of the modelling.

Four growth scenarios have been modelled. These are

Scenario 1 – Business as Usual (Pre COVID-19) - Used as a baseline to compare the other three scenarios. It assumes that there has been no impact from COVID-19 and there is no limit on the number of dwellings that can be constructed.

Scenario 2 – High - Assumes that COVID-19 has a minimal impact on the district. While there are some job losses, the district recovers to a level above the business as usual scenario.

Migration drivers and assumptions are increase by 15% which means more people will move to Central Otago and less people will leave. There has been an allowance for currently zoned land to reach capacity.

Scenario 3 – Medium - Models the expected impact from COVID-19. This assumes that all parameters return to the business as usual prediction by 2025. There is an allowance for capacity constraints of the currently zoned land.

Scenario 4 – Low - models a situation in which COVID-19 has a higher than expected impact on the district, i.e. more job losses, and only recovers to 5% less than the business as usual scenario by 2025.

Migration drivers and assumptions are also reduced by 15% which means less people will move to Central Otago and more people will leave. There is an allowance for capacity constraints of the currently zoned land.

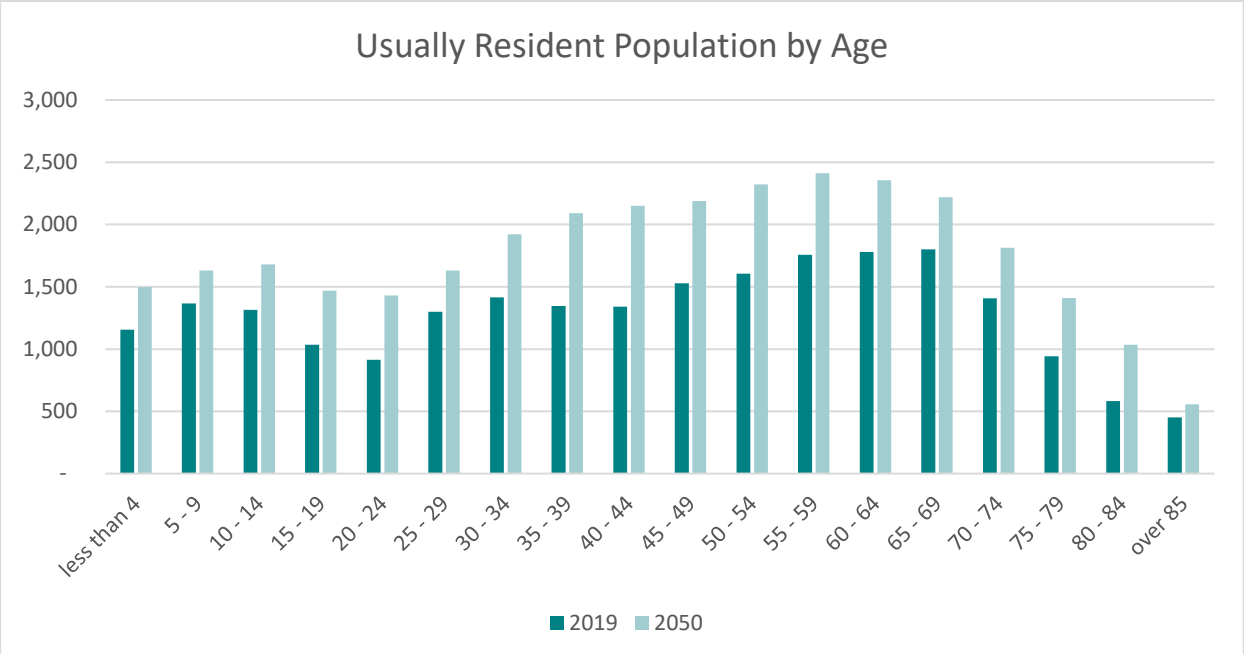
The initial recommendation in June 2020 was that Council used Scenario 3 with six-monthly check-ins to monitor against current data to understand if the anticipated impacts of COVID-19 are occurring, and the progress of recovery. This has been undertaken in December 2020 using data from Data Ventures which is obtained from cell phones and shows that the anticipated drop in population from job-losses has not occurred. The recommended scenario has been amended to Scenario 1.

Scenario 1 projects that the district population will increase by 55% from 22,200 usual resident people in 2018 to 34,474 people in 2050. This equates to an average annual growth rate of 1.3%. The average annual growth rate between 2006 and 2019 was 2.3%, and ranged from 0.6% in the Teviot Ward to 4.4% in the Cromwell Ward.

	2020 Usual Resident Population	2020 Peak Population	2050 Usual Resident Population	2050 Peak Population
District	23,528	45,696	34,474	65,591
Cromwell	9,036	17,375	15,350	27,173
Maniototo	1,697	3,294	1,663	3,873
Teviot Valley	1,225	3,399	1,926	4,943
Vincent	10,938	20,996	15,536	29,604

Table 8.3.1 Central Otago projected population growth 2020 - 2050

The projected demographic profile remains similar, although the cohort of younger people between 15 and 24 who leave the district for other opportunities such as education and employment is less pronounced. There is a high number of older population between 55 and 65 years that move to the area later in their career or for retirement. Elderly people (over 70) leave the area, possibly in search of better healthcare and assisted living options.



The increased older population will affect both the demands on our infrastructure and the affordability of our services to people on fixed incomes in the long-term. An older demographic requires higher levels of service for footpaths and infrastructure that supports accessibility for people with restricted mobility.

We have implemented an innovative method for measuring the level of service on our footpaths. This uses a phone based application that is mounted on a mobility scooter. This records a roughness of the footpath over 5m intervals. This information is mapped, and is used to prioritise work programmes. This ensures that the work programmes are targeted to actual customer experience on the network. Funding has been provided to continue to extend the footpath network, and to ensure that all street crossings have cut down kerbs to enable disabled access to and from footpaths.

Urban Growth

Central Otago District has experienced consistent subdivision growth over the last 18 years. Central Otago, like much of the country has seen property values increase sharply over the past 5 years. Average house values in Central Otago have doubled since 2008 and during the same time period, there has been a noticeable decrease in the average household size with there now being an average of 2.2 people per household.

There is currently no remaining urban-zoned land available for development in Clyde, until the wastewater reticulation project is complete and very little in Cromwell and Alexandra. This is resulting in increased demand in Omakau and Roxburgh where property prices are more affordable.

This has resulted in a number of private plan changes being implemented. The outcome of this is that forecasting of growth areas and the subsequent infrastructure impacts is difficult.

The District Plan is currently under review, and this will include provision of sufficient zoned land to meet the expected demand for the next 20 years.

Council adopted a spatial plan for Cromwell in 2019, and modelling for upgrades in Cromwell is including the planned zone changes, and associated housing density changes. A spatial plan is being developed for the Vincent area, and the ability of infrastructure to meet the different options proposed is being included as part of the spatial plan investigation process.

Financial provision has been made in our resealing programmes for an increase of 850m of sealed roads per annum to the current network due to subdivision.

Other asset growth has been accommodated within the existing operational and renewal budgets, with depreciation being recalculated annually. The duration and extent of subdivision growth and tightening of renewal budgets means that this it is no longer possible to meet the increased work associated with larger networks where there is a direct operational cost for these assets.

Budgets have been increased to provide maintenance on a longer urban sealed network, particularly for routine street cleaning. Further analysis is required to understand the asset and operational cost implications of subdivision growth on the water services assets.

Technology Advancement

Council has embraced technology and it is widely used for quick notification of events such as road conditions and disruptions to service. This technology is also widely used for managing the water, wastewater and roading networks.

Electric vehicle charge stations are being installed across the network. These are often located on Council land but are funded by commercial providers.

The introduction of autonomous (driverless) vehicles will have a significant impact on the way travel is undertaken in the future. For the purposes of this strategy we have assumed that vehicle ownership will continue in rural areas. We expect autonomous vehicles to result in substantial reductions in road crashes and associated deaths and injuries in the longer term. While we recognise that change is coming, no specific provisions have been made in our plans for the introduction of autonomous vehicles. Council will monitor the impacts of this technology on larger metropolitan areas to guide future planning.

The development of technology which provides improved data for decision making is rapidly advancing. This technology is being incorporated into Council's operational activities where appropriate. It is being used to mitigate risk, and to provide data for hydraulic and asset deterioration modelling. It is also used to provide early notification of issues with plant, and weather conditions.

Section 3 - Key Infrastructure Issues

Resilience – Water, Wastewater, and Roads

Over the last decade, Council has undertaken several studies aimed at understanding and improving the resilience of its three-waters and roads networks. The 2020 Resilience Plan collates information from those studies, along with more recent information, to provide a consolidated view of Council's critical assets and risks from hazards. The study also identifies potential mitigations to improve network resilience.

The assessment looked at risks from both a 'hazards' perspective (what are the potential impacts of various hazards) and an 'assets' perspective (what is the consequence of failure of an asset, regardless of cause).

A significant amount of information has been collected as GIS data as part of this study. This information aims to facilitate hazard assessment, such as enabling the overlay of hazard maps (earthquake, flooding, slips) with critical asset maps to identify which assets are most exposed to the hazard. It also assists with rapid response, such as knowing how quickly wastewater will overflow from a pump station in a power outage, which assets are most critical and should be inspected and restored as a priority, and the backup capabilities for communications and power failures.

Many significant weather events have occurred in the District's recorded history causing flooding, wind/snow damage and drought, and climate change is expected to exacerbate these hazards. A number of potential mitigations have been programmed, such as investigating more secure water sources at Roxburgh, Ranfurly, Naseby and Patearoa, upgrading wastewater pump station storage volumes (some only have a few minutes before they overflow if pumps fail) and road flooding mitigations such as upgrading culverts.

It is well known that the earthquake hazard poses a major risk for the district. The recent Alpine Fault Study AF8 confirms that a major Alpine Fault rupture occurs every 300 years (and the last one occurred around 300 years ago) and there are many other local faults. In a major earthquake, it is likely that many roads will be blocked through landslips and the region may be isolated for some time. An improvement action identified is to review the required functions of 'back country' roads that may be needed as alternate routes if highway closures are prolonged, such as in the 2016 Kaikoura earthquake. Additional funding has been provided within the roading programme to enable drainage and metalling to be undertaken on back country tracks.

The water and wastewater pipe networks are highly vulnerable to seismic damage, particularly the older pipe materials such as asbestos cement (as was evidenced in the Canterbury earthquakes). Replacement of the older and most critical pipes, i.e. those that are most likely to fail and cause outages to larger populations, will be prioritised over the next three years.

These hazards will also have secondary effects through power and communications failures. Communication backup arrangements have been established by Council and CDEM, including satellite and radio. However, there is very little existing backup electricity generation capability on Council's water and wastewater networks, with only two mobile generators available. Funding has been included to install permanent back-up generators at Clyde, Roxburgh, and Cromwell bore fields, and at 10 wastewater pump station and treatment sites.

Safety - Water Treatment

Water treatment upgrades are required to meet national drinking water standards on Clyde, Alexandra, Cromwell, Ranfurly and Patearoa, water supplies.

All Council water supplies are chlorinated to mitigate the risk of bacterial contamination such as E. coli. Treatment for virus and protozoa contamination occurs for the Roxburgh supply only. The Roxburgh supply is not meeting the compliance requirements due to sediment from the existing borefield. A project is proposed in 2022 to develop new bores to address this problem.

Work is currently underway on the Naseby supply which will provide protection against protozoa and virus in 2021. Work is programmed in 2020/21 on Omakau, Ranfurly, and Patearoa supplies to enable compliance.

The Lake Dunstan Water Supply Project will continue into 2021/22, and will provide compliant water for Alexandra and Clyde.

Investigation work onto upgrading of the Cromwell treatment plant has commenced, with construction programmed in 2022-2024. The initial investigation work has identified that a lake take is likely to be the most viable option, due to the hardness of the water from the existing borefield.

The budgets for the Cromwell water treatment plant have been increased to provide for a membrane filtration system to be installed, instead of the originally proposed cartridge system. Investigation work for the Lake Dunstan Water Treatment plant identified the presence of the algae lindavia in Lake Dunstan. Trials of different filter systems have identified that the membrane system is the most appropriate to cope with the presence of this algae.

Minimising Environmental Impacts

Completion of construction of stage 1 of the wastewater reticulation on Clyde will continue into 2021/22. The scope of this stage has increased to include connection of 235 properties, instead of the originally proposed 171 properties. This project will improve the quality of groundwater discharges to the Clutha River. It will enable further growth to occur within Clyde on properties which are able to be connected to Stage 1.

Public consultation on the proposal to construct the Clyde wastewater network in three stages identified that many property owners in Stage 3 wish to be connected sooner. The proposed timing of Stage 2 continues to be in 2029, but Stage 3 has now been programmed to be undertaken with Stage 2.

It is expected that there will be increased environmental discharge standards applied to a new resource consents for wastewater treatment sites. Projects to increase treatment processes to improve discharge quality have been programmed for each site prior to consent expiry years. Funding is included in 2021 to undertake investigation into options to reduce nitrogen in discharges from both the Cromwell and Alexandra treatment sites.

The resource consent for the Lake Roxburgh Village wastewater treatment site will expire in 2023. It is expected that there will be increased environmental discharge standards applied to a new consent. The options to address this are to undertake a costly upgrade to the existing treatment site with associated increased operational costs, or alternatively pipe wastewater from Lake Roxburgh Village to the Roxburgh treatment site. Provision has been made to pipe wastewater from Lake Roxburgh Village to Roxburgh in 2022 as this will provide the lowest capital and whole of life cost.

Capacity and treatment process upgrades were programmed at the Alexandra wastewater treatment site for 2029 to provide sufficient capacity to enable stage 2 of Clyde wastewater reticulation to be connected to Alexandra, and to meet existing resource consent requirements for treatment upgrades.

This work has been brought forward to 2024. The existing plant was constructed in the 1980's and there is no redundancy within the process. This means that it is not possible to take the plant offline to undertake mechanical maintenance or renewals without significantly impacting on discharge quality.

Commencing in 2021, funding is provided to progress investigations into the upgrades required at the Alexandra treatment site to meet consent conditions, and options to provide redundancy in the interim. This will enable maintenance work to be undertaken on the existing plant without breaching consent limits.

The alternative would be to continue to accept the risk of unconsented discharge in the increasingly likely event of plant failure.

Council has been phasing out the practise of using oil for dust suppression on gravel roads since 2009. Council has constructed a 100m length of more environmentally appropriate low cost seal (Ecoseal) where there is a house within 100m of a grabel road when undertaking routine gravel renewals. From 2020 oiling is no longer permissible within the Otago Region. Additional funding has been provided in 2021 to Ecoseal the remaining backlog of sites where there is a house within 100m of a gravel road. The alternative would be to use a canola oil product which would provide a significantly higher whole of life cost than the Ecoseal option.

Accessibility in Urban Centres of Cromwell and Clyde

The growth in population, business, tourism, property development, and jobs days is leading to changes in demand for parking, and use of public spaces, potentially eroding the experience for visitors and locals. Traffic, parking, cyclist, and pedestrian volumes within a confined area in Clyde and Cromwell have increased significantly.

The way key streets and lanes are used by people, cyclists and vehicles, and the lack of clarity of the function and purpose of these streets is confusing and potentially unsafe.

The continued development of the New Zealand Cycle Trail route within Central Otago will result in an ongoing growth in cycle tourism and cyclists on the Central Otago Road network. The new trails will eventually provide over 500 kilometres of “destination” off-road cycle trails that connect Queenstown, Wanaka and Cromwell with the existing Central Otago trail network at Clyde. The Lake Dunstan Cycle Trail between Pisa Moorings, Cromwell and the Clyde Dam will be operational in early 2021.

Work proposed in Clyde in the 2018 Long-term Plan has been delayed to co-ordinate this with the wastewater reticulation project. The stage 1 heritage precinct roading work that was planned will be undertaken in 2021. A project is proposed which will see stages 2 and 3 completed in 2021-23 period.

Council has discussed options with Contact Energy to facilitate the safe access of cyclists who finish the New Zealand Cycle Trail network at Clyde, into the Clyde Heritage Precinct. Cyclists are currently required to travel along Fruitgrowers Road along a one lane section of road through an active land slide, and across the single lane Clyde Bridge. A more desirable option would be for cyclists to cross Lake Dunstan near the Clyde Dam, and travel down Sunderland Street into the Heritage Precinct.

