Road Works
Caleb MacDonald

Part 9

INFRASTRUCTURE STRATEGY

Infrastructure Strategy

1. Executive Summary

One of our main functions as Council is to provide core infrastructure to our district, including drinking water, stormwater, wastewater, stockwater and transportation services. These services include $756.7million infrastructure assets and accounted for 31% of our annual operating expenditure and 67% of our capital expenditure in 2016/17.

Our Infrastructure Strategy outlines our high level planned approach to the management of these core infrastructure services over the next thirty years. This strategy enables us to take a long-term strategic view of the renewal and development of our assets, and to plan and manage the capital programme to provide greater certainty for our financial planning. By understanding the condition of our assets, the key risks and emerging issues impacting on our core infrastructure and the options available to manage issues with our core infrastructure, we are better placed to ensure that we continue to provide consistent and reliable infrastructure services to the community.

The key focus for the Ashburton District is to keep building on quality infrastructure in order to encourage and allow for future growth. Our challenge as a district is to create an even more enjoyable place to live and do business. Providing quality services helps attract new people and improves existing residents' quality of life, and ensuring that they also meet the district's needs for the next generation.

The high-level goal for each of the activities covered in this Infrastructure Strategy is:

Drinking Water: "To promote the health and safety of the community through provision of an efficient, safe and reliable drinking water supply."

Stormwater: "To ensure property and the environment are protected and roads and footpaths continue to be accessible during rain events."

Wastewater: "To help protect community health and safety and the environment, through provision of reliable and efficient wastewater schemes."

Transportation: "To enable efficient travel throughout the district to support economic activity and social interaction."

Stockwater: "To promote the productivity of rural land through the efficient provision of clean, reliable stockwater."

There are a range of factors that need to be considered when planning for infrastructure renewal and development. However, the overriding issue is the age and condition of the infrastructure. We have been working hard over the past three years to better understand the condition of our infrastructure with improved data collection and information management across our core infrastructure. This translates to better management of our assets and planning for renewals and capital.

The influence of central government decisions and resulting legislation and standards will continue to impact these core infrastructure services. We have assumed broadly that the government's priorities will not deviate significantly from the current Infrastructure Plan (2015) where the vision is that 'By 2045 New Zealand's infrastructure is resilient and co-ordinated and contributes to a strong economy and high living standards'.

The strategic infrastructure issues that we face over the next 30 years are as follows:

- Drinking Water – managing the renewal programme, backflow prevention, future drinking water standards compliance, demand management and reduced water availability in the future.
- Wastewater – managing the renewal programme, high infiltration and inflow and ocean farm operations.
- Stormwater – managing the capital work programme and associated priorities.
- Stockwater – installing fish screens on intakes.
- Transportation – managing the Ashburton River second bridge project and loan funding of the unsubsidised road renewal work.

We are forecasting expenditure of $128 million on three waters and stockwater, and $93 million on transportation infrastructure renewals and new capital in the 10 years between 2018/19 and 2027/28. This expenditure will allow us to continue to provide the services that are in place now. Decisions to increase service levels by adding or improving services, will mean either increased costs or that existing programmes would have to be reprioritised to include them. That could result in some previously planned work being delayed.

2. Introduction

This is Ashburton District Council's second Infrastructure Strategy. It has been prepared from Council's 2018 suite of Activity Management Plans and forms part of the Long-Term Plan.

The issues discussed reflect the current legislative environment and the communities' priorities across the district.

The financial forecasts are estimates and the reliability of the forecasts decreases beyond ten years and towards the thirty year planning horizon.

2.1 Strategy Layout

The Strategy document sections and corresponding LGA sections are tabled below:

Table 2.1: Strategy Layout

STRATEGY SECTION		LGA 2002 (SECTION 101B)
1	Executive Summary	
2	Identifies the purpose of the Infrastructure Strategy and the core infrastructure included in this strategy	2(a) and 6
3	Describes the district and illustrates the linkage between strategic documents	2(a)
4	Describes the core infrastructure, its condition and performance while recording the significant assumptions, risks and mitigation	2, 3(e), 4 (c) & (d)
5	Discusses the emerging issues that will impact on the core infrastructure assets	3 (b) to 3(e)
6	Discusses Council's response to the emerging issues and the significant decisions to be made during the term of this strategy	2(b), 4(b)
7	Identifies the response options for the significant issues and documents the benefits, costs, timing and funding sources	2(b); 3(a) to (e) & 4(a) to (c)
8	Identifies the costs associated with the actions proposed	4(a)

2.2 Purpose

LGA 2002 Section 101B – Infrastructure Strategy states:

1. A local authority must, as part of its long-term plan, prepare and adopt an infrastructure strategy for a period of at least 30 consecutive financial years.

The stated purpose of the Infrastructure Strategy is to:

a. Identify significant infrastructure issues for the local authority over the period covered by the strategy; and
b. Identify the principal options for managing those issues and the implications of those options.

Section 6 defines infrastructure assets as including:

a. Existing or proposed assets to be used to provide services by or on behalf of the local authority in relation to the following groups of activities:
    i. water supply:
    ii. wastewater and the treatment and disposal of sewage:
    iii. stormwater drainage:
    iv. flood protection and control works:
    v. the provision of roads and footpaths; and
b. Any other assets that the local authority, in its discretion, wishes to include in the strategy.

Collectively, water supply, wastewater and stormwater are referred to as "3 waters" in this and other Council documents.

Flood protection and control works have historically been regarded as part of Environment Canterbury's remit. While large-scale flood protection works such as coastal defences and river stopbanks still fall into this category, there are other aspects to flood protection that cross over with Council activities. We have recently begun developing a Surface Water Strategy, initially in recognition of the need to plan for what remains after water races are closed and the effect of large-scale closures on land drainage, biodiversity and other matters. The strategy also has regard to broader issues including rural flooding and drainage, urban waterway protection, and catchment protection for drinking water sourced from surface water bodies.

Because of the level of work and far-reaching nature of the Surface Water Strategy, Council has decided to continue to include the Stockwater service in this Infrastructure Strategy. Stockwater was included in 2015 because Environment Canterbury's proposed Land and Water Regional Plan sought a reduction in water taken from the Ashburton River for stockwater purposes, and meeting these requirements required significant change in the management and operation of the stockwater network. This is still the case, although good progress has been made towards this goal.

Flood protection will not be treated as a major activity and addressed separately in this document, but will be referenced where it intersects with another activity area.

2.3 Community Outcomes

Council has revised our community outcomes for the district, and have developed strategic priorities to complement these new outcomes.

2.3.1 What are Community Outcomes?

Community outcomes are the future-focused, aspirational goals for the district. These are goals that guide our work of providing quality and cost-effective infrastructure, public services and regulatory functions.

2.3.2 How have these been developed?

The LGA requires councils to include community outcomes in their long-term plans (LTPs) (s.93). However, the process for developing these outcomes has changed significantly. In 2010, an amendment to the Act removed the obligation for councils to collaborate with other organisations when developing community outcomes. Councils can instead focus on what they can directly influence, without having to identify and seek the agreement of other organisations.

We reviewed our community outcomes in mid-2017 as we began our work on developing the draft Long-Term Plan. The most notable change to the community outcomes is that we have included a series of strategic priorities to support these outcomes. These priorities are our commitment to the community in the delivery of our activities and services.

2.3.3 Our Community Outcomes

VISION: The district of choice for lifestyle and opportunity

COMMUNITY OUTCOMES

- Residents are included and have a voice
- A district of great spaces and places
- A balanced and sustainable environment
- A prosperous economy based on innovation and opportunity

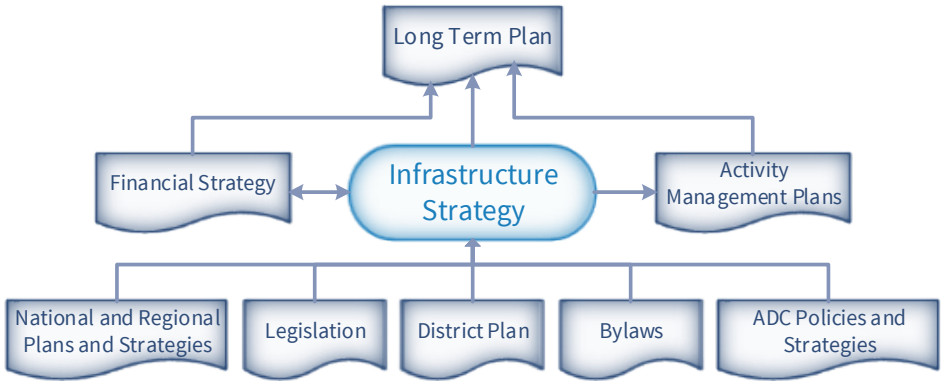
STRATEGIC PRIORITIES

- Plan and provide fit for purpose services
- Work with the community and engage in meaningful conversations
- Lead the community with clear and rational decision-making
- Represent the district on regional/national issues and partner with others when needed

2.4 Linkage with Other Documents

The Infrastructure Strategy has linkages with a range of documents, internal and external. Drawing on the directions and themes from these documents it sets a strategic direction for the Activity Management Plans (AMPs) and the Long-Term Plan (LTP). The figure below illustrates the most significant linkages in detail. Less significant documents have been omitted or grouped into classes for clarity.