There are operational limitations on the use of the Clyde Dam as a cycle route, and an alternative would be to install an electric punt adjacent to the log boom. This would take cyclists across the lake. Funding has been provided to install traffic lights on the Clyde Bridge as an interim measure, and for investigation and then potential construction of an electric punt.

The Cromwell Masterplan is supported by intersection, pedestrian and cycling improvements from 2022. This will improve the flow and safety of traffic, pedestrians, and cyclists within the town centre. A new cycle path along Neplusltra Street will improve cyclist connectivity between the New Zealand Cycle Trail network, Old Cromwell, and the Town Centre.

Capacity of Cromwell Water Network to Meet Growth Demands

Volumetric charging for water was introduced in Central Otago on 1 July 2012. A 30% reduction in water consumption was achieved through volumetric charging. Increase in water demand from population growth in Cromwell has now consumed the original capacity savings that were achieved through the introduction of volumetric charging and demand is now back at the 2012 levels.

The adoption of a spatial plan for Cromwell in May 2019 provides a basis for reassessment of the future water capacity needs for Cromwell.

Projects to improve water treatment, operational performance, and distribution of water to Bannockburn and Pisa are included in the Long-term Plan. These projects include additional capacity to meet future population growth.

Further investigation is required now that the spatial plan has been adopted to ensure that the distribution network and storage provisions for Cromwell township meet future growth demand. Hydraulic modelling will be undertaken in 2021 to inform project planning for pipe replacements and reservoir upgrades. A project has been included in 2027/28 to upgrade pipe sizes and provide increased reservoir capacity.

Stimulus Delivery Programme

The $9.46 million that Central Otago District Council received from Tranche 1 of the Water Stimulus Funding has enabled $5.49 million of projects that were in years 2022 to 2027 of the 2018-28 Long-term Plan to be brought forward. This work is required to be completed by 30 March 2022.

$6.7 million of Tranche 1 of the Water Stimulus Funding is being spent on water projects. This includes $3.8 million for increased reservoir capacity at Alexandra and Naseby, and $2.9 million for resilience upgrades to replace old falling mains, protect the Roxburgh Treatment Plant from scour damage, and improve water pressure at Omakau and Roxburgh.

$1.8 million of the Tranche 1 funding is being spent on increasing the capacity of the Melmore Terrace and Alpha Street pump stations in Cromwell, and on providing a separate pipe between the Tarbert Street pump station and the Alexandra wastewater treatment plant. The Tarbert Street pump station currently pumps to the Dunorling Street pump station, and then across the Manuherikia River to the Alexandra Treatment Plant. Increased resilience will be achieved by separating the two pump stations, as either can then operate independently of the other.

While no commitment has been provided by Government to further tranches of funding, it is anticipated that a funding package will form part of the discussion regarding councils continuing to participate in the reform process. If this occurs, then Council needs to be ready to bring forward further work within the Long-term Plan. Funding has been provided in year one of the 2021-31 Long-term Plan to undertake the necessary investigation work on a number of water and wastewater projects that are in years four to ten of the programme. If further Government funding becomes available then these projects will then be ready to be brought forward,

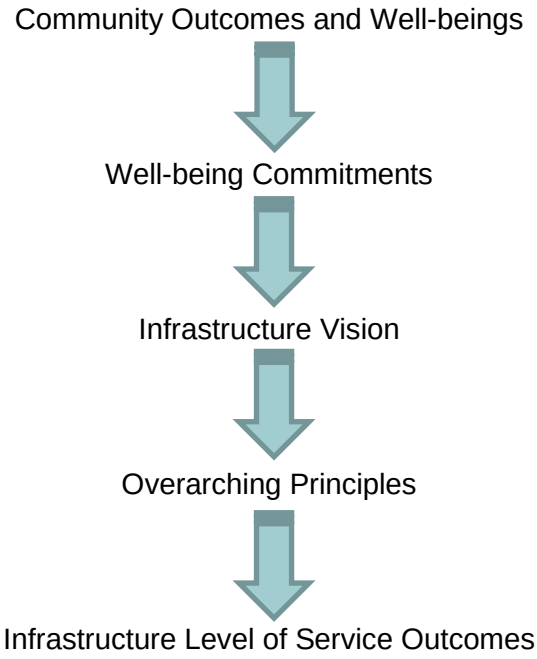
A further $8.7 million of water projects could be brought forward if further funding becomes available. This includes construction of a dedicated rising main for Cromwell, increased capacity in the Bannockburn pipeline, construction of the Pisa reservoir and pipeline, Gilligans Gully upgrade, separation of irrigation connections from treated supplies to increase capacity, construction of reservoir bypass tanks to improve operational efficiency, and installation of back-up generators at Clyde, Roxburgh, and Cromwell.

Increased storage capacity is required at a further five pump stations to provide a minimum of eight hours storage. A project costing $3.6 million to complete this work can be brought forward if further stimulus funding becomes available.

Section 4 – Strategic Priorities

Central Otago infrastructure services are delivered within a framework of strategic objectives. This enables the alignment of strategic priorities across multiple activity and asset groups. This framework ensures that the understanding of need is the same between asset managers and governance decision makers, and that the work that is planned underpins the strategic direction set by Council and the community.

This strategic framework is:



The community outcomes, well-being framework, infrastructure vision, overarching principles, and level of service outcomes have been reviewed and revised by Council in 2020.

Central Otago Community Outcomes and Well-beings

Central Otago District Council community outcomes have been changed in 2020 to incorporate the four well-beings. These reflect the community values that have been expressed during different engagement processes in the 2018-2020 period.

Connected community	Thriving economy	Sustainable environment
Sense of community (caring, relaxed small-town feel, 'together-ness')	Vibrancy of town centres and local businesses	Outdoor recreational opportunities (water-sports, hunting, dark skies, etc.)
Welcoming and family-friendly	Managed growth (in line with community values)	Natural environment (open spaces, landscapes and vistas)
Peaceful	Visitor destination	Clean lakes and rivers
Rural feel	IT connectivity	Cycling and walking tracks
Enabling connections through quality services (e.g. internet, transport)	Protection of productive lands	Protect our unique heritage

Central Otago Well-being Commitments

Council has identified a series of commitments to deliver the well-being aspirations of the community. The commitments which are enhanced by infrastructure delivery are shown coloured.

Council's Commitment to Our Community Outcomes		
1. Provide community facilities that are fit for purpose and cost effective.	**2. Develop a masterplan that encourages urban growth to revitalise the town centre and protect productive land and rural settlements.**	**3. Protect and enhance the landscape and environment by advocating the Central Otago World of Difference values.**
4. Support newcomers to the district and encourage events and projects which celebrate inclusive communities.	5. Uphold the District Plan to ensure that the effects of using, developing and protecting the districts natural and physical resources will be managed in the future.	**6. Profile and reduce Council's environmental footprint, and manage environmental impacts through the District Plan.**
7. Provide contestable funding for community-driven initiatives, experiences and events that promote local and visitor well-being.	**8. Support and encourage a business-friendly community.**	**9 Invest in Council infrastructure to renew plant when needed, to accommodate population growth, and to meet environmental and health standards.**
10. Advocate for improved connectivity and infrastructure across the district, to support community resilience.	11. Encourage visitors to the region to create value to our communities.	**12. Work with other agencies to improve health and water standards in the district.**
13. Advocate for improved mobile coverage and broadband rollout.	14. Encourage high-value visitor experiences in this district, through the provision of a mix of products/experiences that is matched to both community aspirations and the needs of our target markets.	**15. Continue to develop culture and heritage opportunities in the district.**

Infrastructure Vision and Overarching Principles

The vision for Infrastructure is:

We will deliver infrastructure services that support our community

The vision is supported by six overarching principles which underpin all decisions relating to delivery of infrastructure services.

The overarching principles are to deliver infrastructure services which:

- Represent value for money and are affordable;
- Are integrated, consistent, and fit for purpose;
- Are environmentally conscious;
- Are reflective, innovative, and forward thinking;
- Meet legal requirements,
- Are equitable for current and future generations.

Value for Money and Affordability

Value for money and whole of life cost is considered in determining the best option to address maintenance, renewal, and improvement work. Council uses advanced deterioration modelling of sealed roads and pavements, gravel roads, water pipes, and footpaths. This identifies the optimal mix of maintenance and replacement budgets and work programmes for these assets.

Advanced asset management tools require complete and accurate asset data to produce robust outputs. Council invests in the collection of data for roading and below ground three waters assets to ensure that accurate outputs can be produced.

In the past five years council has been investing in improving asset data for water services. This has included:

- implementing a new asset management system (Assetic);
- closed circuit television (CCTV) inspections of the wastewater pipes;
- laboratory sampling of water pipes;
- hydraulic modelling of the council's water and wastewater reticulation schemes, with focus on the modelling needed to support growth in Alexandra and Cromwell.

Integrated, Consistent, and Fit for Purpose

District wide funding is applied to all core infrastructure activities. All properties that receive Council three waters services pay the same rates for these activities regardless of their location. All properties pay for roads and footpaths.

District wide funding has enabled Council to undertake work where it is needed, when it is needed, and to set a consistent level of service for infrastructure across the district. This is providing improved value for money, and improved affordability of services.

Levels of service are set to meet the legal and resource consent requirements for treatment of three waters. Roading levels of service are set based on the national One Network road classification framework. Levels of service for capacity, and response to failures for all infrastructure services are based on the criticality of the service. This is largely driven by the numbers of people impacted by the failure.

Environmentally Conscious

Council expects all decisions made in regards to delivery of infrastructure to be environmentally conscious, and consider the environmental implications as well as the financial and level of service implications. Council's goal is to meet all environmental consent requirements, and to minimise the impacts that infrastructure services have on the environment.

A consents management system was implemented in 2019. This system allows Council staff to access, manage, and ensure compliance with conditions from Otago Regional Council and other organisations. This tool also increases awareness of the range of environmental conditions that need to be managed as part of the Council's infrastructure service delivery.

The structure of Council's Water Services Team has been changed in 2020 to enable a greater level of management and oversight to three waters activities. This includes providing a dedicated consents compliance and monitoring role and increased strategic planning, and operations management capability and capacity to the team. This will increase council ownership of environmental impacts from three waters activities. This will also enable proactive renewals and maintenance work to be undertaken to reduce environmental impacts from unplanned outages and asset failure.

The 2021 Infrastructure Strategy provides funding to increase storage capacity and emergency generators at wastewater pump stations. Funding has been provided to install devices which provide real-time in-flow measurements on all wastewater discharges from treatment sites and improve screening of material entering wastewater treatment. Significant funding has been provided for investigation of improved treatment processes at the Alexandra wastewater treatment site. This includes investigation, resource consent renewal, design and construction commencing in 2025. Funding for investigations into options to reduce nitrogen loadings from wastewater discharges has also been provided in 2021.22.

Reflective, Innovative and Forward Thinking

Central Otago District Council has the second lowest cost roading network in New Zealand. This has in part been achieved through a culture of reflection, and making changes in practises to improve service based on customer feedback and learnings. An all-inclusive, collaborative contracting model has been in place on roading since 2009, and this has provided a culture where ideas and innovative practises have been encouraged from both the contractor and council staff. These are then trialled and rolled out where they are proved to add value.

The three waters maintenance contract is a traditional contracting model with lump sum and unit rate payment methods. This contracting model, combined with management capacity challenges has resulted in less innovation in the delivery of three waters maintenance. Council will consider the potential for improvements from changes to the form of the contracting model in 2021.

Three waters capital improvements have been delivered separately to the maintenance contract. Significant investigation work is undertaken on large capital improvement projects to ensure that innovative designs can be implemented, while still managing risk. A variety of contracting models, including design build and maintain, collaborative, and traditional are being used. The procurement model selected for each project depends on the understanding of risks and cost-effective allocation of these, and the capability and capacity of the contracting market to deliver the work. A review of projects is occurring during and after final delivery to enable learnings to be incorporated into future projects.

Infrastructure planning involves the regular review of development and forecasts relating to technological advancements, government policy direction, society attitudes, population and demographic changes, and environmental and climate change and science. Council infrastructure staff participate in national workshops and meetings, regional work groups and attend industry presentations to ensure they are informed of changes and advancements in infrastructure delivery.

Meet Legal Requirements

Council has had a programme of water treatment upgrades underway since 2018, with the goal of having all schemes fully compliant with the New Zealand Drinking Water Standards by 2023. There have been delays in the delivery of projects in the 2018-2020 period due to unexpected issues being identified with the source water. This has required further investigation work, and changes to the proposed treatment processes. While the initial projects will be completed later than initially proposed, it is expected that all the supplies will still be compliant by 2023.

Additional staff resources have been provided to enable full compliance with all consent monitoring and reporting requirements. Investment has also been provided to enable upgrading of wastewater pump stations to ensure emergency storage and power supply is provided to avoid unconsented discharges.

Equitable for Current and Future Generations

One of the biggest challenges a council faces is balancing its community's ability to pay, with the need to maintain infrastructure and deliver services. The COVID-19 pandemic has added to this challenge. Council aims to keep rates and charges affordable for current and future generations. At the same time, Council needs to focus on building community resilience, supporting economic development and promoting opportunities for growth that ensures our community is sustainable into the future.

To ensure that we continue with a balanced approach, we keep the two guiding principles of affordability and sustainability at the forefront of how we develop our infrastructure and financial strategies.

The desired outcome of this strategy is that Central Otago District Council's asset base and operational expenditure are managed in a cost-effective manner and continue to be funded in a manner that is sustainable for current and future generations.

Council rates for the majority of its depreciation, which is held in reserve to be spent on replacement assets and the payment of borrowings required to fund these assets. All roading and three waters infrastructure renewals are funded by depreciation reserves.

Council may also choose to loan or rate-fund replacement assets if there is insufficient depreciation reserves.

Council has not previously rate-funded depreciation for bridge renewals, so there is limited reserves set aside for the programme of bridge renewals in the 30 year infrastructure strategy. Ratepayers are being asked to fund the increased depreciation costs that result as well as the interest cost for the use of money in the early years of the programme. Because bridges are long life assets, external loan funding may be appropriate. Council has the capacity to borrow further in terms of its limit to total assets.

Increased level of service for significant capital works is primarily funded by loan. These loans will typically be for no longer than 30 years and funded either internally or externally dependent on the availability of cash reserves. Taking a loan in this instance means that future users of the asset help to pay for it over the asset's lifespan and current ratepayers are not burdened with the full cost.

To ensure council manage the cost of borrowings to mitigate unnecessary costs to the capital programme, Council consulted with the community in the 2020-21 Annual Plan and has joined the Local Government Funding Agency.

As part of the consultation on the 2018-28 Long-term Plan it was decided that all properties connected to the Clyde Wastewater project will pay a connection fee. For stage one this is $10,000 and will be paid either as a one-off payment in full or spread over ten-years with a 5% interest charge per annum.

When replacing or putting in new assets Council will consider whether to build the asset to cater for future growth. This may mean, for example, putting in a larger pipe than is needed for today's use to accommodate additional users in the future. Developers contribute to the capacity upgrades on existing infrastructure networks to service growth through payment of development contributions. This money is put in a reserve and used for the growth portion of capital projects.

Typically building additional capacity for growth in a network precedes the actual growth demand. The growth portion of the capital programme is funded through development contribution reserves. In most instances these reserves for growth typically run as deficits attracting interest that are in turn funded by development contributions.

Infrastructure Level of Service Outcomes

The Infrastructure Strategy sets a common level of service framework for all infrastructure activities. Levels of service are both defined and measured against the following outcomes:

- Safe and healthy.
- Accessibility.
- Resilience and reliability.
- Aesthetics (amenity and comfort provided for customers).
- Sustainability.

Safe and Healthy

This requires infrastructure which supports a safe and healthy community, and ensure the safety and wellbeing of our workforce.

Council will:

- maintain and operate our infrastructure in a safe condition;
- provide guidance on safe use and warn of hazards;
- adopt the appropriate level of risk for our services.

Safe and healthy infrastructure is provided through ensuring that our roading network is safe to use for all modes, support heathy transport choices, provide streetlighting and street layouts that promote safe communities, safe water supplies, and wastewater treatment and discharges that support community health and wellbeing.

Projects are included in the 2021 Infrastructure Strategy to improve the safety of water supplies, reduce the risks of wastewater overflows to waterways from pump stations, increase the level of wastewater treatment on all plants, and to improve road safety.

Our objective level of service	How we measure success	Our aim
Provide a safe and healthy roading network	Change from previous year in number of fatalities and serious injury crashes on local roading network	Stable or decreasing trend
Provide a safe and healthy roading network	The percentage of footpaths that fall within the Council's level of service standard for the condition of footpaths	> 70%
Provide a safe and healthy water network	Compliance with the NZ Drinking Water Standards	
	Part 4: Bacterial Compliance	All schemes to comply
	Pt5: Protozoal:	Part 5: Protozoal compliance Omakau to comply 2022 Naseby to comply 2022 Alexandra/Clyde (Lake Dunstan Water Supply) to comply 2022 Patearoa to comply 2023 Ranfurly to comply 2023 Cromwell/Pisa to comply 2023
Provide a safe and healthy wastewater network	Compliance with discharge consents	Nil abatement notices, infringement notices, enforcement orders, and convictions
Provide a safe and healthy wastewater network	Number of dry weather sewerage overflows from sewerage scheme	Number of dry weather sewerage overflows ≤ 1 per 1,000 connections
Provide a safe and healthy work environment	No loss time injuries by contractors and staff.	Nil

Accessibility

Accessibility relates to the ability and ease of accessing our infrastructure networks and services.

Council will:

- Manage infrastructure assets and services to ensure accessibility for users wherever possible;
- Provide customer-focussed processes for those requesting access.

Road accessibility includes all modes of transport, access to land, heavy vehicles accessibility, and access for services, and public events for social and cultural well-being. Water and wastewater accessibility includes connection to Council managed and maintained supplies where this is practical.

The water, wastewater and stormwater networks have been designed to supply properties within the designated supply areas. Council has hydraulic models for the existing water and wastewater networks. Further modelling is underway to understand the implications on water and wastewater networks from the adopted Cromwell spatial plan, and for the options identified for the proposed Vincent spatial plan.

Projects to provide increased capacity, and accessibility are included in the 2021 Infrastructure strategy. This includes extensions to the water and wastewater networks, treatment capacity upgrades, and road capacity upgrades in Clyde and Cromwell town centres. Proposed bridge upgrades will improve accessibility for heavy vehicles. There are a number of roading projects designed to improve accessibility for pedestrians and cyclists. Increased investment has been provided to improve the level of service on the lowest classification of roads (tracks), which will improve accessibility to back country areas.

Our objective level of service	How we measure success	Our aim
Provide a fully accessible roading network	Average length of time to issue a consent for access to a road	≤ 2 days
Provide a fully accessible roading network	The percentage of footpaths that fall within the Council's level of service standard for the condition of footpaths	> 70%
Provide a fully accessible roading network	Length of roading network not available to class 1 vehicles	4.7%
Provide an accessible water network	**Total number of customer complaints for:** Water clarity Water taste Water odour **Water pressure and flow** Continuity of water supply Responses to water service requests	≤ 13 per 1,000 connections
Provide efficient water and wastewater networks	Average length of time to issue a consent for access to a road	≤ 5 days

Resilience and Reliability

This relates to the consistency of service that users can expect under both normal operating conditions, and during emergency or extreme weather events. It also includes provisions for restoration of service following an event and alternative service, and public information.

Council will:

- Provide increasingly consistent levels of service
- Advise customers and keep them informed of interruptions to service, and when service will be restored
- Be prepared for response to incidents and emergency events
- Provide alternatives when feasible
- Carry out mitigation to avoid disruption for critical services where appropriate

The 2020 Infrastructure Resilience Plan, and Infrastructure Response Plans have been used to inform resilience mitigation projects that have been included in the work program for the next 30 years.

Improvements will also be undertaken in conjunction with future renewals where required. This include the provision of secondary flow paths around bridges. The road approach is designed to be washed away to preserve the bridge structure. The road is able to be replaced at a lower cost, and more quickly than the bridge.

Stormwater management in urban areas is being reviewed as part of updating of Councils engineering standards for development. In urban areas streets are designed to act as secondary flow paths in extreme events. This enables the street to be flooded, rather than private property.

Water treatment upgrades are being designed to accommodate the implications of flood events on source water quality. Additional reservoir capacity is also being provided to increase storage of clean water.

Consideration of alternative water sources, or pre-treatment processes to address turbidity which results in boil water notices is being investigated in 2021. The Naseby, Ranfurly, and Patearoa networks are particularly vulnerable to dirty water impacting on treatment processes following storm events. Supply of water to these towns is also impacted by drought conditions within the Maniototo area impacting on availability of water, and limited source water options other than surface water takes.

Stormwater infiltration investigation and follow-up with property owners is being undertaken to reduce the impacts of extreme rain on wastewater networks.

The Infrastructure Response Plan details the response processes for infrastructure failures. These may be as a result of a number of events, including:

- Natural disasters (e.g. extreme weather events, earthquake).
- Loss of dependent supplies (e.g., electricity, telecommunications).
- Critical asset failure/breakages from any other cause.

These are further refined following a review of the response to each major event.

Council sets aside $50,000 per annum in an emergency response fund specifically for roading, and has an emergency event fund which can be accessed if required for other Council services, including water and wastewater. This accumulates to provide funding for reinstatement following emergency or extreme weather events.

Council has insurance for above ground water and wastewater assets. Below ground assets, roads, and bridges are not insured. Council assumes that all below ground infrastructure would not be damaged in a single event. Council's general emergency event fund can be accessed for underground assets, with the added ability to loan fund reinstatement following an emergency event.

Our objective level of service	How we measure success	Our aim
Water resilience and reliability	Fault response time to urgent call-outs Attendance:	Target median time to get to site ≤ 1 hour
	Resolution:	Target median time to resolve ≤ 4 hours
	Fault response time to non-urgent call-outs Attendance:	Target median time to get to site ≤ 8 hours
	Resolution:	Target median time to resolve ≤ 24 hours
Water resilience and reliability	Number of boil water notices	Nil (measured under bacterial compliance in LTP)
Wastewater resilience and reliability	Fault response times Attendance:	Target median time to get to site ≤ 1 hour
		Target median time to resolve the problem ≤ 4 hours
Stormwater resilience and reliability	Number of flooding events that occurred	Nil
Stormwater resilience and reliability	Number of habitable floors affected in flooding events	Target number of habitable floors affected ≤ 1 per 1,000 properties per flood event
Stormwater resilience and reliability	Response time to attend flood events	Target median time to get to site ≤ 1 hour
Stormwater resilience and reliability	Number of complaints received about stormwater performance	Total number of customer complaints ≤ 2 per 1,000 properties
Roading resilience and reliability	Number of journeys affected by unplanned events	<20,000
Roading resilience and reliability	Number of service requests from customers responded to within 10 days	≥ 90%

Aesthetics

This relates to the look, taste, smell, and feel of our services. This includes the comfort of the drive on roads, maintenance of the road sides, and street cleaning in urban areas. It addresses the taste and smell of water, tidiness and smell of wastewater sites, and visual and odour impacts of discharges.

The Residents' Survey has specifically demonstrated customer dissatisfaction with water quality and lime scale. Most of the respondents of the survey want to see progress on improved water quality and supply, particularly Alexandra and Cromwell.

Clyde township does not have a wastewater network. High population and visitor numbers over the summer is placing pressure on private systems on commercial properties in the historic precinct. This generates odour issues.

Specific projects in the 30-year plan to address customer concerns are:

- Lake Dunstan Water Supply, which will extend the Clyde water supply to Alexandra and address lime scale concerns
- Cromwell water treatment upgrade
- Improved treatment of water at Omakau, Naseby, Ranfurly and Patearoa
- Wastewater reticulation for Clyde township
- Increased investment for vegetation control on rural sealed roads.

Our objective level of service	How we measure success	Our aim
Wastewater aesthetics	Total number of complaints for: • Odour • Faults • Blockages Responses to wastewater service requests	Total number of complaints ≤ 10 per 1,000 connections
Water aesthetics	Total number of customer complaints for: Water clarity Water taste Water odour Water pressure and flow Continuity of water supply Responses to water service requests	≤ 13 per 1,000 connections
Roading aesthetics	The average quality of ride on the sealed road network, measured by smooth travel exposure	Smooth Travel Exposure ≥ 90%
Roading aesthetics	Percentage of sealed local road network that is resurfaced	> 3.9% of sealed road length resurfaced per annum
Roading aesthetics	Customer satisfaction with unsealed roads	To maintain customer satisfaction at or above 70%

Sustainability

Sustainability has been included as an infrastructure level of service outcome from 2021. This recognises that a greater level focus on sustainability in the delivery of service will provide improved environmental outcomes through reduced resource consumption, reduce costs and provide more sustainable services for the future.

An Environmental Engineering Team was established in 2017 to provide focus and resources to improving sustainable practises in the delivery of infrastructure. This includes an increased emphasis on engineering and design practises used in subdivision development, energy use, use of green technologies, and project design.

Measurement of carbon emissions over the 2017-2020 period is providing evidence to understand the carbon implications of infrastructure services. Electricity consumption for water and wastewater will continue to increase as higher technology treatment plants are completed, and as a consequence of population growth. A water demand management programme has been included in the 2021-13 Long-term Plan. This includes public education on improved use of water, removal of irrigation networks from the treated water supply, and a review of pump operating practises.

Water meter installation was undertaken in most parts of the district in 2012. As the original meters reach the end of their economic life they will be replaced with more technologically advanced meters. These will provide for remote reading and enable real time information for residents.

Specifications for new and renewal of pipes includes the use of crushed glass as a construction material. Offcuts of pipes are being recycled, and sustainability is being included as an attribute in procurement processes.

Increased funding has been included to enable all dust suppression sites to be sealed using a low cost sealing method, and use of waste oil as a dust suppressant has been discontinued.

Deterioration software is being used to optimise the renewal and maintenance of sealed roads, unsealed roads, and water pipes. This reduces premature replacement of assets, and reduces resource consumption and costs.

Our objective level of service	How we measure success	Our aim
Wastewater sustainability	Compliance with discharge consents Responses to wastewater service requests	Nil abatement notices, infringement notices, enforcement orders, and convictions
Wastewater sustainability	Number of dry weather sewerage overflows from sewerage scheme	Number of dry weather sewerage overflows ≤ 1 per 1,000 connections
Water sustainability	The percentage of real water loss from the network reticulation system (leaks, metering inaccuracies)	Target current annual real losses from the networked reticulation system ≤ 30% of water produced
Water sustainability	The average consumption of water per day per resident	To maintain water demand at <600 L/person/day
Stormwater sustainability	Compliance with discharge consents	Nil abatement notices, infringement notices, enforcement orders, and convictions
Roading sustainability	The percentage of footpaths that fall within the Council's level of service standard for the condition of footpaths	> 70%

Section 5 Summary of Significant infrastructure Projects

Cost in $1000's	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/36	2036/41	2041/46	2046/51
Roading														
Roading Renewals	5,055	5,055	5,255	5,206	5,356	5,729	5,671	5,836	6,243	6,184	33,722	38,936	41,036	42,988
Walking & Cycling Improvements	550	1,370	150	2,193	1,112	164	168	173	178	183	730	770	812	850
Clyde Heritage precinct	1,365	0	1,600	0	0	0	0	0	0	0	0	0	0	0
Cromwell Town Centre Improvements	0	350	0	705	3,041	3,832	0	0	0	0	0	0	0	0
Alexandra Improvements	0	0	0	0	0	0	0	0	475	0	1,888	0	0	0
Seal Extensions	100	317	100	2,114	540	109	112	115	119	122	126	0	0	0
Large Bridge Replacements	0	0	0	0	0	0	0	404	0	2,434	0	0	6,362	0
Total Capital Investment Roading	**7,070**	**7,092**	**7,105**	**10,219**	**10,049**	**9,834**	**5,952**	**6,528**	**7,015**	**8,924**	**36,466**	**39,706**	**48,209**	**43,839**
Stormwater	**380**	**380**	**380**	**390**	**391**	**391**	**391**	**392**	**393**	**393**	**2,038**	**2,251**	**2,485**	**2,963**
Wastewater														
Wastewater Renewals	1,073	1,148	1,217	1,460	1,912	1,914	1,913	1,919	1,924	1,925	9,282	10,064	11,111	13,250
Alexandra Treatment Upgrades	500	500	1,200	410	6,783	6,790	5,140	0	0	0	0	0	0	0
Cromwell Treatment Upgrades	250	0	0	0	0	0	0	5,158	0	0	0	0	0	0
Lake Roxburgh Village Treatment Upgrade	100	800	0	0	0	0	0	0	0	0	0	0	0	0
Omakau Treatment Upgrades	300	0	0	0	0	0	0	0	0	0	0	3,696	0	0
Ranfurly Treatment Upgrades	0	0	0	0	0	0	0	0	0	0	0	0	4,080	0
Naseby Treatment Upgrades	0	0	0	0	0	0	0	0	0	0	0	0	0	4,162
Ranfurly Treatment Upgrades	0	0	0	205	0	0	0	0	0	0	0	0	4,080	0
Roxburgh Treatment Upgrades	0	0	100	103	0	0	0	0	0	0	0	3,696	0	0
Pump Station Storage	300	0	0	3,702	0	0	0	0	0	0	0	0	0	0
Upgrades with development	30	30	30	338	339	340	339	340	341	341	1,770	1,954	2,158	2,573
Clyde Reticulation	3,700	0	0	0	0	0	0	516	0	3,206	5,463	0	0	0
Network Improvements	0	1,140	1,320	0	0	0	0	0	0	0	0	0	0	0
Total Capital Investment Wastewater	**6,253**	**3,618**	**3,867**	**6,219**	**9,034**	**9,044**	**7,392**	**7,933**	**2,265**	**5,472**	**16,515**	**19,410**	**21,429**	**19,984**