Figure 1: Infrastructure Strategy - Linkages with other key documents



Council's Significance and Engagement Policy (S&E Policy) establishes a general approach for determining the significance of Council issues, decisions or proposals and sets out when and how Council will engage the community in decision-making relative to the significance of the decision.

Section 97 of the Local Government Act 2002 requires that decisions to alter significantly the intend level of service provision for any significant activity (including commencing or ceasing such activity), or a decision to transfer the ownership or control of a strategic asset can only be taken if the decision has been explicitly provided for in the Council's Long-Term Plan or through an amendment to the current Long-Term Plan, either or which require the proposal to provide for the decision to be included in the consultation document (in accordance with section 93E).

Council's water supply and reticulation networks, wastewater infrastructure and road network are all defined as strategic assets. This means that decisions that materially change the nature of these assets are automatically deemed significant under the S&E Policy. The degree of significance depends on a number of further factors, including:

- The number of people affected and the level of impact;
- The level of current and potential community interest;
- Whether the issue is of political interest to Te Runanga o Arowhenua as mana whenua;
- The cost and impact on rates;
- The impact on levels of service;
- The risk level of the project; and
- The health and safety considerations.

For example, a routine renewal of an old sewer main serving one street, while being "significant", is unlikely to be of high significance because it affects few people, has minor impact on rates (if depreciation-funded), does not change the overall level of service, and is low-risk because it is a common activity. However, replacing and upsizing a trunk main serving an entire catchment may be of high significance.

In this document we have chosen to focus our attention on the high-significance projects, leaving the routine, low-significance projects for the AMPs.

This document should be read in conjunction with the Financial Strategy. The Financial Strategy looks at:

- The nature and size of Council's asset base and how much money should be spent on them for maintenance and investment.
- The balance between current and future funding to ensure inter-generational equity while operating within Council's established financial policies (for example the Revenue and Financing Policy outlines services Council provides, and how they should be funded).
- Emerging issues or drivers that might change our current assumptions, and plans to mitigate any negative effects of changes.

2.5 Ashburton District Profile

Situated around 80 kilometres south of Christchurch, Ashburton District is in the central South Island. The district is bounded by the Pacific Ocean in the east, the Southern Alps in the west and the Rakaia and Rangitata Rivers at the north and south. The district covers around 6,175 square kilometres and has a population of approximately 34,100 (est. 2017).

Ashburton District is one of New Zealand's fastest growing rural districts with a population increase of 22% since 2006 (approx. 2% pa). This period of rapid, but consistent growth follows an earlier period of little to moderate growth. The recent growth has occurred in both urban and rural parts of the district and is considered to have been driven primarily by strong growth in the local rural economy.

Expansion of reliable irrigation has underpinned changes in land use, mainly to dairying, dairy support and high value crops. This in turn supports local service industries and value-added manufacturing. Other factors, including tourism (Methven), the Ashburton Business Estate and post-earthquake migration from Christchurch have also contributed to population growth in the District but are thought to be minor influences relative to the strong rural economy.

Long-term population projections have been developed based on consideration of historic trends, Statistics NZ projections, and drivers of growth and constraining factors.

The adopted long-term projection indicates district population growth of around 9,000 residents over the next 30 years, reaching around 43,000 by 2047. To achieve this growth it will be necessary to maintain a relatively high level of net migration into the district, without which the population will grow slowly or even stabilise, there is a probability of even a decline. Council will monitor population trends closely over the coming years to identify any departure from the adopted projection, especially any rapid slowing of growth, ensuring that any planning decisions are revised in a timely manner.

3. Core infrastructure

3.1 Core Infrastructure Assets

The core Ashburton District infrastructure assets are tabled with 2017 optimised replacement values (ORC) below:

Table 3.1: Ashburton District Infrastructure Assets

ASSET	DESCRIPTION	REPLACEMENT VALUE	% OF TOTAL
Water	Water extraction, treatment and distribution	$112.2M	14.8%
Wastewater	Wastewater collection, treatment and discharge	$118.9M	15.7%
Stormwater	Stormwater collection and discharge	$40.3M	5.3%
Transportation	Including pavement layers, surfacing, culverts, bridges, footpaths, kerb and channel, traffic services, and streetlights.	$453.6M	59.9%
Stock Water	Water intakes, distribution and discharge	$31.7M	4.2%
TOTAL		**$756.7M**	**100%**

3.2 Asset Description

3.2.1 Drinking Water

Council operates and manages 12 potable water schemes. The number of connections varies from 32 (Dromore) to 8,131 (Ashburton). The Lake Hood scheme used to be separate but is now connected via a trunk main to the Ashburton network.

Water is obtained from a variety of sources: surface water intakes, infiltration galleries and deep groundwater bores. Water treatment depends on the source of the water and the needs of the scheme. Deep (secure) groundwater may have chlorine addition only, or chlorine addition plus pH correction. Surface water or shallow groundwater is filtered in one or more stages and then disinfected using UV. After treatment, water enters the distribution network, either directly or after storage in reservoirs. Booster pumps are used on most schemes to maintain adequate reticulation pressure.

A criticality assessment of reticulation assets has identified some critical assets, predominantly trunk mains and mains located where maintenance and repair would be significantly more difficult or expensive, such as those located under State Highway or railway. Of the most critical categories, one of the raw water trunk mains in Methven is programmed for renewal in two stages, and in Ashburton some mains are planned for renewal as part of the ongoing programme.

The majority of the network is in good condition but there are parts of the pipe networks coming to the end of their nominal useful life and thus being considered for renewal. Renewal of pipes and other assets is not solely determined by age; we also consider information from analyses of samples of similar pipes, numbers of maintenance incidents, and the criticality and risk in the case of failure, amongst other factors. The networks operate effectively, although recent work using minimum night flow and estimates for typical night use suggests that unaccounted-for water loss is relatively high. In the absence of widespread or universal metering and better information, we assume that the bulk of this is leakage. Determining the actual leakage rate, and reducing it is an area of focus in this LTP period.

3.2.2 Wastewater

Ashburton, Methven and Rakaia are served by community wastewater schemes with a total of 9,466 connections.

The majority of the reticulated network operates on gravity, with 14 pumpstations used to service defined subdivisions. The largest pumpstations serve Lake Hood and the Ashburton Business Estate. Wastewater is conveyed to wastewater treatment plants. Ashburton and Methven use aeration and oxidation ponds for treatment, while Rakaia uses clarifiers, a trickling filter and UV disinfection. In all cases treated wastewater is discharged to land.

A criticality assessment of reticulation assets has identified some critical assets, predominantly trunk mains and mains located where maintenance and repair would be significantly more difficult or expensive, such as those located under State Highway or railway. One particularly critical asset for the Ashburton scheme is the pipeline under the Ashburton River that carries all of the wastewater from Ashburton to the treatment plant at Wilkins Road, on the southern bank of the river. This asset is approaching its nominal end of life, is in unknown condition and the consequences of failure would be extreme and replacement would take significant time. Condition assessment was considered and investigated but the opinion of the engineers was that attempts to carry out condition assessment posed a significant risk of damaging the pipeline and may not provide any meaningful information. For these reasons, and because the river crossing is nearing its capacity limits; it will be replaced imminently with a larger, much deeper pipeline and pump station.

The majority of the network is in good condition but there are parts of the pipe networks coming to the end of their nominal useful life and thus being considered for renewal. Renewal of pipes and other assets is not solely determined by age; we also consider information from analyses of samples of similar pipes, numbers of maintenance incidents, and the criticality and risk in the case of failure, amongst other factors. The networks typically operate effectively, but there is a known high level of infiltration and inflow, especially during periods of high groundwater. Progress has been made on reducing inflow from private gully traps, and the ongoing renewal programme will steadily reduce infiltration.