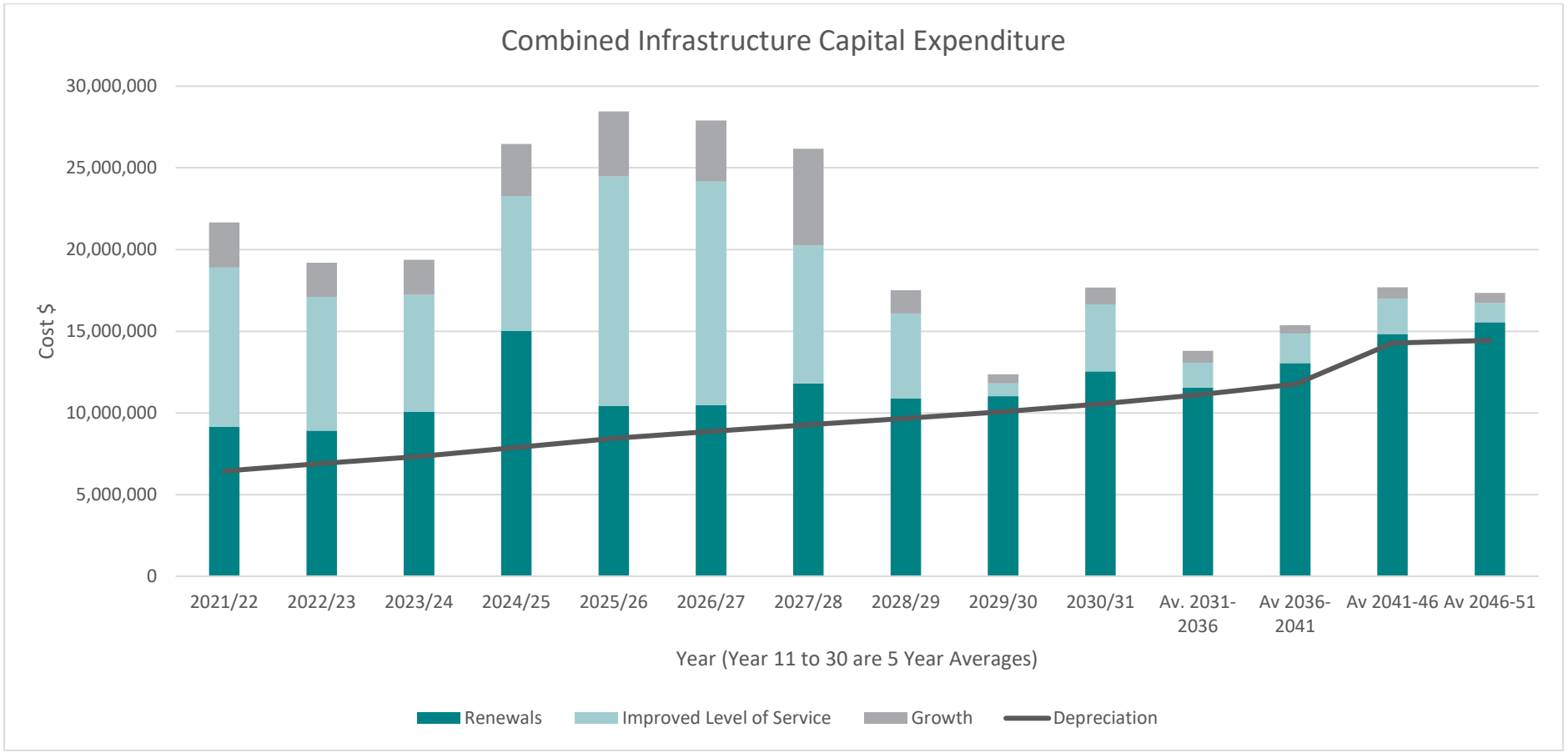
Cost in $1000's	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/36	2036/41	2041/46	2046/51
Water														
Water Renewals	1,660	1,832	2,050	2,224	2,169	2,172	2,170	2,177	2,182	2,183	11,323	12,501	13,802	16,459
Lake Dunstan Water Supply Treatment	4,300	0	0	0	0	0	0	0	0	0	0	0	0	0
Cromwell Treatment	800	4,700	4,700	0	0	0	0	0	0	0	0	0	0	0
Reticulation Extensions	0	0	0	5,139	5,144	5,140	0	0	0	0	0	0	0	0
Cromwell Distribution Improvements	375	0	0	5,948	0	0	4,626	0	0	0	0	0	0	0
Lake Dunstan Supply Distribution improvements	0	500	0	0	0	823	0	0	0	0	0	0	1,300	0
Demand Management	150	0	0	974	0	0	0	0	0	0	0	0	0	0
Upgrades with development	75	75	75	384	385	386	386	387	388	388	2,012	2,221	2,452	2,924
Resilience Improvements	0	400	600	0	1,182	0	0	0	0	362	0	0	0	0
Network Improvements	250	500	500	0	0	0	0	0	0	0	0	0	0	0
Total capital Investment Water	**7,610**	**8,007**	**7,925**	**14,373**	**8,726**	**8,347**	**7,171**	**2,552**	**2,557**	**2,908**	**13,198**	**14,376**	**16,977**	**18,159**
Total Infrastructure Investment	**21,313**	**19,097**	**19,277**	**31,201**	**28,200**	**27,615**	**20,905**	**17,406**	**12,230**	**17,698**	**68,217**	**75,743**	**89,099**	**84,945**

Inflation Provisions

G. Inflation reflects erosion in the buying power of money. Each dollar buys less and less goods and services over time. Depreciation staff, costs and some expenditure items have inflation applied from year 1 of the plan. The majority of the balance of the expenditure forecasts for each activity are input in the dollars of the relevant year for the first three years (e.g. water and wastewater renewals and other operational expenditure lines such as maintenance contracts). Where cost change has been applied for year four onwards, Council has used the BERL indices shown below. There is a medium risk that inflation may increase at a higher rate. This would impact on the affordability of Council's services and would be addressed as part of Council's annual planning process.

	Roading	3 Waters
Year 1	1	1
Year 2	1	1
Year 3	1	1
Year 4	1.0298	1.0256
Year 5	1.0595	1.0277
Year 6	1.0902	1.0288
Year 7	1.1219	1.028
Year 8	1.1544	1.0315
Year 9	1.1879	1.0338
Year 10	1.2233	1.0343
Year 11	1.2586	1.0308
Year 12	1.2953	1.0514
Year 13	1.3331	1.0724
Year 14	1.372	1.0938
Year 15	1.412	1.1157
Year 16	1.4532	1.138
Year 17	1.4956	1.1608
Year 18	1.5392	1.184
Year 19	1.5841	1.2077
Year 20	1.6303	1.2319
Year 21	1.6779	1.2565
Year 22	1.7268	1.2816
Year 23	1.54	1.3072
Year 24	1.571	1.3333
Year 25	1.602	1.36
Year 26	1.634	1.3872
Year 27	1.667	1.4149
Year 28	1.7	1.4432
Year 29	1.734	1.776
Year 30	1.769	1.776

Section 6 Combined Infrastructure Financial Estimates



Section 7 – Activity Summaries

Water

Central Otago's vision for water services is "to deliver safe and wholesome water supplies which support a healthy community and environment".

Council provides potable water to properties within nine water schemes. Population growth is forecast to continue on the Alexandra, Clyde and Cromwell schemes. Visitor growth is projected to increase across all schemes.

There are a number of private water supplies within Central Otago that are not managed by Council. These water supplies are not included within the scope of this plan, but work will be undertaken over the next three years to understand the extent and condition of these supplies.

Improving the safety and resilience of all schemes, while meeting the additional demands of growth, legislative change, and delivery reform growth is a challenge.

Regardless of which entity delivers water in the future, delivering improved quality of water, servicing a larger area, will result in increased costs to consumers.

Completing water treatment upgrades to meet the New Zealand Drinking Water Standards remains a key issue. All Council schemes are chlorinated.

Work is underway to upgrade the Clyde and Alexandra water supplies to meet the New Zealand Drinking Water standards. This will involve construction of a new treatment plant at Lake Dunstan which will treat water to both of these towns, with the potential to also supply rural residential areas in the Springvale area in the future. Construction of the new treatment plant is expected to be completed in early 2022.

Investigations and design has progressed on upgrading of the Omakau/Ophir water supplies to meet the New Zealand Drinking Water standards. Construction of a new borefield, pipeline, and treatment plant is expected to be completed in 2021.

Investigations and design of upgrades to the Patearoa and Ranfurly supplies are also progressing. Design will be finalised in 2021, and these projects will then progress to construction.

Upgrades to the Naseby Water Treatment plant will be completed in 2021, which will make this scheme compliant.

Investigations on a new bore site are progressing at Roxburgh. Construction of the new bore is programmed for 2022. This is expected to enable the existing Roxburgh treatment plant to achieve compliance.

Investigation work has commenced for upgrading Cromwell water treatment, and detailed design will commence in 2021, with construction between 2022 and 2024. The Pisa supply will be connected to the Cromwell supply in 2023-25.

Council has been investing in hydraulic modelling of the networks to improve understanding of growth impacts. More advanced measurement devices will be installed in the next three years to improve understanding of demand on sections of individual networks. This work will feed into updated models and refine designs for future capacity upgrades. This is particularly relevant for the Cromwell water network to support the new spatial plan, high growth, and increased density of housing.

Council has been programming for small numbers of backflow prevention devices to be installed on an annual basis. Increased investment has been provided in 2021 to 2023 to enable this work to be completed.

Council reduced its renewal programme over the 2018-21 period to enable more evidence to be collected to inform renewal programming. The investment into renewals has been increased from 2021 to follow a similar profile to annual depreciation funding. This will enable water meters that were installed in 2012 to be replaced, as well as targeting a programme of replacement of old asbestos pipes.

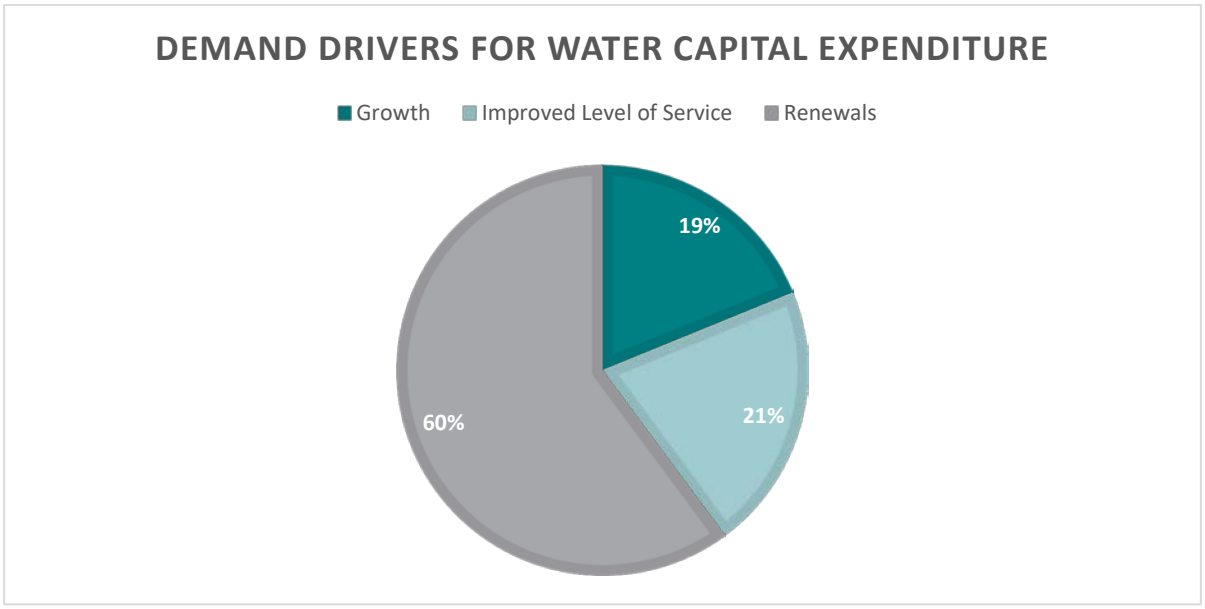


Figure 12.1.1 Drivers of Demand for Water

Figure 12.1.2 Projected Capital Expenditure – Water graph shows depreciation comparable to the overall renewal program for water.

Water treatment assets have a data confidence rating of uncertain. This is estimated to have a moderate (±25%) impact on budgets. A project to update condition assessments has been included in the water stimulus delivery plan.

The programme of significant investment on new water infrastructure that commenced in 2018 will continue through the next seven years of this plan. These new assets will add to depreciation costs.

The more technically complex treatment plants will result in higher electricity and operational costs, as well as routine renewal of membranes at 10 year intervals.