3.2.3 Stormwater

Ashburton District has one significant piped stormwater system serving Ashburton (including Tinwald); Methven and Rakaia have limited infrastructure: some isolated pipes, siphons and swales. Stormwater is conveyed to storage and treatment ponds and then to disposal points (natural waterways, streams, swales and soakpits).

The network is relatively new and in good condition. However, the capacity of the stormwater infrastructure in Ashburton and Tinwald has not been sufficient to prevent surface flooding during heavier rain events and overall the conveyance and disposal capacity is unable to provide the desired level of service. This has been exacerbated by rapid growth which has led to increased hard surface areas with associated increased run-off. The network's capacity will be augmented, along with improvements to the treatment of stormwater, in accordance with the Ashburton Urban Stormwater Strategy (AUSS).

The AUSS is a comprehensive plan to monitor, treat and dispose of stormwater across the Ashburton and Tinwald urban area, with a view to obtaining and operating under a global stormwater resource consent in the coming years. Major infrastructure development arising from the strategy is programmed over the next 30 years.

3.2.4 Stockwater

Council's stockwater network covers the majority of the district to some degree, except where coverage is provided by the Montalto and Methven Springfield piped stockwater/ potable water schemes. The network services approximately 2,100 properties. The network is reducing over time as races are closed, either due to changes in farm practices making stockwater races unnecessary or undesirable, or because water becomes available from an alternative source such as a groundwater bore or irrigation scheme.

Water is sourced from 23 main intakes, including one from the Rangitata Diversion Race (RDR) at Klondyke and the Acton intake which is operated and managed by Acton Irrigation Ltd. The majority are from rivers, streams, springs and drains. 16 of these abstractions are from the Hakatere / Ashburton River system; the remainder are taken from the Rangitata, Hinds and Rakaia systems.

3.2.5 Transportation

Council operates and maintains the fourth longest local authority road network in New Zealand. The network includes urban roads (201km) and a substantial rural network (2,422km). The entire road network is 2,623 km long, comprising 1,507 km of sealed roads (which includes 4km of bridge deck),and 1,116 km of unsealed roads. The footpath network totals 232 km, with 94% located in the three main urban areas of Ashburton, Methven and Rakaia.

Asset types include bridges, road and footpath structures (pavement layers and surfacing), drainage (culverts, sumps, soakpits, kerb and channel, earth surface water channels), traffic services (signs, markings, signals, islands, railings, bollards) and streetlights.

Historically, transportation networks in New Zealand tended to grow in relation to economic and social demand, with a short-term forward planning horizon. The majority of the district's road pavements have therefore evolved from tracks formed on existing in-situ materials rather than being purpose designed. While the area's natural geology

generally provides good road foundations ongoing renewals are required to meet current and future demands.

Bridges are significant (cost) and critical (network resilience) transportation assets. Most of the district's bridges were built between 1960 and 1990 with an average estimated life of over 100 years. Traffic growth and heavy vehicle size and weight changes will diminish the life expectancy to some extent, and in some cases asset replacements will be required in advance of life expectancy to enable continued network resilience.

Drainage assets account for 11% of the 2017 transportation valuation, with culverts making up the majority of this value. Changing weather patterns and land use will require enhanced and innovative stormwater management solutions.

3.2.6 Data Confidence

Confidence ratings are assigned to asset data and financial values as part of the annual revaluation process. The Water, Wastewater, Stormwater and Stockwater asset groups are assigned an overall confidence rating of B, representing an estimated accuracy of ±15%. Breaking this down further, location, quantity and replacement costs are assessed at confidence level B, but there is greater uncertainty around total and remaining life, which for some assets, particularly facility assets, might be graded C (±30%). Total and remaining life is less certain for water pipeline assets than for wastewater and stormwater because of the higher complexity of assessment methods required for pressure pipes.

Transportation assets are assigned individual confidence ratings due to the diversity of asset types - the latest valuation report provides the detailed ratings. Using weighted averages based on asset valuation, overall ratings are; location – A (±5%), quantity – B (±15%), unit cost – C (±30%), total and remaining life – C (±30%).

Since the last Infrastructure Strategy a significant data auditing and cleansing exercise has been carried out on the 3 waters assets. This has improved our confidence in the location and attribute data (material, length, age, size etc), but not enough to cause us to upgrade the accuracy rating overall to an A due to a number of assumptions in the data or missing or poor-quality construction data.

As part of this process the older extrapolated condition gradings associated with assets were not retained. Where condition ratings are based on reliable evidence they have been retained, and new ratings are being added; current ratings are therefore assigned a high degree of confidence. The former ratings were assigned in 1999-2002 and were largely generalised extrapolations. Given the time that has passed, and the findings of CCTV inspections that deviate from the assumed grades, it is fairer to say that the old ratings are no longer representative. This does not make a significant difference to valuation and programming because the ratings were not used to a significant degree, being only a minor component of the decision-making, and generally being confirmed with CCTV in any case. The notable time since previous ratings were assigned was largely caused by resource limitations.

A renewed effort into CCTV and other condition assessment tools is underway and it is proposed to continue this, and a new extrapolated condition rating will be applied when the data are available to support reasonably robust conclusions. CCTV inspection is carried out on all wastewater pipelines programmed for renewal to confirm the need for renewal; this allows the programme to be modified if the results indicate a need for this. Condition assessment of the actual pipelines is not as straightforward for drinking water, but should an analysis of similar pipes imply that a class of pipes is in significantly better or worse condition than expected, the programme would be revisited.

Transportation data validation and condition rating surveys have been undertaken since 2015 for various assets including footpaths, kerb and channel, streetlights and signs. The accuracy of locations and quantities requires some further work (and continuing updates as assets are added or changed) but is generally good. Intended data improvements will focus on the poor cost and life information. Condition data varies considerably with some assets being surveyed annually, while others have never had condition assessments.

Table 2: Definitions and interpretation of confidence ratings

GRADE	LABEL	DESCRIPTION	ACCURACY
A	Accurate	Data based on reliable documents	±5%
B	Minor inaccuracies	Data based on some supporting documentation	±15%
C	Significant data estimated	Data based on local knowledge	±30%
D	All data estimated	Data based on best guess of experienced person	±40%

3.3 Assumptions and Risk

A risk assessment has been carried out for the activities covered by this strategy. Some risks identified are common to all activities, while others are specific. Only risks ranked as high or extreme (before mitigation) have been included for this discussion unless they are exceptional.

Where a risk has been identified, we have made an assumption about the likely outcome and planning is based on that assumption. We have also identified the effect on our planning, should our assumptions prove to be incorrect.

Some risks, particularly around natural disasters and climate change, are discussed in more detail under section 4.7 - Improving Infrastructure Resilience.

3.3.1 Common assumptions and risks

3.3.1.1 Population Growth

Assumption: Population will continue to grow, reaching approximately 43,400 by 2048. This is a slight slowing of growth compared to the 2015-25 LTP assumption.

Risk of the assumption on planning: An incorrect assumption would lead to overspending on unnecessary infrastructure or renewing infrastructure early to add unwarranted capacity, or underspending and having inadequate infrastructure.

Mitigation: Population projections are based on the best available information from Statistics NZ. Council monitors population trends at least on a 3-yearly basis and revises planning decisions accordingly.

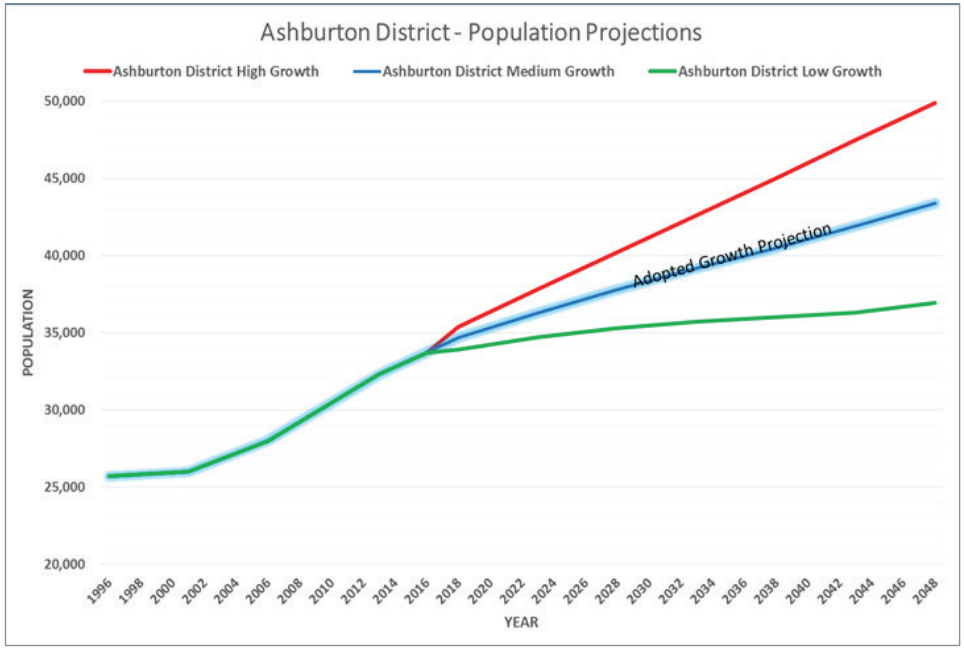
An important risk for all activities is that population growth and economic growth does not occur in line with the adopted projections, either higher or lower. When considering future infrastructure needs with a 30-year or longer timeframe, and with reticulation asset lives being up to 100 years, incorrect assumptions could lead to overspending on unnecessary infrastructure or renewing infrastructure early to add unwarranted capacity.