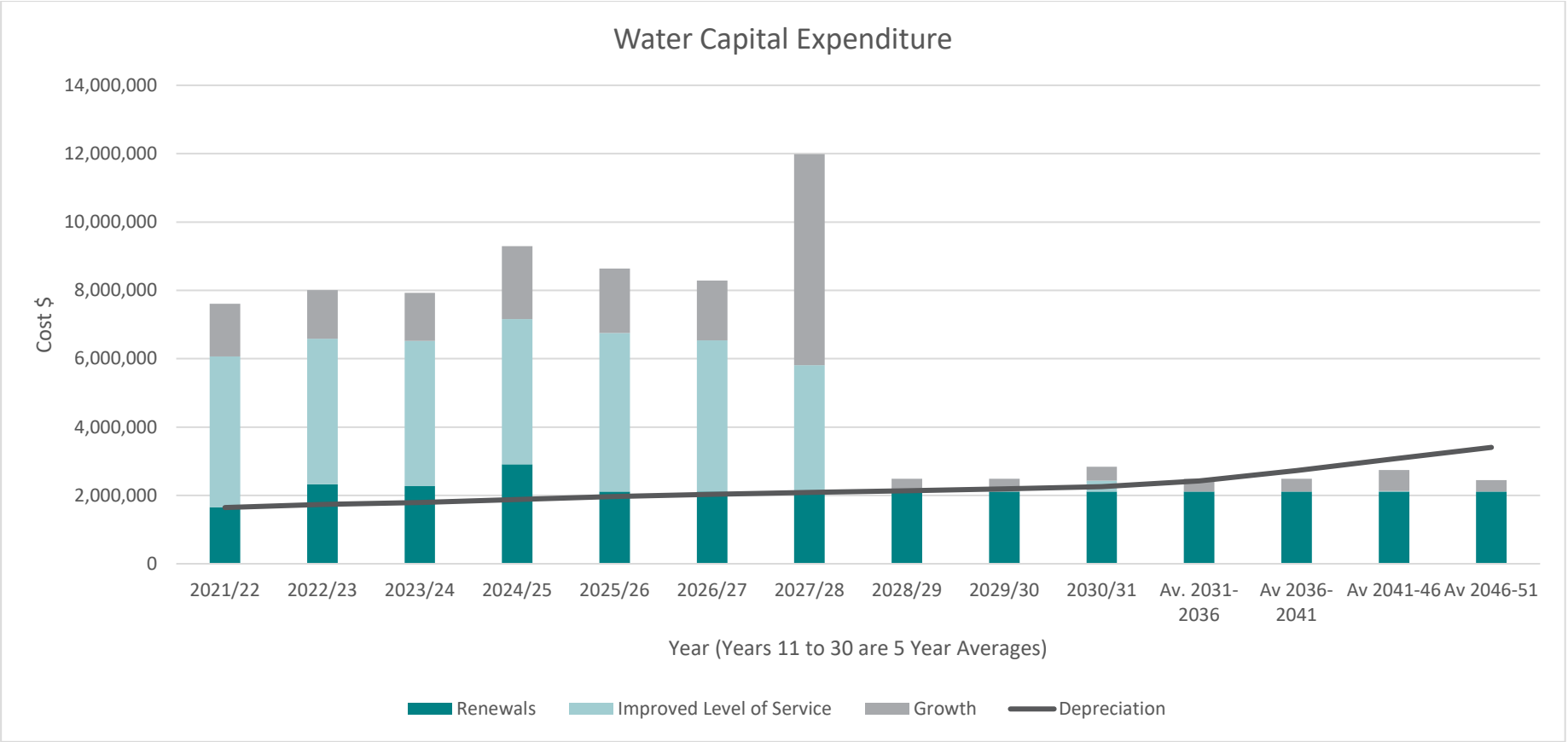


Figure 12.1.2 Projected Capital Expenditure – Water

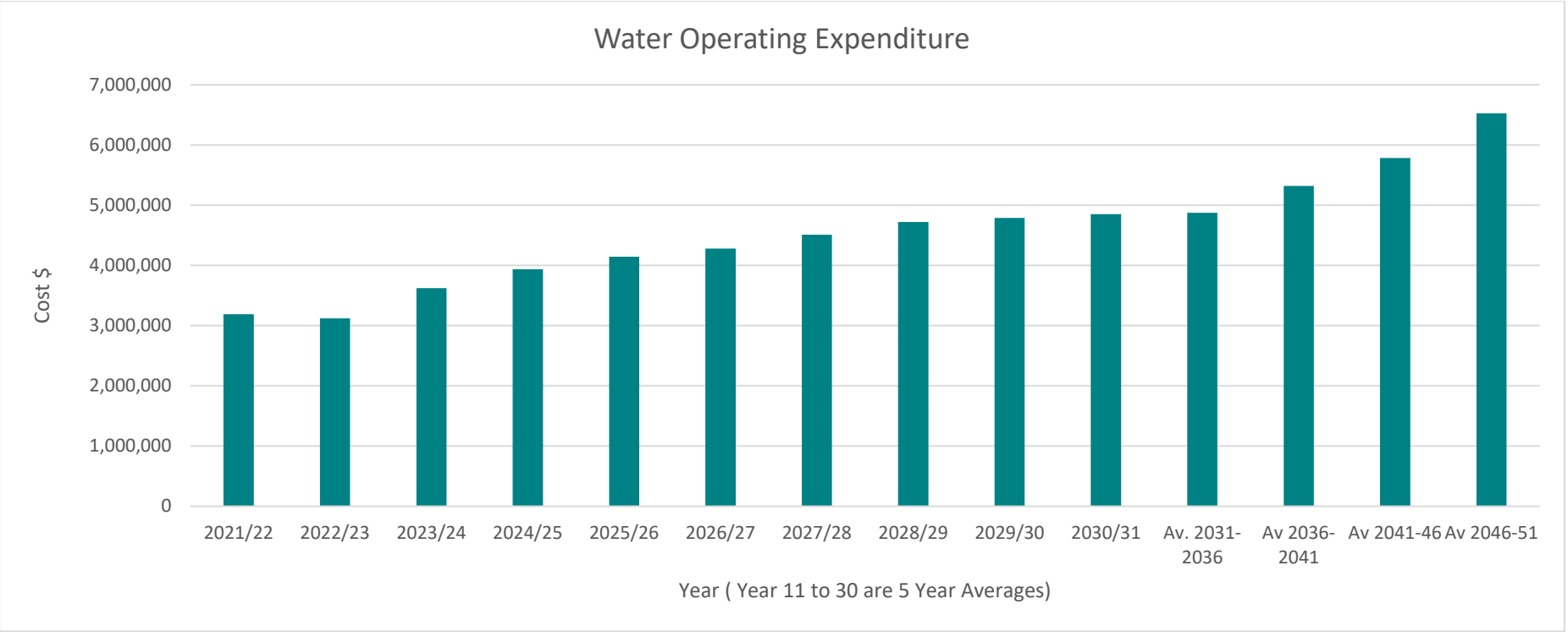


Figure 12.1.3 Projected Operational Expenditure – Water

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Completion of Lake Dunstan Water Supply Treatment	Existing treatment does not meet protozoa treatment requirements	Install membrane treatment plants		74% Level of Service 26% Growth	$4.3	2021/22	$4.3
Cromwell Treatment and Bore Field Development	Existing treatment does not meet protozoa treatment requirements, insufficient bore capacity to optimise treatment plant and meet future demand	Construct more bores at existing bore field and build membrane treatment plant		74% Level of Service 26% Growth	$0.8 $4.7 $4.7	2021-22 2022-23 2023-24	$0.8 $4.7 $4.7
Cromwell Rising Main	Water from the bores is pumped through the network to the reservoir, this causes pressure fluctuations, and increases risk	Construct a dedicated rising main to the existing reservoir that will improve operational efficiency, improve capacity of flow to the reservoir, and improves resilience	Continue to pipe water to the reservoir through the existing network and accept pressure and reservoir fluctuation issues	74% Level of Service 26% Growth	$0.2 $2.2	2021-22 2024-2025	$0.2 $2.3
Pisa Reservoir and Rising Man	Separate schemes for part of Pisa and Cromwell. Pisa scheme has insufficient capacity	Connect the Pisa scheme to the Cromwell network by constructing a new reservoir at Pisa	Maintain two separate schemes, and increase capacity and level	74% Level of Service 26% Growth	$0.1 $2.6	2021-22 2024-2025	$0.1 $2.7

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
	to meet growth, and does not meet NZ Drinking water standards	Disestablish the Pisa treatment facility	of treatment on the Pisa scheme				
Bannockburn Pipeline	Insufficient capacity in existing pipeline Bannockburn to meet firefighting requirements and growth demand	Construct larger pipeline to Bannockburn	Construct an additional pipeline	74% Renewal 26% Growth	$1.0	2024-2025	$1.3
Backflow Prevention	Risk of contaminated water flowing back into the network due to pressure variances	Installation of backflow prevention devices to reduce risk of water contaminations	Accept a higher level of risk of drinking water contamination	89% Level of Service 11% Growth	$0.25 $0.5	2021-22 2022-23	$0.25 $0.5
Network isolation valves	Shutdowns due to failure result in widespread loss of supply, unable to close parts of the network if there is a contamination risk	Install valves to enable areas of the network to be isolated	Maintain a higher risk level and supply outages during repairs.	44% Level of Service 45% Renewal 11% Growth	$0.5	2023/24	$0.5
Generators for Bore fields (Clyde, Roxburgh, Cromwell)	Bores stop operating due to power outages	Install permanently located emergency generators for Lake Dunstan, Cromwell	Increase reservoir capacity to accommodate power outages	82% Level of Service 18% Growth	$0.45	2025/26	$0.46

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
		and Roxburgh bore fields	power outage periods				
Reservoir bypass tanks	Unable to take reservoirs offline for maintenance without affecting supply of water to town	Install bypass tanks to enable maintenance of main tank	Install two reservoirs	82% Level of Service 18% Growth	$0.7	2025/26	$0.72
Site Fencing	Sites do not have fencing adequate to restrict access	Install high fencing	Install low fencing	82% Level of Service 18% Growth	$0.4	2022/23	$0.4
Roxburgh Bore	Sediment is entering the borefield from the adjacent Clutha River	Install a new bore	Add additional treatment processes	91% Level of Service 9% Growth	$0.3	2023/24	$0.3
Bridge Hill falling main	Falling main is nearing the end of its useful life	Replace falling main	Accept higher risk of failure	100% Renewal	$0.5	2023/24	$0.5
Demand Management	Treated water is being used for irrigating reserves, reducing capacity for growth and peak demand	Construct bores to enable irrigation to be split off from town supplies	Increase capacity of schemes to accommodate irrigation needs	74% Level of Service 26% Growth	$0.15 $0.95	2021/22 2024/25	$0.15 $0.97
Naseby Clarifier	To assist in addressing turbidity	Install additional treatment process	Pipe water from an alternative source	91% Level of Service	$0.15	2023/24	$0.15

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
	issues from source water			9% Growth			
Patearoa firefighting	To improve the level of service for firefighting requirements			91% Level of Service 9% Growth	$0.15	2023/24	$0.15
Gilligans Gully capacity and pressure improvements	Pipe and pump capacity is insufficient to meet growth and level of service requirements for pressure	Upgrade supply main to Letts Gully with pump station at Gilligans Gully to provide sufficient capacity for growth	Construct a new network from the reservoir to service Gilligans Gully and Letts Gully areas.	91% Level of Service 9% Growth	$0.8	2027/28	$0.82
Lake Dunstan Water Supply Booster Pump	New pipeline between Clyde and Alexandra will have insufficient capacity to meet expected growth in 2045	Install a booster pump	Install a larger pipe, or a second pipe	100% Growth	$0.4	2045/46	$0.5
Additional Bridge Hill Reservoir	A new reservoir will be required to provide capacity for growth in the Bridge Hill Area	Construct an additional reservoir at a higher elevation to the existing Bridge Hill site to service properties above the reservoir	Construct an additional reservoir on the existing Bridge Hill site and pump to houses above the reservoir	10% Level of Service 90% Growth	$0.9	2043/45	$1.2

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Ophir Trunk Main Relocation	The existing pipe is located in the bed of the Manuherikia river, which is prone to excessive scouring at this location	Relocate the pipe onto the Omakau Bridge when the bridge is replaced	Leave the pipe in the river bed and continue to undertake remedial works following floods	91% Level of Service 9% Growth	$0.35	2030	$0.36
Cromwell Town Centre Capacity Upgrades	Higher density zoning in new spatial plan will increase water demand within the town centre area	Replace under capacity pipes and provide more reservoir storage	Increase bore and treatment capacity and upgrade under capacity pipes	100% growth	$4.5	2027/28	$4.6
Network Upgrades with Developments and to meet growth	Opportunities occur to upgrade the capacity of pipes installed during developments to service the wider community	Provision to enable cost effective upgrades to be undertaken when they are presented due to development	Miss opportunities to include cost effective capacity improvements when development work is occurring and program these separately through future long term plans	44% Level of Service 45% Renewal 11% Growth	$10.2	2021 - 2051	$12.5

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Reticulated water Supply to the Dunstan Flats Area	Bores on some rural residential properties in the Dunstan Flats area run dry during summer months. This may get worse as irrigation practises change, and climate change occurs	Reticulated supply fed from a reservoir off the new Lake Dunstan Water Supply pipeline	Reticulated supply fed off the Clyde or Alexandra networks	74% Level of Service 26% Growth	$15.0	2025-28	$15.4

Table 12.1.1

Wastewater

Central Otago's vision for wastewater services is "to deliver safe and compliant wastewater networks which support a healthy community and environment".

The wastewater services activities enable the collection, conveyance, treatment and disposal of wastewater within seven schemes across the district.

Reducing the environmental impacts of all schemes, and ensuring the network is resilient to disruptions is a priority.

Council has been investing in hydraulic modelling of the wastewater networks to improve understanding of growth impacts. Resilience work is programmed within the next four years to improve pump station capacity, provide emergency generation, and reduce the risk of wastewater overflows occurring.

Continuing investigation and following up on stormwater infiltration will reduce the demand on the reticulation, pump and treatment networks. This will help to lessen the impacts of growth and provide improved resilience to intense rainfall events.

Council reduced its renewal programme over the 2018-21 period as CCTV inspections identified that the condition of the pipes were better than expected. The renewals programme has been increased from 2021 to enable increase renewals to be undertaken on mechanical and electrical componentry to reduce the risks of asset failures.

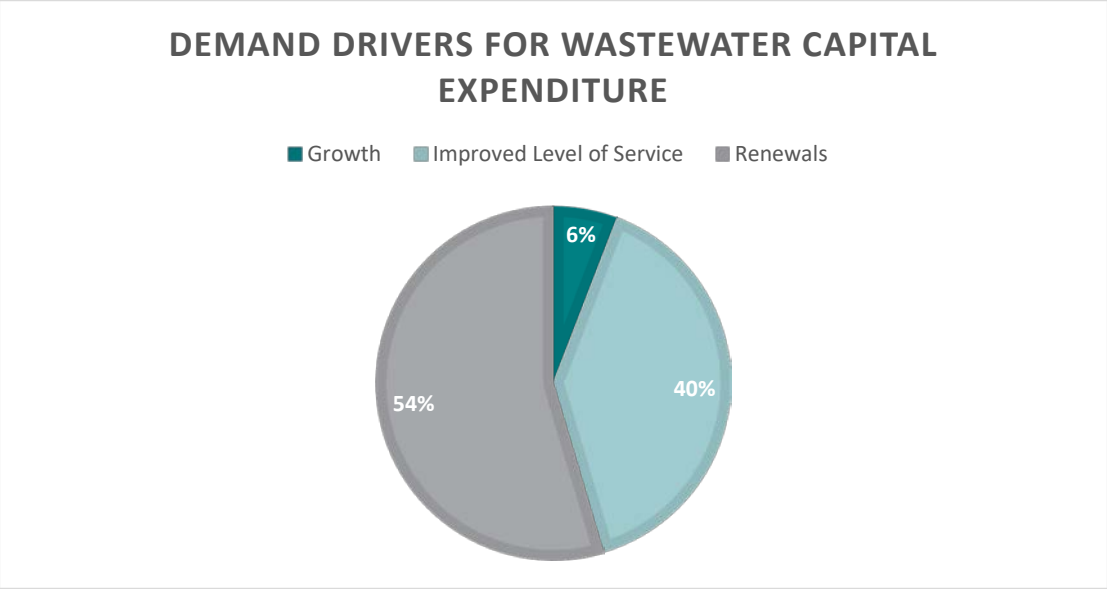


Figure 12.2.2 Demand Drivers for Growth.

Wastewater treatment assets have a data confidence rating of uncertain. This is estimated to have a moderate (±25%) impact on budgets. Further work is planned to update condition assessments, and review asset life assumptions based on condition, construction date, existing age, and historical replacements in the next three years.

The programme of significant investment on new wastewater infrastructure that commenced in 2018 will continue through the next seven years of this plan. These new assets will add to depreciation costs.

The more technically complex Cromwell treatment plant has resulted in higher electricity and operational costs, as well as routine renewal of membranes at 10 year intervals.