We have adopted a long-term projection of growth by around 8,700 residents over the next 30 years, reaching around 43,400 by 2048. To achieve this growth it will be necessary to maintain a relatively high level of net migration into the District, without which the population will stabilise or even decline. This projection assumes a modest decline in the rate of growth from the current rate, and is a compromise which is intended to prevent overspending caused by too high a growth rate being assumed.

Population projections are derived from an assessment of historical, current, and likely future trends in births, deaths, and migration – the three components of population change. Assumptions about future fertility (births), mortality (deaths), and migration are formulated after analysis of short-term and long-term historical trends, government policy, information provided by local planners and other relevant information. Assumptions are set first at the national level and used as a constraint for the subnational assumptions (this 'top-down' approach prevents implausible projections for any area).

To mitigate against any departure from the adopted projection, especially any rapid slowing of growth, Council will monitor population trends at least on a 3-yearly basis and revise planning decisions accordingly.

Figure 2: Ashburton District population projections and adopted growth projection



3.3.1.2 Natural or Manmade Disaster

Assumption: We will be affected by one or more natural or manmade disasters in the life of this LTP, and plan accordingly.

Risk of the assumption on planning: Failing to adequately prepare for foreseeable events would mean that our infrastructure networks would be unable to function to the level expected. However, it is important to balance the actual realistic likelihood of an event against the mitigation cost.

Mitigation: Council participates in, and evaluates information from, regional and national civil defence organisations.

Water, wastewater, stormwater and transportation are defined as Lifeline Utilities under Schedule 1 Part B of the Civil Defence Emergency Management Act 2002 (CDEM Act).

Section 60 of CDEM Act requires each Lifeline utility, amongst other requirements, to:

- ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency;
- have and make available in writing a plan for functioning during and after an emergency; and to
- participate in the development of the national civil defence emergency management strategy and civil defence emergency management plans.

The main risks considered in the Ashburton district are:

- Earthquake
- Flooding
- Tsunami
- Wind storm
- Fire
- Snow
- Technological emergencies (e.g. air crash, rail crash, hazardous chemical spillage, LPG incidents, water supply contamination or a combination).

The Canterbury CDEM Group Plan (adopted 2014) includes a full risk profile for the Ashburton district. In planning for the future we have assumed that we will experience these events and therefore our new and renewed infrastructure will be designed to mitigate these where this is practical, while acknowledging that existing infrastructure may not meet this level of service. The risks identified above are addressed in the subsequent sections in terms of the effects on services, and in section 4.7 Improving Infrastructure Resilience.

3.3.1.3 Reduced decision-making capability, poor investment decisions

Assumption: Rational and optimal decisions are made based on the information available and the judgement of those involved.

Risk of the assumption on planning: If decision-making is not optimal, pipes may be renewed sooner, or later, than they ought to be, leading to wasted life or higher maintenance costs. We may also not be able to take advantage of the best available technology and techniques, raising costs in the long term.

Mitigation: Council is looking, particularly in the Transportation area, at improving the business case and project delivery processes to ensure the highest quality decision-making and prioritisation of resources.

Throughout this plan, we have assumed that decision-making is optimal, given the information available or expected to be available. However, the further forward in time, the more likely it is that the situation will change as greater information becomes available.

Adding to the problem is that new technology may arrive to render our present assumptions incorrect. Again, for programming purposes we have to assume current or foreseeable technology. When new technology becomes available, poor utilisation may result from a lack of technical expertise.

A transition to a “Better Business Case” (BBC) process for programme development and project planning will help to ensure that all relevant information is captured and requirements are anticipated, and that open questions and uncertainties are accounted for in the planning stage. A BBC also acts as a reference point during the implementation phase of the project and can be referred to after the project to determine whether the benefits in the business case were realised. This process is referred to as the “Business

Case Approach" (BCA) in NZTA-subsidised transportation planning.

In addition, ongoing training and professional development for Council staff, operators and contractors is essential.

3.3.1.4 Poor quality of construction reduces asset life

Assumption: Assets will generally not fail prematurely and unexpectedly because of defects in materials or construction.

Risk of the assumption on planning: Decisions have been made on the timing of renewals based on the expected likelihood of experiencing failure or increased maintenance cost. If these are incorrect, emergency repairs or replacement may be needed, which increases costs.

Mitigation: New assets are rigorously tested before acceptance. Existing assets are inspected where practical to check for defects that might indicate early failure.

We generally assume that assets will last for a standard useful life based on material, size, age, and other attributes, although the expected useful life may be modified if specific information comes to light (e.g. through condition assessment or based on an established pattern). However, there remains a risk of assets needing to be replaced early if they are not constructed to the required quality. The effect of this is an increase in unplanned maintenance and renewal expenditure.

Attention needs to be paid to rigorous testing before accepting an asset. A new process is in development to track new assets vested in Council, from the early engineering approvals through to final inspections and the acceptance of records and drawings. This will formalise the process and give confidence that new assets have been constructed and tested to appropriate standards.

3.3.1.5 Other general assumptions

There are some other basic assumptions which underpin our forward planning:

- Expected levels of service (for three waters) do not change from current. Transportation levels of service are expected to change once the One Network Road Classification (ONRC) is fully implemented, but at the time of writing there are no confirmed changes to the levels of service.
- Projects will proceed as planned and programmed.
- Existing resource consents and legislation will not change significantly.
- Approaches to service delivery and ownership models for assets remain as they are.
- Council funding provisions from insurers, internal funding and government subsidies is sufficient to reinstate core infrastructure in event of natural disaster within the next 30 years.
- The Funding Assistance Rate (FAR) received by Council for NZTA-approved subsidised transportation works will remain constant for the next 27 years. The risk arising from changes to this FAR (specifically where subsidies are reduced) is increased local funding through rate rises or separate levies/taxes.
- Council's asset data is reliable and complete enough to support sound planning and decision-making.
- Legislative changes will be introduced with regard for local government planning cycles and timeframes, allowing adequate time to implement any recommended or mandated changes, especially those involving major capital work and expenditure.
- Robust and comprehensive business continuity systems and documentation are required to mitigate risks related to staff changes. Local authority business and management practices have historically relied heavily on personal staff knowledge and experience gained through long tenures. Nationally, staff turnover is increasing and employment periods shortening, which increases the risks of losing undocumented procedures, information and event history.

3.3.2 Water

3.3.2.1 Loss of water supply

Assumption: Our current water sources will continue to be viable and not lose significant capacity in the lifetime of the plan.

Risk of the assumption on planning: Where a source turns out not to have long-term viability, or a source is seriously damaged, the (unbudgeted) cost to provide alternatives could be very high.

Mitigation: We monitor long-term weather and groundwater trend data to identify trends.

We also engage with ECan and others to access the best available groundwater science.

Two main risks to the long-term continuity of water supplies are:

- Some sources are susceptible to falling water levels caused by drought, excess abstraction upstream, or a combination of factors; or
- Pumps or other equipment may fail, or damage may be caused to a bore, gallery or headworks.

The likelihood of this is low, but where an incident is long-lived the impact, and cost, could be high. Most of the supplies are sourced from deep groundwater bores where the supply is proving reliable from year to year, although there are a few exceptions.

To mitigate these risks, we carry out ongoing monitoring of seasonal and long-term weather and groundwater trend data, and investigate where schemes are vulnerable. This includes working in partnership with ECan and a local hydrogeology consultancy who have developed a groundwater model for the region that can be applied to our own bores to improve the degree of certainty of our forecasts.