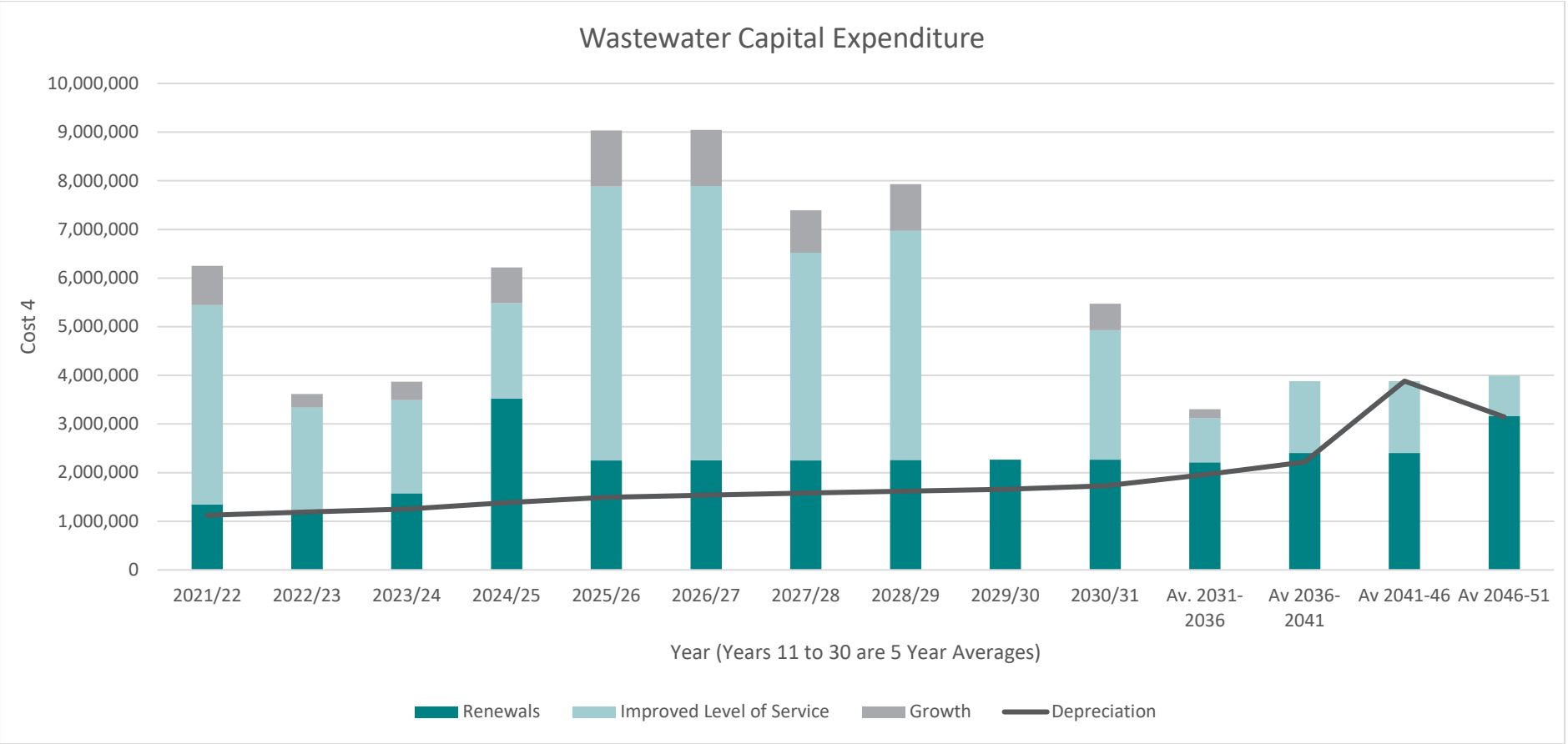


Figure 12.2.2 Projected Capital Expenditure – Wastewater

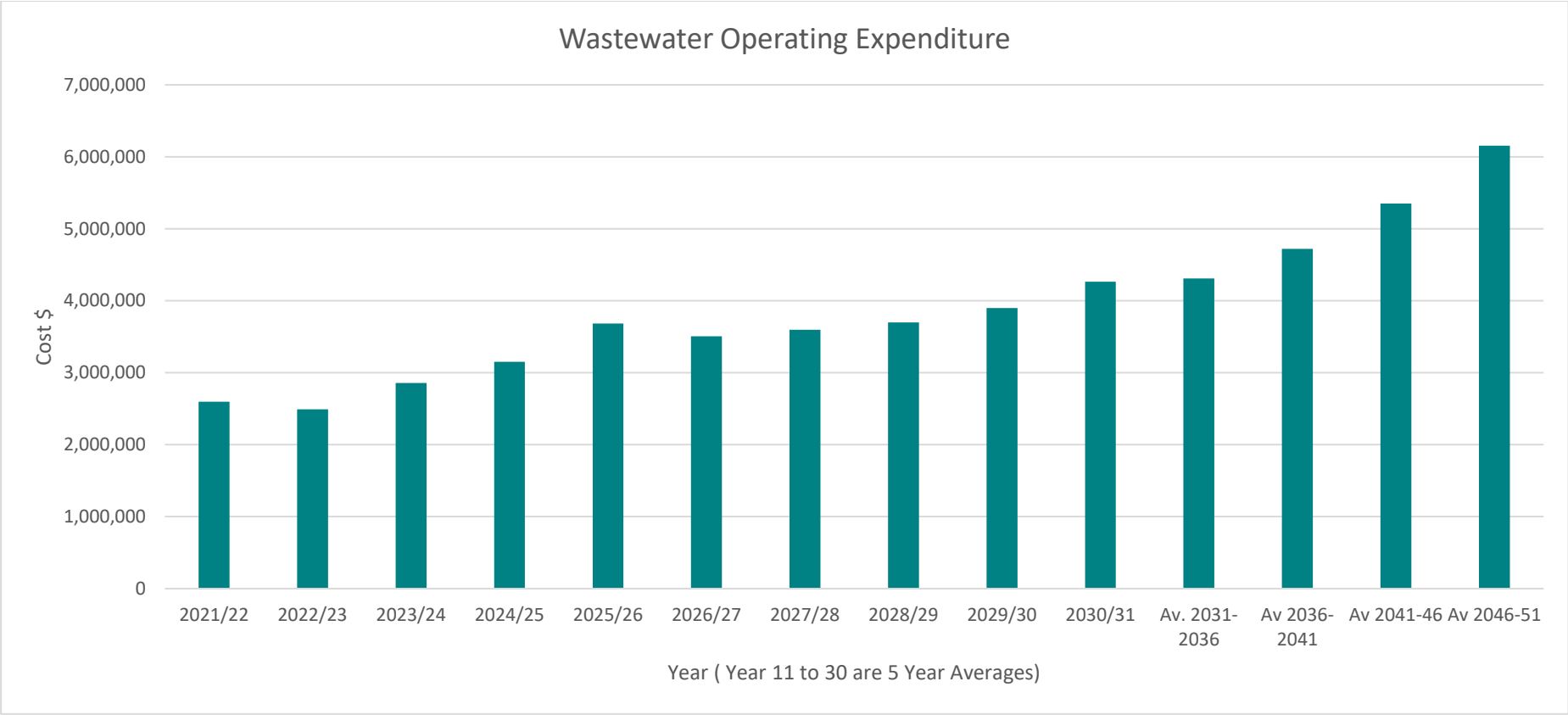


Figure 12.2.2 Projected Operational Expenditure – Wastewater

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Earnscleugh Road pumpstation	Pumpstation is located in middle of road causing operational issues for maintenance of pumpstation and retaining road access	Relocate pumpstation	Close road while maintenance is undertaken	44% Level of Service 45% Renewal 11% Growth	$0.36	2023-24	$0.36
Alexandra Wastewater Treatment Upgrade	The Alexandra Treatment Plant requires upgrading to accommodate increased capacity from stage 2 of Clyde reticulation, and to meet changes to conditions when the consent expires. There is no redundancy within the existing plant, meaning that it cannot be shut down for repairs and maintenance without impacting on discharge quality and breaching consent requirements	Duplicate the existing process plant to provide increased capacity and ability to shut part down for repairs and maintenance	Build a new plant at another location	83% Level of Service 17% Growth	$15.8	2021-26	$16.18
Alexandra Wastewater Treatment Nitrogen Removal	Additional treatment upgrade will be required to ensure the impacts of additional loading due to population growth does not negatively impact on the quality of discharges. This is also a resource consent requirement	Nitrogen removal process added to treatment	Alternative discharge method	83% Level of Service 17% Growth	$5.0	2027-28	$5.14

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Cromwell Wastewater Treatment Nitrogen Removal	Additional treatment upgrade will be required to ensure the impacts of additional loading due to population growth does not negatively impact on the quality of discharges. This is also a resource consent requirement	Nitrogen removal process added to treatment	Alternative discharge method	83% Level of Service 17% Growth	$0.25 $5.0	2021/22 2028-29	$0.25 $5.2
Clyde Wastewater Complete Stage 1- Commercial area and oldest part of town	The density of septic tanks in Clyde may not meet more stringent discharge controls for urban areas. There is anecdotal evidence that on site systems in the commercial area are struggling during peak times resulting in odour issues. Clyde is unable to grow further unless a wastewater system is implemented	Construct a reticulated wastewater system for Clyde. Pipe wastewater from Clyde to Alexandra, and treat at the existing Alexandra Wastewater treatment plant. Implement reticulation in three stages	Construct a reticulated wastewater system for Clyde. Construct a separate treatment facility for Clyde at Muttontown. Implement reticulation in a single stage.	83% Level of Service 17% Growth	$3.7	2021-22	$3.7
Clyde Wastewater Stage 2 – pre 1997 development					$0.5 $3.1	2028-29 2030-31	$0.52 $3.2
Clyde Wastewater Stage 3 – later development					$5.3	2032-33	$5.5
Omakau Treatment Upgrade – stage 1	Treatment modifications are required to improve environmental outcomes and meet discharge requirements on existing resource consents	Aeration added to ponds	Install a tertiary treatment system	83% Level of Service 17% Growth	$0.3	2021-22	$0.3

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Omakau Treatment Upgrade – stage 2	Treatment modifications are required to improve environmental outcomes and meet discharge requirements on new resource consents	Install a tertiary treatment system, discharge to river	Additional biological treatment in pond, discharge to land	83% Level of Service 17% Growth	$3.0	2040-41	$3.7
Flow Meters on pump stations	Stormwater infiltration into the Alexandra wastewater network is not well understood. This could result in unnecessary capacity being provided to meet demand during rain events	Install flow devices on pump stations to monitor difference in flow during rain events	Provide additional capacity within the network and treatment plant to accommodate stormwater infiltration	46% Level of Service 46% Renewal 8% Growth	$0.36	20223-24	$0.36
Pumpstation storage capacity upgrades	Limited pumping and storage capacity to accommodate inflow during high flow, resulting in overflows	Increase pump station storage capacity	Install larger pump and main pipe.	41% Level of Service 41% Renewal 18% Growth	$0.3 $3.61	2021/22 2024/25	$0.39
Upgrade inlet screens– Naseby, Roxburgh and Ranfurly treatment sites	Quality of inflow affects pond and plant performance, and reduces discharge quality	Install new inlet screens	Increase pond cleaning and treatment processes	83% Level of Service 17% Growth	$0.54	2022/23	$0.54
Install S-scan devices on six sites	New environmental standards require real time data on discharge quality	Install S-scan devices	Fail to meet legal requirements	83% Level of Service 17% Growth	$0.6	2022-23	$0.6

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Install generators on all pump stations with risk of overflow to water course	Power outages cause overflow to water course	Install permanent generators	Increase storage capacity, provide mobile generators	83% Level of Service 17% Growth	$0.6	2023/24	$0.6
Lake Roxburgh Village Treatment	Consent expires, requiring increased treatment to meet expected new consent conditions	Pipe to Roxburgh and combine the treatment to the existing Roxburgh site	Increase treatment processes at Lake Roxburgh Village	46% Level of Service 46% Renewal 8% Growth	$0.1 $0.8	2021-22 2022-23	$0.1 $0.8
Ranfurly Treatment	Consent expires, requiring increased treatment to meet expected new consent conditions	Increase treatment processes	Additional biological treatment	100% Level of Service	$3.0	2045-46	$4.1
Naseby Treatment	Consent expires, requiring increased treatment to meet expected new consent conditions	Increase treatment processes	Pipe to Ranfurly and combine treatment at one site	46% Level of Service 46% Renewal 8% Growth	$3.0	2046-47	$4.2
Roxburgh Treatment	Consent expires, requiring increased treatment to meet expected new consent conditions	Increase treatment processes	Additional biological treatment	100% Level of Service	$3.0	2040-41	$3.7
Electricity Supply to Roxburgh Wastewater site	Electricity required to enable remote monitoring of the site. Solar panels are not working in winter	Install electricity supply	Manually monitor and operate plant during winter	100% level of Service	$0.2	2022-24	$0.02

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2021 Cost ($ Million)	Year	Escalated Cost ($ Million)
Ranfurly sludge drying beds	Existing drying beds in poor condition	Replace and upgrade existing beds	Transport and process sludge at another site	100% Level of Service	$0.2	2024/25	$0.21
Network Upgrades with Developments	Opportunities occur to upgrade the capacity of existing pipes and pumps installed during developments and long term forecasts do not include provision to address the implications of growth on capacity of the network	Provision to enable cost effective upgrades to be undertaken when they are presented due to development and recognise future capacity requirements to meet growth	Miss opportunities to include cost effective capacity improvements when development work is occurring and program these separately through future long term plans	100% Growth	$0.9 (0.03/ Annum (0.33 Annum)	2021 – 24 2024-50	$10.9

Stormwater

Central Otago's vision for stormwater services is "To deliver safe and compliant stormwater networks which support a healthy community and environment".

The stormwater services activity enable the collection, conveyance, and disposal of stormwater within Cromwell, Alexandra, Roxburgh, Omakau, and Ranfurly. These towns have reticulated stormwater systems to manage drainage and prevent flooding. The remaining towns have mudtanks connected to soakpits, open channels, and culverts across roads. This infrastructure is maintained as part of the roading activities.

Renewal expenditure in the next ten years will be focussed on addressing discharge infrastructure.

Central Otago has low rainfall, and minimal stormwater discharges to waterways. It has been assumed that there will be minimal additional requirements on stormwater discharges within the Central Otago area from increased regional controls on urban water discharges.

In the next three years Council will collect a detailed inventory of discharge locations and undertake flow monitoring to identify where further work may be required to improve environmental outcomes.

Council expects to be able to accommodate improvements required for environmental reasons, or upgrades for climate change within the renewals program in the 30-year plan.

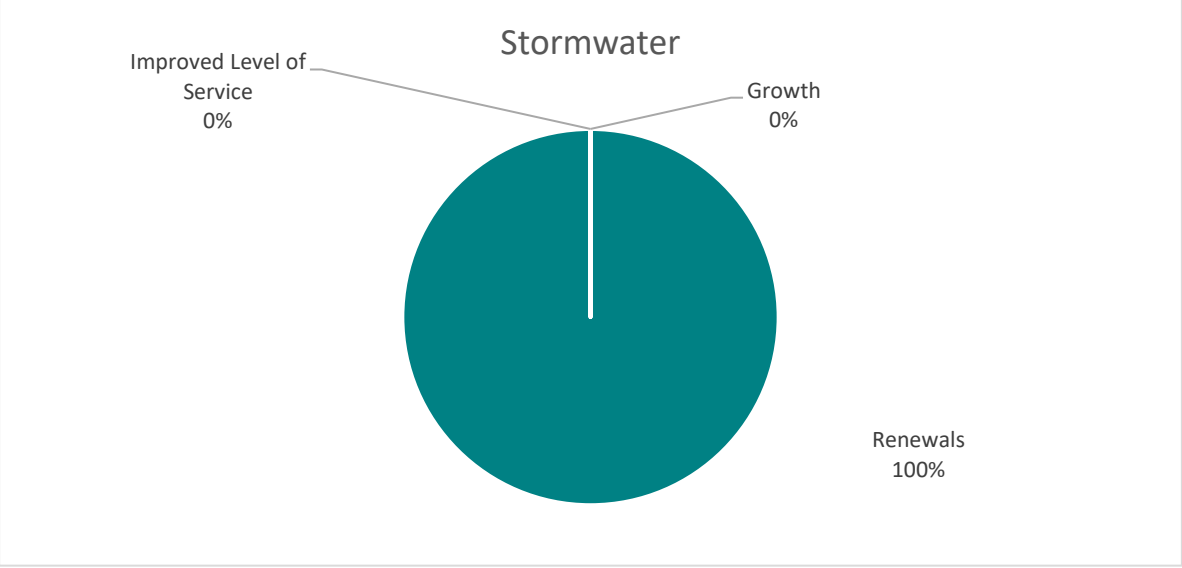


Figure 12.3.1 Demand Drivers for Stormwater Capital Expenditure

Figure 12.3.2 Projected Capital Expenditure – Stormwater graph shows depreciation is the same as programmed renewals expenditure over the next 30 years.

Council reduced its renewal programme over the 2018-21 period to reflect the relatively young age of the pipe infrastructure. The investment into renewals has been increased from 2021 to follow a similar profile to annual depreciation funding. This will enable long standing issues in the urban areas to be addressed.

Most point assets (mudtanks, soakpits, etc) which have shorter lives are maintained as roading assets.

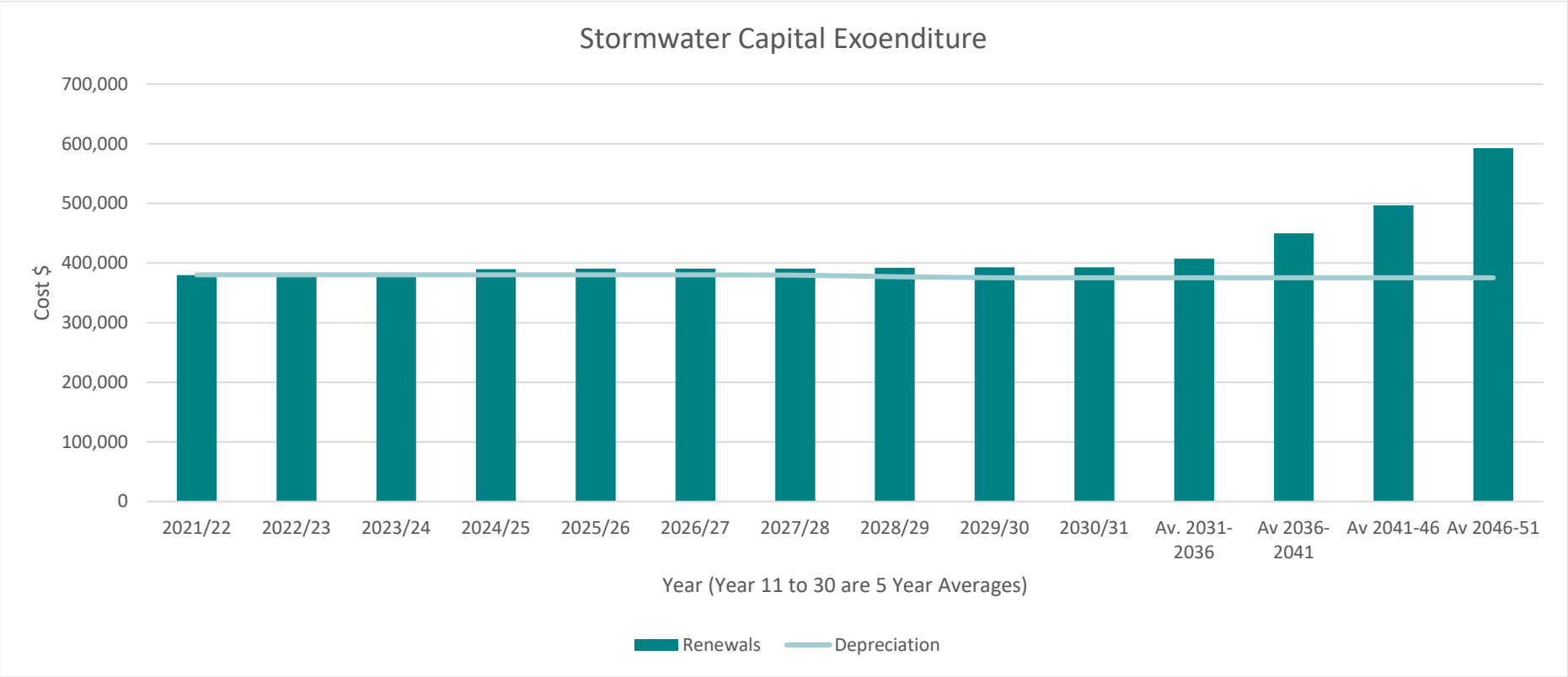


Figure 12.3.2 Projected Capital Expenditure – Stormwater

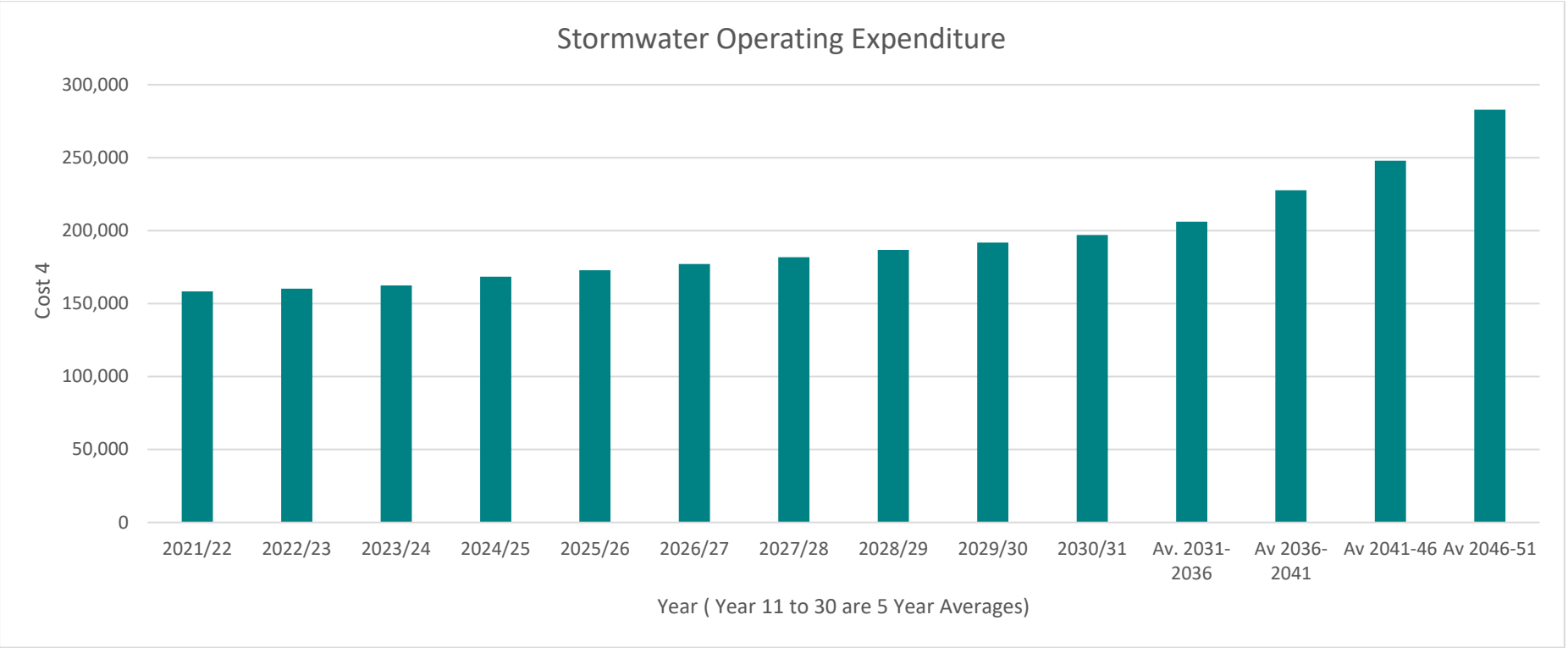


Figure 12.3.3 Projected Operational Expenditure – Stormwater

Roads and Footpaths

Central Otago's vision for roads and footpaths is "to ensure an efficient, fully accessible, safe network".

The costs of our unsealed road network are increasing due to traffic demand and reduced material availability.

Unsealed roads make up 72% of roads and account for approximately one third of proposed roading investment. There is a backlog of renewals work on unsealed roads, particularly on the lowest volume roads, which service land and back country areas.

Improved productivity on rural land is generating more heavy vehicles on the gravel road network, and on bridges. Higher land use returns for agriculture and horticulture activities has resulted in reduced access to suitable gravel supplies, and higher royalty costs. This is increasing costs to provide a fit for purpose unsealed road network.

Renewals investment for unsealed roads has been increased to enable council to meet increased costs to deliver the same level of service. While not fully addressing the backlog, this will enable an increased metalling and drainage programme to be undertaken on the lowest volume roads.

An aging bridge network will require us to consider options on how we provide an affordable level of service that meets future demands.

Central Otago has 179 bridges with 72 expected to reach the end of their economic life within the next 30 years. Many of these are on low volume roads where alternative routes exist. The economic viability of replacement options needs to be considered.

The number and weight of trucks on bridges are also increasing, as a result of regulatory changes and improvements in land productivity.

Replacement of structural components and small bridges will continue. This programme is based on an assumption that not all bridges will be replaced, and further discussion will be held with the community regarding this.

Detailed structural inspections are underway, and impact assessments will be undertaken during 2021 to inform community discussion regarding the shape of the bridge network in the future.

High growth is increasing the asset base that needs to be maintained and renewed. Older assets are servicing increased demand and higher customer expectations.

Growth is increasing traffic volumes in urban centres, on unsealed roads, and bridges, and development is increasing the length of road that needs to be maintained. There is approximately 850m of new urban streets, and 2-3km of rural sealed road being vested in Council each year. This is increasing both operational and renewal costs.

Council has agreed to a managed risk approach to the sealed road renewals programme. This is supported by an optimised decision-making framework that makes extensive use of modelling, which is then validated in the field. The resurfacing programme has been increased to approximately 4.5% of the total sealed road length per annum in response to the 2020 modelling work.

A very small proportion of the pavements of our urban streets are beginning to fail. It is no longer cost-effective to undertake routine maintenance and resurfacing of these sections of road. We will continue to reconstruct approximately 300m of urban streets each year. This has been identified as being the optimal length of annual reconstruction from deterioration modelling.

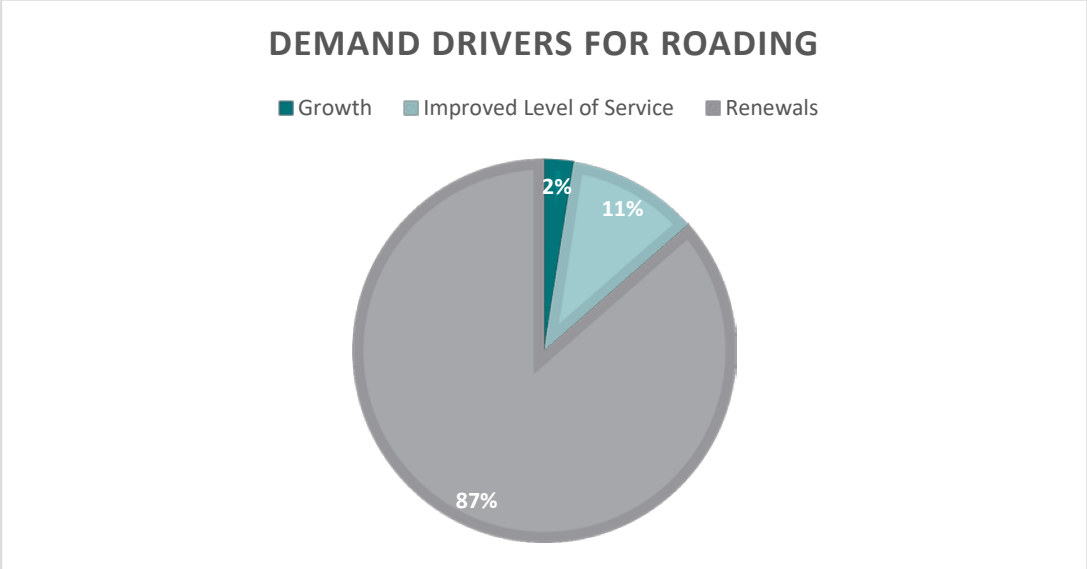


Figure 12.4.1 Demand Drivers For Roading Capital Expenditure

The capital expenditure that has been programmed receives a 51% subsidy from Waka Kotahi New Zealand Transport Agency. For this reason only 49% of the depreciation cost is funded.
Depreciation will be accrued on bridges and sealed pavements which have long lives, and Council has modest renewal programs for both of these assets. This is due to the good condition of the sealed pavements, and uncertainty on the need for bridge renewals.

As discussed above, Council will be reviewing the bridge network and consulting with the community to determine what bridges should be retained. This may result to changes in the bridge depreciation funding and renewal program depending on the outcome of this consultation.

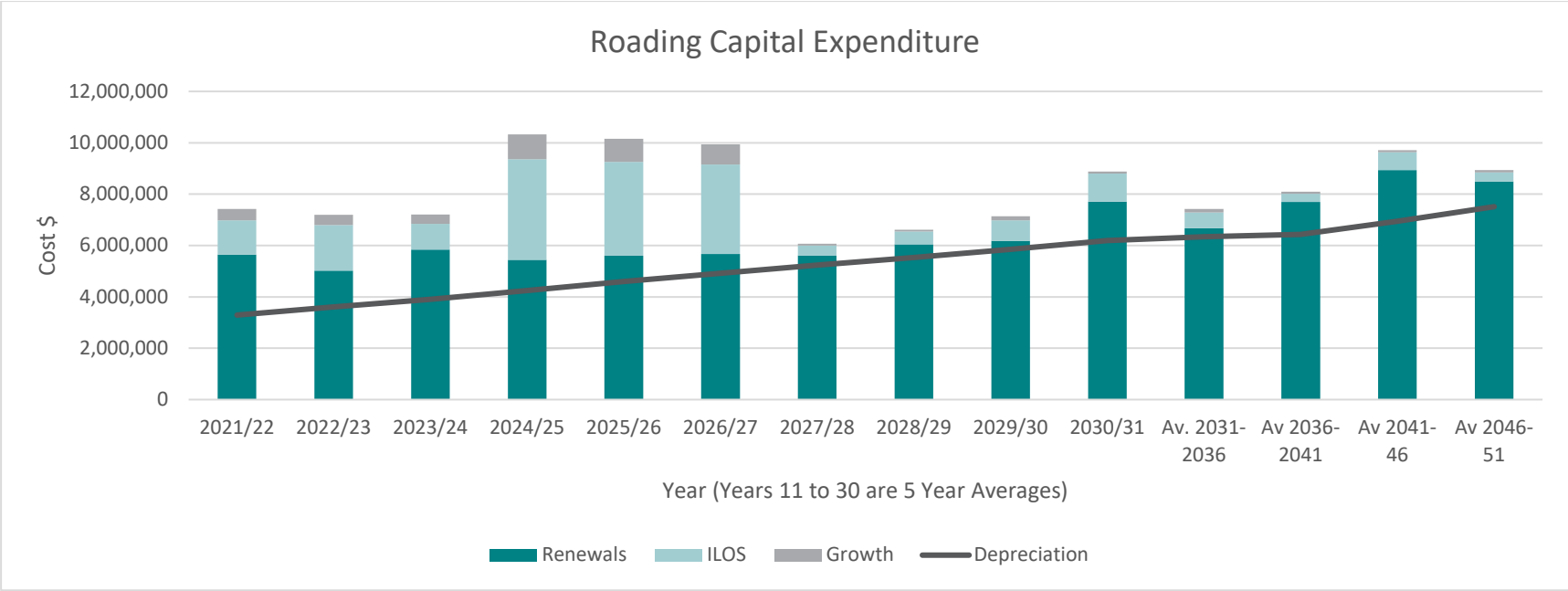


Figure 12.4.2 Projected Capital Expenditure – Roading

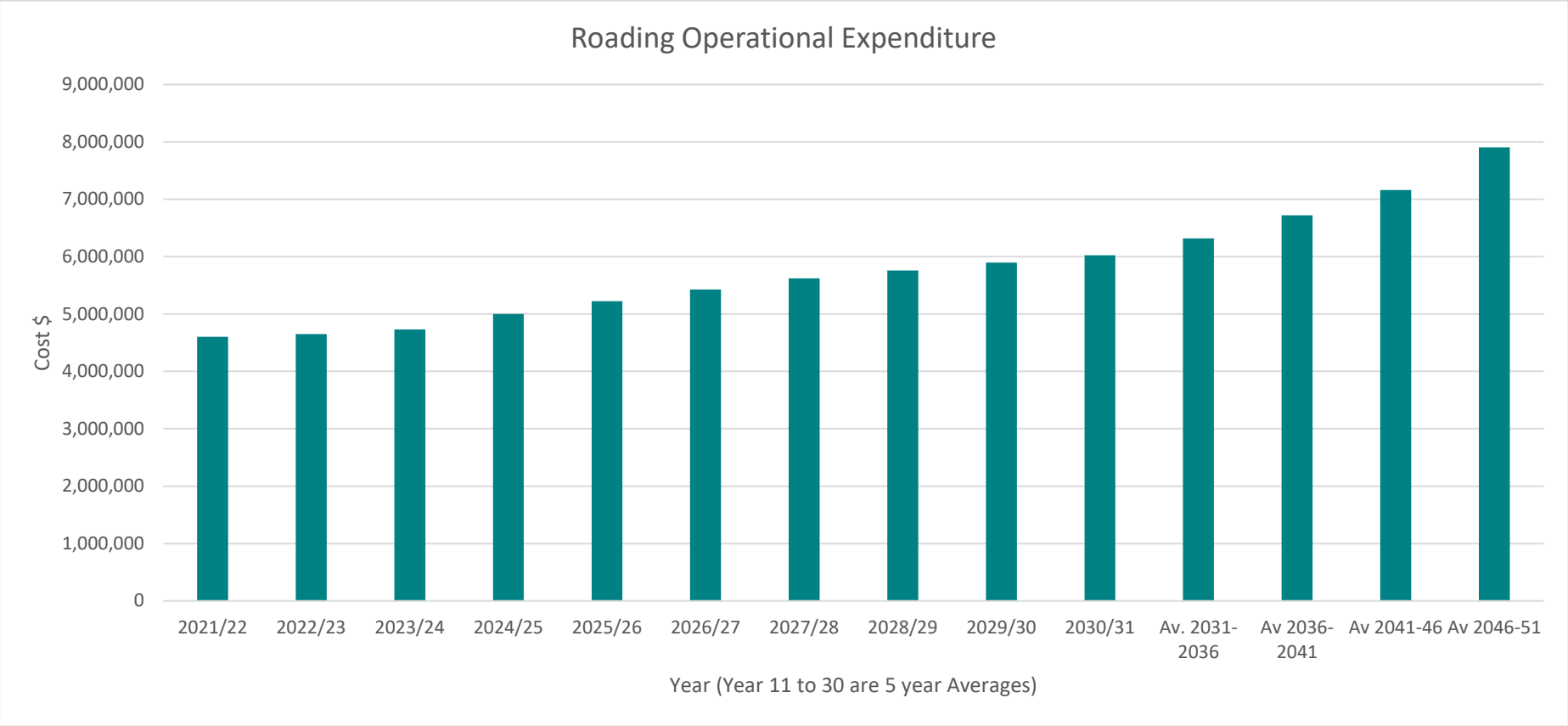


Figure 12.4.3 Projected Operational Expenditure – Roading

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2020 Cost ($ Million)	Year	Escalated Cost ($ Million)
Clyde Historic Precinct – Road upgrades	Growth is resulting in increased demand for parking, and use of public spaces, eroding the experience for visitors and locals, and creating safety issues	Completion of remaining two stages, – Lodge Lane, Holloway Street, and angle parking on Fache Street, and Sunderland Street upgrade	Addressing parking by improving access to car parking beside river, reducing speed on Sunderland Street	81% Level of Service 19% Growth	$1.365 $1.60	2021-22 2023-24	$1.365 $1.60
Dedicated cycle path on Alexandra Bridge	Linkage required between Roxburgh Gorge NZ cycle trail and Otago Rail Trail to complete the NZ Cycle Trail linkages. Include viewing platform to view old bridge piers	Construct a clip-on pathway onto side of bridge	Separate bridge is constructed for cyclists and pedestrians, or they share the existing road across the bridge with traffic	41% Level of Service 40% Renewal 19% Growth	$0.22 $1.98	2022-23 2024-25	$0.22 $2.04
Clyde cycle trail connections	No separated cyclepaths between the new Lake Dunstan Cycle Trail and Clyde Historic Precinct. Unclear wayfinding between Clyde Historic Precinct and Otago Central Rail Trail	Provide Traffic Lights on Clyde Bridge. Provide access across Lake Dunstan using a punt and upgraded path to the Clyde Historic Precinct. Improve cycling connections between the Precinct and the State Highway 8 underpass	Provide access to the south-eastern end of the Clyde Historic Precinct via the Clyde Bridge	41% Level of Service 40% Renewal 19% Growth	$0.4 $0.1 $0.9	2021-22 2022/23 2025/26	$0.4 $0.1 $0.95