As an example of work undertaken, the Mayfield water supply spent several months in 2017 on emergency water restrictions after the water level in the bore fell to under 0.5m above the pump. This situation was identified in time and managed to ensure continuity of service. We have plans for dealing with short-term losses of service due to equipment failure. Formal plans for long-term loss of supply are not fully developed.

3.3.2.2 Contamination due to backflow

Assumption: The risk from backflow will be mitigated to an acceptable level by a progressive implementation of the Backflow Prevention Policy.

Risk of the assumption on planning: If the implementation programme is not aggressive enough, the main risks are either a significant contamination incident occurring or regulatory involvement from health authorities for failing to take all practicable steps to provide safe drinking water. Accelerating implementation would increase costs.

Mitigation: The high-priority properties have been identified as part of the policy development, and implementation will begin with the highest risks first. New connections are given strong scrutiny to ensure they comply with the policy.

Backflow is where water flows back from private property into the network at large. This water may have been contaminated, and the contamination could be spread. An example is a swimming pool connected to the public mains; if the pressure in the reticulation drops for any reason, swimming pool water might flow into the mains and then go on to be supplied to nearby customers.

Backflow risk is reduced by using backflow prevention devices on water connections, such as double-check valves or reduced pressure zone devices.

Council has a Backflow Prevention Policy, effective 13 August 2015, linked to the new water supply by-law adopted on 22 September 2016. Section 10 of the bylaw requires all customers to:

> *"… take all necessary measures on the customer's side of the point of supply to prevent water which has been drawn from the WSA's water supply from returning to that supply."*

The bylaw clarifies that "all necessary measures" includes the use of an approved backflow prevention device, and excluding cross-connections between the public water supply and sources of contamination such as other water sources or systems incorporating other non-potable substances (e.g. chemicals).

Overall the risk is regarded as moderate. There is some large or high risk industry connected to the drinking water supplies, a large proportion of which already have backflow prevention in place and monitored through the building act processes, but the towns do not have a significant industrial or manufacturing base.

New and renewed connections all include appropriate backflow prevention, and have for a number of years, but a large number of existing connections have unknown or no backflow prevention systems in place. The overwhelming majority of these are low-risk properties, such as businesses using the water for non-process uses or residential properties with swimming pools or domestic irrigation systems.

The backflow prevention policy now needs to be given effect to, starting with the highest risks first, and actively managed as business as usual.

3.3.2.3 Non-compliance with DWSNZ or Health Act due to equipment failure

Assumption: The equipment in place is sufficient to meet the DWSNZ and failures are a rare and isolated occurrence. We further assume that we can manage responses to failures in a way that protects public health.

Risk of the assumption on planning: If we are unable to reliably respond to equipment failure in a way that protects public health, we may be subject to regulatory action or prosecution. We could opt to provide true redundancy, but this comes at a significantly higher cost.

Mitigation: Remote monitoring and alarming helps operators and staff to respond quickly to any incidents. Plants are fail-safe in some scenarios, but we propose to improve on this.

All of Council's water supplies have now been upgraded to comply with the DWSNZ, with the exception of Montalto and Methven Springfield which are rural agricultural supplies and where investigations are ongoing.

Active treatment of secure groundwater is not a requirement of the DWSNZ as long as the source water remains proven free of contamination; these sites are generally fail-safe, although overdosing is still a risk.

However, where treatment is necessary for DWSNZ compliance, for example at shallow bore and infiltration gallery sites, single-component equipment failures could render the supplies non-compliant. For example, an UV unit may lose power while still allowing water to flow. There is little redundancy, although the sites are partially fail-safe. For example, plants can be set to shut down if treatment equipment is out of spec for any reason, but this control depends on a PLC making the determination and initiating the response.

Creating redundancy of treatment systems carries an increased cost, and at the moment we are not proposing to provide this. Instead, we regard critical equipment failures as a manageable risk and rely on quick and appropriate responses by staff and contractors to minimise risks.

Remote monitoring is in place at all facilities with alarms to notify operators of process failures, but this is largely untested and a formal programme of regular end to end testing of alarms and critical process control points is proposed to provide confidence that the plant will behave as expected and effectively mitigate the risk.

3.3.2.4 Storage or reticulation capacity insufficient for firefighting purposes

Assumption: The Ashburton scheme is, and will continue to be, designed for firefighting purposes. We also assume that we will continue to provide the same level of service into the future, including not raising levels of service for other schemes.

Risk of the assumption on planning: Committing to providing a higher level of service on currently non-firefighting supplies would require upgrades to pipework, pumping and storage that have not been budgeted for. Lowering levels of service would open Council up to reputation, or potentially legal, risks.

Mitigation: New development is assessed against the Fire-fighting Water Supplies Code of Practice, and any upgraded infrastructure needed is provided by the developer. We engage with Fire and Emergency NZ to ensure our levels of service are understood.

Not every scheme is designed as a firefighting supply; Ashburton is designed to meet the requirements in the New Zealand Fire Service Fire-fighting Water Supplies Code of Practice, while Methven and Rakaia meet the requirements to some extent but not fully. Other schemes with hydrants have these primarily for flushing or for filling firefighting tankers.

If we do not provide adequately for firefighting, particularly when there is an expectation that this capacity will be in place, risk is increased property damage or loss, and associated reputation (or even financial) loss to Council if the cause is identified as inadequate infrastructure.

As development takes place, schemes need to be continually assessed to check their alignment with the firefighting requirements, in terms of water storage and available flow capacity. For planning purposes, we have made the assumption that any new and renewed infrastructure will be designed to meet the firefighting code of practice. However, we also assume that a continued focus on reducing scheme leakage will free up flow capacity without a need to increase source and treatment capacity. Any proposed infrastructure additions in this area are to provide hydrants in newly-developed areas, not to increase supply capacity.

3.3.2.5 Contamination or damage due to repairs or incorrect commissioning of new works

Assumption: Reticulation risks are well-managed through existing procedures. Facilities

are assumed to be operating satisfactorily and their risks well-managed in practice.

Risk of the assumption on planning: Under this assumption we propose no sweeping changes to operating procedures that would significantly affect costs. If the review identifies that plants have not been commissioned correctly there may be remediation costs.

Mitigation: Plant operators are experienced, qualified and trained.

Water supplies are at considerable risk when repairs, maintenance or modifications are being carried out. The operations and maintenance contractor has documented, well-established procedures for mitigating these risks for routine work and critical stages of project work, particularly in the reticulation, such as live tapping or shutdowns.

However, formal commissioning procedures for new facilities need to be developed to ensure a consistency of approach, and to ensure that all parties understand the changes and how to operate any new equipment correctly. If this is not done reliably, there is a risk of contamination, inadequate treatment or equipment damage. In addition, existing plants should also be revisited to ensure that commissioning was completed correctly and that plants are still operating within their expected operational specification.

3.3.2.6 Failure of old watermains, especially everite, results in unprogrammed renewals

Assumption: Renewal of pipes can be carried out at a rate matching depreciation without a significantly increased risk of unexpected failure and associated maintenance cost.

Risk of the assumption on planning: If the assumption is incorrect, we will need to accelerate or reprioritise the renewal programme, which will come at a higher cost.

Mitigation: The highest-risk pipe, everite AC, has been prioritised for renewal and is mostly replaced. Pipe remaining life assessments are carried out to indicate where assumed lives may be incorrect. Maintenance costs are monitored to check for unexpected increases.

In preparing this strategy and the forward works programme we have assumed that renewal of pipes can be carried out at a rate matching depreciation without a significantly increased risk of unexpected failure. This increases the costs of operations in the short term (to repair bursts) and will lead to an accelerated renewal programme; both of these effects will have a negative impact on rates, so good management is important.

The highest risk of premature failure is from everite AC pipe, which has proven unreliable in the past. A significant proportion of this pipe has been renewed already or is programmed for renewal in the coming years. The remaining pipe will be assessed to determine an expected remaining life and prioritised for replacement accordingly.

3.3.2.7 Failure of a significant reticulation asset

Assumption: Critical reticulation assets will not fail before their programmed replacement date. These dates are in turn based on assumptions about the condition of the assets.

Risk of the assumption on planning: If the assumption is incorrect, emergency renewal or maintenance will be required, with associated higher costs.

Mitigation: Condition assessment is complete or proposed for critical assets where practical, and this will inform future infrastructure programming. Redundancy is proposed where this is appropriate.

There are some critical pipelines in the networks which would cause major disruption if they were to fail unexpectedly. Key examples would be large raw or treated water trunk mains servicing large parts of townships or whole townships or the pipe crossing the Ashburton River.