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2020 Cost ($ Million)	Year	Escalated Cost ($ Million)
New Footpaths	Growth, aging demographic and increased traffic exacerbates safety issues where there are gaps in the existing footpath network	Construction of new footpaths and cycle ways, in conjunction with providing compliant crossing facilities	Vulnerable users share the road with vehicles or walk on road verges.	81% Level of Service 19% Growth	$3.0 (0.1 annum)	2021-2050	$4.19
Cromwell Town Centre Intersection Upgrades	Growth in population and visitors is placing pressure on key intersections. Safety issues at intersections will be exacerbated with higher traffic demand	Sargood Road/ /Murray Terrace roundabout	Install traffic lights	81% Level of Service 19% Growth	$0.1 $1.9	2022/23 2026/27	$0.1 $2.07
		Realignment of Murray Terrace	Upgrade Illes Street intersection (2 intersection upgrades instead of 1)	81% Level of Service 19% Growth	$0.85 $1.615	2022/23 2026/27	$0.85 $1.76
		Barry Avenue/Murray Terrace Intersection and traffic calming	Install roundabouts or traffic lights	81% Level of Service 19% Growth	$0.2 $0.38	2022/23 2025/26	$0.2 $0.40
		Waenga Drive/Murray Terrace Intersection and traffic calming	Install roundabouts or traffic lights	81% Level of Service 19% Growth	$0.2 $0.38	2022/23 2025/26	$0.2 $0.4
		Barry Avenue/Waenga Drive roundabout	Install traffic lights	81% Level of Service 19% Growth	$0.75 $1.425	2022/23 2025/26	$0.75 $1.51

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2020 Cost ($ Million)	Year	Escalated Cost ($ Million)
Cromwell Town Centre Lanes	Lack of definition of road and carpark areas in Cromwell town centre causes confusion and safety issues for pedestrians, cyclists and vehicles	Change existing lane through carpark to a defined road	Leave existing informal carpark through routes	41% Level of Service 40% Renewal 19% Growth	$0.05 $1.374	2022/23 2024/26	$0.05 $1.431
Alexandra intersection upgrades	Growth in population and visitors is placing pressure on key intersections. Safety issues at intersections will be exacerbated with higher traffic demand	Traffic calming, installation of turning bays and splitter islands	Roundabouts or traffic lights	81% Level of Service 19% Growth	$1.5	2031/32	$1.89
Construction of Alexandra Northern Access Road	Access to residential and industrial development will result in a new road being built to provide access from SH8. There will be a gap between the developers projects across Council reserve land which will be funded by Council	Construct approximately 310m of new road between MacLean Road and State Highway 8 – across Council owned land, in co-ordination with road construction by developers	Construct full length of road between McLean Road and Dunstan Road, including a roundabout at SH 8.	81% Level of Service 19% Growth	$0.41	2025/26	$0.48
Seal extension Sandflat Road	Growth in traffic volumes resulting in excessive maintenance costs and safety issues due to dust.	1.2 km seal extension	More frequent maintenance and renewal, use of dust suppression products	81% Level of Service 19% Growth	$0.41	2024	$0.43

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2020 Cost ($ Million)	Year	Escalated Cost ($ Million)
Seal extension Maori Point Road	Growth in traffic volumes resulting in excessive maintenance costs and safety issues due to dust	Seal extension for 5.85km	More frequent maintenance and renewal, use of dust suppression products	81% Level of Service 19% Growth	$0.217 $1.95	2022/23 2024/25	$0.217 $2.01
Speed Limit Signs	Review of Speed Limit Bylaw will result in changes to speed limits and changes to signs	Install signs to reflect new speed limits	Don't change the speed limits	40% Level of Service 40% Renewal 20% Growth	$0.25	2021/22	$0.25
Small safety projects	Growth in traffic volumes and network usage is resulting in some minor deficiencies in roading geometry, intersections and surfacing presenting an increased risk to road users	Construction of reconfigured intersections and minor geometric improvements, in conjunction with short sections of sealing	Existing Levels of Service are maintained	60% Level of Service 20% Renewal 20% Growth	$3.0 (0.10/annum)	2021-2050	$4.19
New Dropped Kerb Crossings	Growth, aging demographic and Increased traffic exacerbates safety issues where there no cutdowns in the kerbs to facilitate for disabled access from the road to the path	Construction compliant crossing facilities	Vulnerable users share the road with vehicles	70% Level of Service 20% Renewal 10% Growth	$0.55 ($0.05/annum)	2021-2032	$0.61
Neplusltra Street cycle Path	Construction of shared path to connect Alpha Street and the Lake Dunstan Trail to the Cromwell Town Centre	2.2km of separated cycle path and road crossing upgrades within existing road reserves	On-road cycling facilities	81% Level of Service 19% Growth	$0.90	2022-23	$0.90

Project	Problem	Principal Option	Principal Alternatives	Capital Expenditure Split	2020 Cost ($ Million)	Year	Escalated Cost ($ Million)
Sealing rural gravel road/sealed road intersections	Gravel from the side road migrates onto the intersection causing a safety issue, edgebreak occurs on the edge of the seal	Seal back 30-50m on the gravel side road	More frequent maintenance sweeping, grading, and edge break repair	50% Level of Service 47% Renewal 3% Growth	$1.1 ($0.1/annum)	2021-2032	$1.25
Omakau Bridge Replacement	Settlement is occurring in the piers. The single lane bridge is not wide enough to take farm vehicles. The existing structure is nearing the end of its economic life	Construction of a new concrete bridge	Jacking of existing piers, and widening of existing deck	28% Level of Service 65% Renewal 7% Growth	$0.35 $1.99	2028/29 2030/31	$0.4 $2.43
Little Valley Road Bridge Replacement	Timber decked railway bridge on concrete abutments is nearing the end of its economic life. Substandard seismic performance	Construction of a new concrete bridge	Replacement of structural components, and seismic strengthening	20% Level of Service 60% Renewal 20% Growth	$0.35 $3.5	2042/43 2045/46	$0.86 $5.5

Table 12.4.1

Section 8 Assumptions and Risk

Section 4 of both the Water Services and Roading Activity Management Plans outline the assumptions, negative effects and risks for the individual activities. These include specific activity risk registers that follow Councils Corporate Risk Management Policy.

The following tables identify the assumptions that have been made in developing the 30 Year Infrastructure Strategy and associated work programme, and the risks associated with these assumptions.

Assumption	Risk	Consequence	Likelihood	Mitigation
The growth scenario used is appropriate for Council's long term planning	Growth occurs at a different rate to the medium growth projections	Capacity improvements will need to occur sooner, or be delayed	Moderate	Growth projections are reviewed every three years, and project timing is reconsidered based on updated data
There will be more stringent requirements for Urban Water Quality discharges under new national Environmental Standards	The requirements, and timing of compliance are not yet known	The standard of discharge assumed may be over estimated or further costs if standard of discharge assumed is under estimated	Moderate	Upgrade requirements are reviewed every three years as new standards are developed
The implementation period for compliance new national Environmental Standards will occur when existing consents are due for renewal	The implementation period to comply with new requirements may be shorter than allowed for in project planning in this Infrastructure Strategy	Costly upgrades will need to be undertaken earlier	Moderate	Upgrade timelines are reviewed every three years as new standards are developed
There will be no legislative changes regarding the level of treatment required to comply with	It is expected that there will be legislative change as a result of the Havelock North Inquiry It is unknown if this will change the	Financial penalties if prosecuted for not meeting the required standards	Unlikely	Projects to improve treatment of water schemes to meet the bacteria and protozoa requirements will be completed within the

Assumption	Risk	Consequence	Likelihood	Mitigation
the NZ Drinking Water Standards	level of treatment required			first 3 years of this LTP
There will be legislative changes regarding treatment operations, monitoring, and reporting with the NZ Drinking Water Standards	These changes have been indicated through early engagement with Taumata Arowai and the proposed Water Services Bill	Financial penalties if prosecuted for not meeting the required standards	Almost Certain	Council has proposed to increase operational funding for resourcing to improve management and operations of water schemes
The options to solve the problems will be the same in the future as they are today	Technology advances may provide more cost effective options for addressing the problems in the future	Council may over-estimate the cost of addressing some of the problems	Moderate	Constant review of emerging technologies. 3 yearly reviews of the Asset Management Plans, Long-term Plan, and Infrastructure Strategy
The existing infrastructure will perform as expected and expected useful lives will be achieved on significant assets	Mechanical, electrical, biological, and complex process equipment could fail earlier than expected. Climatic conditions could impact on the effectiveness of biological processes. Sedimentation could affect bores at water sources	Additional renewal work could be required	Moderate	Performance monitoring of assets along with condition assessments to determine the timing of replacement of end of life assets
Inadequate human resources to deliver council services	Council is unable to attract or retain a sufficient number of people with the capabilities to	Lowering levels of service and delays in capital projects Increase use of consultants at higher cost	Almost Certain	Workload management, positive workplace culture and leadership.

Assumption	Risk	Consequence	Likelihood	Mitigation
	deliver agreed services			Use consultants to assist with peak workloads. Streamline work processes to make better use of staff time. Use of collaborative contracting models with contractors and consultants to best optimise staff resources across all organisations
The contracting industry does not have the resources to respond to the projected bow wave of central and local government investment in infrastructure	Contractors, consultants, and materials are not available	Higher tendered costs due to reduced competitiveness in the market	Almost Certain	Council staff meet with representatives from local large and medium sized contractors monthly to keep informed of workloads and contractor capacity. This provides information regarding the local market, and feedback from contractors is used to ensure tendering is timed to meet capacity, material order and lead in times are considered in programming, and contract deadlines are realistic and achievable. Contractor feedback is also considered when determining procurement options. Councils across Otago and Southland are also sharing information on upcoming

Assumption	Risk	Consequence	Likelihood	Mitigation
				tenders and construction work programs to manage conflicting demands on the market. Where practical, contracts within Central Otago will be of a size to enable medium sized contractors within the region to tender the work
Projects will be delivered on time in accordance with the funding timeline	Inadequate lead times are provided on projects to undertake investigations and consent work prior to programmed construction dates	Public dissatisfaction and reputational risk due to late delivery on consulted projects	Moderate	Provide adequate lead in times during project and financial planning to enable preliminary investigation, consent, and design work to be undertaken in preceding years to construction
There will be no significant earthquakes which cause widespread damage to Council infrastructure	A significant earthquake could have a catastrophic impact on Council core infrastructure	Service could be lost on parts of the networks	Unlikely	Network resilience and emergency response plans will be developed in 2018/19 to improve our ability to respond to an event
There will be moderate natural disasters that interrupt day to day business and cause damage to Council infrastructure	That events are more severe or more often than anticipated	Loss of business continuity, significant damage to underground assets that are self-insured and increased insurance premiums	Almost Certain	Business continuity planning Council sets aside $120,000 per annum for disaster recovery to cover moderate events and damage to underground assets. Council also has the ability to raise debt for costs above the fund balance, which

Assumption	Risk	Consequence	Likelihood	Mitigation
				currently sit at around $2million
Population growth will occur in the expected locations	Demand for property, and increasing land value in Cromwell, Clyde and Alexandra may result in lower cost alternatives such as Maniototo and Roxburgh experiencing higher than anticipated demand	Greater demand will be placed on infrastructure in Maniototo, and Roxburgh	Moderate	Infrastructure Staff monitor resource consent applications to get early warning of issues such as this Models will be updated more frequently if development occurs in different places than anticipated
External interest income rates are assumed to be 2% to 3% over the life of the plan	Interest rates move affecting interest income	Greater cost through a either lower interest income	Moderate	Duration of investments are set to minimise interest rate exposure Council invests in accordance with the Investment Policy
Internal interest rates are assumed to be 2% to 3% over the life of the plan	Interest rates move affecting interest income and the cost of borrowing	Greater cost through a either lower interest income or higher borrowing costs	Moderate	Duration of loans and investments are set to minimise interest rate exposure Council invests and borrows in accordance with the Investment Policy and Liability Management Policy
Economic growth will continue, and a recession will not occur	Austerity measures are required to reduce public spending	Reductions in levels of service, deferral of improvement and growth related work	Moderate	Annual plan revisions 3 yearly reviews of the Asset Management Plans, Long-term Plan, Financial Strategy and Infrastructure Strategy
That inflation will occur at the rates	Inflation costs may be much higher,	Insufficient budgets to deliver proposed	Unlikely	Work programs will be reprioritised to

Assumption	Risk	Consequence	Likelihood	Mitigation
forecast in the 2020 BERL report	particularly in the next three years	programmes, or levels of service		minimise impacts on levels of service 3 yearly reviews of the Long-term Plan, Financial Strategy and Infrastructure Strategy
Net operational savings will be achieved equivalent to year 2 and 3's inflation rate	Savings are not achieved	Higher rates or reduced levels of service	Moderate	Depreciation and staff cost are excluded for this assumption Management committed to the process
Net expenditure in 2020/21 is the same as planned through the 2020/21 annual plan	Net expenditure does not equal the annual plan	Cash reserves and or fixed assets are not equal to the opening position for the 10 year plan	Moderate	Significant unspent expenditure is carried forward to year one of the plan with little effect on the 10 year plan. Other variance to operating budgets are moved to reserves
The Roading program presented in Council's Long-term Plan will be funded by Waka Kotahi NZTA	Waka Kotahi NZTA may not fund the full programme as presented	Reduced levels of service for roading activities, deferral of renewals work which could result in increased future cost	Moderate	Waka Kotahi NZTA have been involved during the development of the programme. Where increased expenditure is proposed this is supported by evidence and a robust business case which meets Waka Kotahi NZTA requirements. Increased budget has been included following advice from Waka Kotahi NZTA auditors in October 2020
Levels of Service will not	Public expectations may	Reduced public satisfaction	Moderate	3 yearly reviews of the Asset

Assumption	Risk	Consequence	Likelihood	Mitigation
significantly change	change drastically, along with demand for improved levels of service			Management Plans, Long-term Plan, Financial Strategy and Infrastructure Strategy
Council will continue to deliver the core services included in this strategy	Legislation may be changed to place responsibility for some core services with regional or national authorities	The responsibility and cost of delivering these services will be transferred to a different organisation	Almost Certain	3 yearly reviews of the Asset Management Plans, Long-term Plan, Financial Strategy and Infrastructure Strategy
The asset base increases beyond predicted. (Private Water Supplies)	Operational budgets are insufficient to meet demand from increased assets	Level of service failure or unbudgeted expenditure occurs	Likely	Council has resolved that any share of the initial costs to upgrade private supplies to meet the New Zealand Drinking Water Standards that transfer to Council ownership and management are to be met by the private supplier and/or by the Council and will be considered on a case by case basis
Assets are vested in Council which do not meet level of service requirements and require immediate investment. (Private Water Supplies)	Capital budgets are insufficient to meet the costs of upgrading new vested assets to meet service requirements	Level of service failure or unbudgeted expenditure occurs	Likely	
There will be no further tranches of government stimulus funding for water or wastewater upgrades, or to facilitate water reform	Work in later years of the program may need to be brought forward. Inadequate staffing levels to deliver increased programme of work	Opportunities to progress work which is of greatest value to the community may be missed.	Moderate	Progress planning for work which is in years 4 – 10 of the programmes so these are ready to proceed if funding is made available
Council will meet its proposed capital	The programme of work is not delivered resulting in a	Possible impact on levels of service, delays in replacing assets	Moderate to Likely	Council can revise the speed of delivery in future annual plans. Any money already collected can

Assumption	Risk	Consequence	Likelihood	Mitigation
expenditure programme of work	backlog, and financial risk with the introduction of external borrowings to fund Councils capital programme of work	and cost increases. Assets could fail before they can be replaced		be carried forward to a later year to be used at the point of construction

Table 14.1.1