The first mitigation step is to ensure that condition assessment of these critical assets is up to date, where practical, to estimate the remaining life available. Where replacement is indicated by existing information, this has been programmed. We are assuming that the lifetime indicated by the condition assessment is accurate, but of course pipes might fail unexpectedly.

Although the addition in 2013 of the Tinwald water treatment plant has mitigated the impact of the failure of the pipe across the river, the renewal programme includes upsizing of pipes in Chalmers Avenue so that a second pipeline can be constructed to cross the river when the second urban bridge is built. This builds in redundancy and provides extra protection against anticipated adverse events.

3.3.3 Wastewater

3.3.3.1 Failure of a significant reticulation asset

Assumption: Critical reticulation assets will not fail before their programmed replacement

date. These dates are in turn based on assumptions about the condition of the assets.

Risk of the assumption on planning: If the assumption is incorrect, emergency renewal or maintenance will be required, with associated higher costs.

Mitigation: Condition assessment is complete or proposed for critical assets where practical, and this will inform future infrastructure programming. Redundancy is proposed where this is appropriate.

There are some critical pipelines in the networks which would cause major disruption, as well as pose risks to public health or the environment if they were to fail unexpectedly. Key examples would be large trunk mains servicing large parts of townships (e.g. Trevors Road in Ashburton) or the siphon under the Ashburton River.

The first mitigation step is to ensure that condition assessment of these critical assets is up to date, where practical, to estimate the remaining life available. Where replacement is indicated by existing information, this has been programmed.

The river siphon cannot be assessed because preliminary investigations have suggested that assessment might damage the siphon itself. A project to construct a new Ashburton River pipeline has been brought forward and construction is programmed for 2018.

3.3.3.2 Pump station failure at Lake Hood results in wastewater overflowing into the lake.

Assumption: The existing protection in place is adequate.

Risk of the assumption on planning: We have not allocated any budget for improvements or upgrades, which would be needed if the protection was found to be inadequate.

Mitigation: Dual pumps provide redundancy and alarms provide alerts for emerging problems. Overflow areas are bunded.

A pumpstation failure and overflow is a serious problem, but Lake Hood is particularly vulnerable due to its proximity to two pump stations and due to the number of recreational water users who could come into contact with any contamination.

All standard ADC pumpstations have two pumps installed for duty cycling, as well as adequate storage capacity to allow time to replace faulty equipment before overflows become a problem. They are all telemetered and have alarms for high wetwell levels, to alert operators to respond promptly. This telemetry will be included in the end-to-end testing programme as a critical signal.

To further mitigate the risks around Lake Hood, there is a bunded overflow area in place to contain flow and prevent it from entering the lake.

3.3.3.3 Infiltration and inflow causes overflows at pump stations and treatment plants

Assumption: Overflows are rare and do not represent widespread public health or environmental risks. The current renewal and inspection programmes are sufficient to eliminate these problems over the medium term.

Risk of the assumption on planning: If the rate of overflows does not decrease sufficiently quickly, or the risks are deemed unacceptable, more work will be needed and that will come with a cost. The most likely option is an accelerated renewal programme.

Mitigation: The ongoing Right Pipe Project inspects gully traps to reduce surface water inflow.

There is a known significant level of infiltration and inflow on the Ashburton and Methven schemes, and there may also be problems on the Rakaia scheme in the private (on-property) reticulation. This additional water comes mostly from groundwater infiltration into pipes and manholes, and from surface water inflow into gully traps and manholes.

The ultimate effect of this extra water in the network is to overwhelm the capacity of pump stations and trunk mains, causing overflows, and at the treatment plants themselves, causing poor treatment quality and overflows.

The Wilkins Road and Ocean Farm wastewater treatment plants have defined and consented overflow points that discharge into swales leading to the Ashburton River. The environmental consequences of major overflows are significant, as are the reputational effects and remediation costs.

Limited infiltration investigation and remediation work has taken place in the past, including lateral sealing and patch repairs, focused on Tinwald. This will be resumed to reduce infiltration, and the new groundwater level monitoring bores installed in 2016 will help target priority areas for investigation.

The Right Pipe Project, which inspects gully traps to ensure surface stormwater cannot flow into the wastewater system, will continue.

3.3.4 Stormwater

3.3.4.1 Inability to meet compliance requirements for discharge quality

Assumption: The programme of works proposed for the 30 year period are sufficient to ensure compliance with the proposed global stormwater resource consent.

Risk of the assumption on planning: There is an extensive programme of works proposed. If the requirements of the consent are more demanding than anticipated, or if the works do not provide the level of treatment required, the programme would need to be revisited and modified. There is likely to be a cost increase.

Mitigation: The proposed consent and Stormwater Management Plan (SMP) have been prepared using the best available professional input. They have been created in consultation with ECan and are being consulted on with other stakeholders prior to lodging.

Presently Council discharges stormwater to ground, to urban streams and to the Ashburton River under existing use provisions and a few isolated resource consents that cover discharges from subdivisions. An application is due to be lodged shortly for a global stormwater discharge consent for the Ashburton (and Tinwald) area to formalise and harmonise all of these arrangements. The procedural document which relates to this work is the Stormwater Management Plan (SMP).

There is a programme of upgrades to improve the quality of the final discharge water. In creating this programme and the Long-Term Plan we have assumed that the global stormwater consent is granted and is substantially the same as proposed, and that the proposed upgrades will allow us to meet the requirements of the putative global consent.

We have also assumed that the requirements for discharge water quality will remain constant over a reasonably long period. Should this not prove to be the case, or should the consent be more onerous than anticipated, additional costs may be needed to further improve the discharge quality.

3.3.4.2 Performance or capacity failure

Assumption: Critical reticulation assets will not fail or exceed their capacity before their programmed replacement date. These dates are in turn based on assumptions about the condition of the assets.

Risk of the assumption on planning: If the assumption is incorrect, emergency renewal or maintenance will be required, with associated higher costs.

Mitigation: Condition assessment is complete or proposed for critical assets where practical, and this will inform future infrastructure programming. Redundancy or an upgrade to the wider network is proposed where this is appropriate.

The networks have known capacity limitations in specific areas, but the assets themselves are generally relatively new and in good condition. We have assumed that no significant asset failures will occur, and that no renewals will be needed to maintain the current levels of service as a minimum. If this assumption is not accurate and a major failure occurs, there is a risk of private property flooding in areas not currently prepared for this.

3.3.5 Stockwater

3.3.5.1 Restrictions in water abstraction and availability of water to consumers

Assumption: The stockwater network will continue in its present form, although some unfocused race closure will occur, at a rate of approximately 100km/yr initially, decreasing over time.

Risk of the assumption on planning: This assumption is subject to change, particularly pending the conclusions and directions of the Surface Water Strategy. In which case, a programme of work will need to be developed and budgeted.

Mitigation: We engage with ECan directly and through the Ashburton Water Zone Committee, to ensure that we are informed of any changes of direction from outside the organisation.

The current Land and Water Regional Plan (LWRP) seeks a reduction in abstractions from the Ashburton River system for stockwater purposes from 5.33 cumecs (in 2012) to 2.9 cumecs by 2023. While this is achievable, and much progress has been made to date, there are no detailed plans for specific closures or reconfigurations, although limited exploratory work has been carried out in the previous 3 years.

The assumption under which the Stockwater activity operates is that the network will continue in its present form, although the total length of races reduces by approximately 100km per year as a result of unfocused local race closures initiated by individual customers.

3.3.6 Transportation

3.3.6.1 Bridge failure

Assumption: Bridges will not fail before their programmed replacement date. These dates are in turn based on assumptions about the condition of the assets

Risk of the assumption on planning: If the assumption is incorrect, emergency renewal or maintenance will be required, with associated higher costs. There could also be network disruption and impacts on alternative routes.

Mitigation: Condition assessment is complete or proposed for critical assets where practical, and this will inform future infrastructure programming. Redundancy is proposed where this is appropriate.

Bridges are the main pinch points of the roading network. Where these fail the only option is to divert traffic. The district's network layout and topography is more amenable to detours than many other areas of the country, but when they occur both road users and assets are stressed – increasing the potential of harm to both. The risks of bridge failure range from short-term condition impairment and user delays, to long-term network disruptions and permanent route closure.

The extent of risk minimisation or mitigation actions need to be especially mindful of costs as the risks, while high in consequence, are low in frequency.

4. Emerging Issues

The task of building, operating and maintaining infrastructure assets in an affordable and sustainable manner is subject to a number of significant issues. Some are well-understood, while others are more uncertain. This section discusses a few of the challenges facing the infrastructure networks over the 30 year planning period, and talks about the approaches taken to prepare for and address them.

4.1 Demographic Changes

The population growth projection discussed previously will lead to increased demand for services, particularly for water, wastewater and transportation infrastructure. This has been incorporated into forward planning timeframes and infrastructure sizing calculations. Increased or improved demand management techniques may be able to offset some of these effects, such as delaying the development of additional water sources or applications for new resource consents for larger wastewater discharges.

As the population and local economy grows, expectations may change towards higher levels of service. For example, more intensive use of the transportation network places a greater maintenance burden on Council particularly if levels of service rise in response to the implementation of the One Network Road Classification (ONRC). Demands on transportation infrastructure in particular will also tend towards higher levels of service as the population ages. Mobility declines with increasing age, so new approaches, and investments, are needed to ensure good accessibility.

On the other hand, water consumption exhibits relatively complex relationships with demographic changes. Studies are mixed: some indicate that water use per capita peaks in the 18-24 age group, others point to increased home production of food as a driver of increased water demand[1]. Smaller families and more 2-person adult households are likely to increase per-capita water demand as water is not used as efficiently. This uncertainty over net effects points to the need to monitor long-term trends and identify these early to ensure good planning.

An aging workforce and difficulties with the recruitment and retention of suitably experienced and qualified staff in a rural district, particularly with low unemployment in a strong growing economy, may present issues with the future operation and management of the services and infrastructure projects. The continued development of appropriate staff to meet the challenges of infrastructural demands and regulatory changes is essential to ensure prudent and rational outcomes.

4.2 Urban Development

As well as growth in the population, there is a need to plan for geographic expansion in the urban areas served, particularly though subdivision, both residential and industrial/commercial.

In accordance with Policies 9.1G and H, the current District Plan anticipates future growth and has zoned significant areas of land on the periphery of the townships for residential development, both Residential C (medium-low density) and Residential D (low density, semi-rural), and has allowed for higher density living closer to the centres of Ashburton and Rakaia. The District Plan aims to keep growth to existing settlements to promote energy and other efficiency and to protect the rural amenity resource.

Policies 9.2C-E and 9.3D then require that subdivisions are connected to reticulated networks for potable water, sewerage and stormwater disposal where available, and that upgrades are carried out where necessary and paid for in accordance with the Long-Term Plan.

Council's approach to providing infrastructure for these zones is as follows:

- Requiring the developer to provide the local infrastructure of a subdivision, meaning the reticulation within the boundary of the development and any connections to the existing Council networks.
- Negotiating appropriate cost-sharing arrangements with developers for upgrades of other network assets, e.g. trunk mains, that may be required to adequately service land zoned for development. The share depends on the degree of benefit accruing to the parties.
- Taking account of future development directions when planning renewals and upgrades.

1 Hummel, D., & Lux, A. (2007). Population decline and infrastructure: The case of the German water supply system. Vienna Yearbook of Population Research, 5, 167-191. Retrieved from http://www.jstor.org/stable/23025603

Generally, Council's preference is to follow demand and allow developers to set the direction and pace of network development, rather than to be proactive and have infrastructure in place and unused. Of the residential zones in the current District Plan, large amounts remain unserviced and undeveloped. The development zones are, for the most part, adjacent to existing networks and able to be serviced with perhaps minor upgrades required to nearby pipes.

Exceptions arise when routine renewals are required or when capital works are proposed, such as the Allenton Relief Sewer (ARS) replacement or the addition of a bore to the Ashburton scheme. In these cases the location and character of pipes or facilities is designed to provide optimal benefit given the future shape of the town. Pipes may be upsized at the time of renewal (for example Chalmers Avenue will be upsized partly to prepare for a second river crossing to be installed with the proposed second urban bridge) or may be located so as to provide gravity servicing for future developments (for example it is proposed to locate the ARS to the east of town to enable servicing the zones east of Trevors Road).

A related area is provision for wastewater disposal. Currently only Ashburton, Methven and Rakaia have reticulated wastewater schemes and other residents dispose of wastewater via septic tanks or other on-site means. Expansion of community wastewater schemes to currently unserviced communities is possible in the future but is not proposed at present because of the significant costs and low community demand in previous consultation, and no legislative drivers. It is envisaged that changes in national environmental standards might lead to more public schemes being established in future as villages expand and as controls on treatment levels and discharge quality and quantity increase.

4.3 New Technologies

On the whole, new technologies are likely to assist Council to become more efficient and effective in its future delivery of services. It is important to note that typically Council is relatively risk-averse and unlikely to be on the cutting edge of any new technological frontier until the risks and benefits, particularly with respect to whole-of-life costs, have been fully established.

This strategy does not try to forecast every possible technological change, but some near-term highlights have been specifically included for consideration.

4.3.1 Greater data availability

A shift towards client-centric or self-service models for processes and services is likely to lead to demands for more and more information to be made available publicly. And the rise of big data analytics and open data projects will add to this demand.

For example, Council has recently trialled smart water meters which provide daily or hourly consumption information. This information has been analysed internally and used to identify leaks and high-usage properties. Sharing this information directly with customers could be a powerful educational tool; making it available in an anonymised form could, for example, allow agencies to benchmark customers across the region or country, or target water-efficient appliance subsidies at communities with higher than average water demand.

The corollary to this is that expectations around the information available to, and used by, Council in assessing and providing services will also continue to grow. For example, manual water quality sampling is increasingly being augmented or replaced by automated instrumentation; traffic information is increasingly important, as funding evidence as well as use in planning and forward works programming.

4.3.2 Changing vehicle make-up

Moves are being made to phase out the sale of petrol and diesel vehicles, in favour of electric vehicles. This will require changes to be made to the infrastructure to provide for more charging stations. There is potential for a shift away from private vehicle ownership towards a mobility-as-a-service (e.g. Uber or similar), where vehicles spend more time in motion and less time parked. Adoption is likely to be much slower in Ashburton compared to cities, but if this shift eventuates, parking provisions will need to be re-evaluated.

4.4 Changing Government Priorities and Legislative Environment

The government's objective is that New Zealand's infrastructure should be resilient and coordinated and contribute to growth and increased quality of life. This will be achieved through better use of existing assets and better allocation of new investment, as set out in the New Zealand Infrastructure Plan 2015 (NIP).

The NIP provides a vision for New Zealand's Infrastructure that:

> *"By 2045 New Zealand's infrastructure is resilient and coordinated and contributes to a strong economy and high living standards."*

Environmental compliance and progress is reflected through national policy statements and promulgated through regional and district plans.

We have assumed broadly that the government's priorities do not deviate significantly from currently-established patterns. There are some areas where there is uncertainty and we need to be prepared to respond.

4.4.1 Three Waters

4.4.1.1 Drinking Water Standards

The Drinking-Water Standards for New Zealand 2005 (Revised 2008) are approaching 10 years old, and are regarded as showing their age, especially as compliance with the standards is now mandatory and many water suppliers are having varying degrees of success demonstrating compliance.

A major campylobacter contamination incident on the Havelock North water supply in 2016 which led to an estimated 5,500 people contracting gastric illness has given rise to a government inquiry. This first stage of the inquiry focused on the specifics of the Havelock North incident, while Stage 2, which reported in December 2017, considered the wider regulatory environment, including drinking water standards, water safety plans, emergency response and management and governance.

While there has been no formal direction in the form of increased standards or legislation, indications based on the Stage 2 report are that increased standards are more likely than not. We have therefore looked at the most likely scenarios that would affect our supplies and planned accordingly, including making budget provision, rather than taking a wait-and-see approach. Of course, final designs and models might change, but it is our preference to show capital costs if they are expected.

We do assume that, in practice, adequate time will be allowed for water suppliers to implement any recommended or mandated changes, especially those involving major capital work and expenditure.

The most likely impacts on our water supplies are:

- Below-ground boreheads and surface water ingress were one factor in the Havelock North incident. While below-ground boreheads are not necessarily unsafe, it is likely that they will fall out of favour and that it may be difficult to have them signed off as secure. Accordingly, we propose raising the Ashburton and Rakaia boreheads above the ground.
- It is likely that the "secure" status for groundwater will be removed, and that our deep groundwater supplies, which are currently assumed to be protozoa-free and therefore do not require treatment, may require additional treatment or monitoring to demonstrate compliance.

  The assumption made for planning purposes is that "secure" groundwater status will be removed and we have therefore allowed for the cost of installing UV disinfection units on each of the deep groundwater bores; the final cost may turn out to be be lower if monitoring alone is sufficient.
- The rigour and level of detail in water safety plans (WSPs) is likely to be increased, as is the level of enforcement by drinking water assessors of implementation and non-conformances. As demonstrating stronger management of critical control points is a strong theme at the moment, we have provided for adding online analysers for chlorine, fluoride and other additives, with alarms for over- or under-dosing, to demonstrate good control over the treatment process.
- Focus is likely to come on the training for operational and management staff, with an updated qualification framework and certification process envisaged. This will have implications for our current practice, as well as for the next operations and maintenance contract.
- As part of this process the National Environmental Standard for Sources of Human Drinking Water (NES for Drinking Water) is likely to come under closer scrutiny. While this applies primarily to regional councils, any tightening of requirements and standards may have an effect on the way we operate, both in our capacity as a water supplier and also in other activities (e.g. forestry or land disposal of stormwater and wastewater).

The review also hints at the creation of a new national regulator for water. This will be explored further in the government's three waters review, discussed in the next section.

4.4.1.2 Three Waters Review

The government has announced the intention to review the three waters activities, to determine how to improve the management of drinking water, wastewater and

stormwater. This is in response to a number of highly-publicised events (cost overruns on two large wastewater schemes, contamination and illness outbreaks, and concerns from the Auditor General and Productivity Commission about investment and regulation of three waters infrastructure). In particular, attention was drawn to a "dispersal of responsibilities in the sector"[2].

This work is being completed by the Department of Internal Affairs and is programmed for completion in 2018.

The aims of the review, as stated in the Cabinet paper on the subject, are:

- To focus primarily on understanding the challenges associated with managing finances, infrastructure and compliance and monitoring systems; and
- To identify how to make the most of the current regulatory settings, and support greater collaboration between local and central government.

It is too early to accurately predict and plan for the outcomes from this review. At present we are not proposing any specific in-house changes in response, except those already identified elsewhere as improving asset management and operational practices. We are watching the progress of the review and will respond when a clear picture emerges. Some potential, speculative scenarios are:

- A new central regulator may be set up to take over drinking water compliance responsibilities from DHBs.
- A new central regulator may also take over performance monitoring for the sector, replacing to some extent the role of Audit New Zealand and local levels of service and performance monitoring.
- Councils may be encouraged or directed to form regional CCOs to provide economies of scale for the asset management and governance functions, as well as to provide access to greater technical depth.
- Funding may be partially or fully removed from local rates and allocated via a central funding body, using a model similar to the way roading funding is allocated nationally through the New Zealand Transport Agency (NZTA).

2 Government review of three waters services (Cabinet Paper) https://www.dia.govt.nz/diawebsite.nsf/Files/Three-waters-review-Cabinet-Paper_Redactions-applied/$file/Three-waters-review-Cabinet-Paper_Redactions-applied.pdf

4.4.1.3 Fluoridation

Currently only Methven's water is fluoridated. The Health (Fluoridation of Drinking Water) Amendment Bill may pass in 2018. This bill would give DHBs the power to decide whether to mandate fluoridation within their areas, or to direct that fluoride not be added. At the time of writing there is no indication from CDHB on whether or not it would mandate fluoridation if the Bill passes.

Given these uncertainties, we have assumed status quo for the purposes of long term-planning. If the bill passes, the issue will be revisited.

Notably, if the Bill passes, the Ministry of Health will make available $30m of funding over 10 years for councils directed to fluoridate; this funding covers the cost of capital works, and is not conditional on deprivation index or population size. It is not clear if this will be a 100% subsidy, or a lower rate.

4.4.1.4 Emerging contaminants

On a more speculative level, there are additional contaminants which, while not monitored at present, may require monitoring in future, or existing contaminants which will see limits tightened.

An example in drinking water is the possibility that viruses may become an area of focus. Currently these are not routinely tested for, but the US EPA is investigating the potential for regulation. UV disinfection may be sufficient to treat for enteroviruses, or alternative standards and treatment methods may be required.

At present, since this is speculative and there are no a firm proposal we are simply waiting and monitoring, and will respond if and when a clearer picture emerges. For drinking water, for example, this might be when revised Drinking Water Standards are developed and consulted on.

In wastewater, final discharges might require monitoring for pharmaceuticals in future. More likely is a tightening of nitrate loading limits, which might mean further cleaning of the wastewater as part of the treatment process, or the acquisition of additional land to spread the discharge. While this is not firm, and will not be until future revisions are made to the Land and Water Regional Plan, we assume that it will happen before consent renewal and as a result there is additional land expansion tentatively programmed for the later years of the 30-year period for Ashburton and Rakaia, in preparation for renewing the discharge consents and the new consenting environment at the time.

4.4.2 Transportation

The One Network Road Classification (ONRC) is being embedded into the transportation sector over the 2018-21 period. The intent of this system is to provide road users with nationally consistent service expectations, inform and support activity management planning, investment choices, and operational decision-making. Changes are expected to maintenance levels within the district due to ONRC as a result of the customer-focus intent rather than the traditional best for asset approach.

The 2018-21 period will be a work in progress for both NZTA and RCAs enabling changes to ONRC (ready for full implementation by 2021-24) in response to practical evidence. Consultation with the road network users should be held over this period, to ascertain the impact of ONRC where Council may need to address gaps in levels of service, or provide NZTA with evidence of changes required to ONRC. The risks related to these possible changes include reduced road safety, reduced asset quality/performance and customer dissatisfaction.

Over 75% of the district's roads are included in the two lowest ONRC categories (Access and Low Volume), meaning they carry the least amount of traffic. With the intended national "standardisation" through ONRC it will be increasingly difficult to justify the existing funding levels for low-use routes, so it is likely they will experience a reduction in works undertaken. And while levels of service on high volume roads are expected to rise, across the district the net effect of these changes may be perceived as general network decline.

The change of government in late 2017 resulted in modifications to the Government Policy Statement (GPS) on Land Transport. A Draft GPS 2018 was released in April 2018, with a second stage GPS signalled for release in mid-2019. The changes that will most affect ADC are; footpath works now being subsidised and an overall increase in transport funding. The funding increase may result in slightly expanded programmes, but this is unlikely before 2021. The footpath subsidy will likely have an immediate effect on budgets as the targeted footpaths will be lowered to reflect the subsidy input.

4.4.3 Iwi involvement in decision-making

Ngai Tahu occupies all but the most northern part of the South Island, which includes the Ashburton District in its entirety.

Te Rūnanga o Arowhenua, which is based at Arowhenua Marae outside Temuka, have mana whenua (customary rights/authority) in Ashburton District. The rūnanga has developed its own strategic plan to guide future development. Council will look to contribute where appropriate to the achievement of the rūnanga's strategic goals. Arowhenua's strategic vision is: Arowhenua – Nurturing our people through generations, guardians of the environments we live in, progressing our future locally and globally.

Council continues to be committed to building a strong relationship with Te Rūnanga o Arowhenua and working with the rūnanga in good faith. Te Rūnanga o Arowhenua has recently formed and wholly owns Aoraki Environmental Consultancy Limited (AEC); this charitable company aims to "enable meaningful relationships with local and regional councils, local resource users, community interest groups and Te Rūnanga o Ngai Tahu". AEC will provide a focal point and interface between Council's plans and interests and those of Māori.

This relationship is likely to be most critical in the near term for the following issues:

- The proposed global stormwater consent, formalising stormwater treatment levels and discharges to land and to waterways;
- Wastewater consent renewals, where discharge quality and quantity limits will be under consideration;
- Water abstractions, especially as drinking water resource consents are renewed and reviewed.

Early indications based on initial meetings are that working more closely with this major stakeholder will be a net benefit. As such, we have assumed that there will be no impact on the timing or cost of projects.

It is too early to tell if or how this new relationship might change strategic directions, so we have assumed no effect. This position will be reviewed over time as links grow and mature.

4.5 Resource Consents and Renewal

Over the period covered by this strategy, most of ADC's critical resource consents will be due for renewal. In some cases this may be a fairly straightforward exercise, while others will be more arduous. In all cases there will be additional work required and this needs to be planned for and programmed.

Drinking water consents are due for renewal between 2030 and 2045 (Ashburton is the biggest and is due in 2039), and wastewater consents are due between 2033 and 2039.

In the drinking water area the main considerations are likely to be groundwater protection and abstraction volumes. The current Ashburton consent requires all practicable steps to be taken to minimise leakage from pipes and structures, including:

- Area and sub-zone metering
- Leak noise correlation
- Leak noise data-logging
- Active pressure control

And to implement and maintain a Water Restrictions Policy.

It is possible, at least for the larger schemes, that requirements to carry out active water loss detection and minimisation, or to implement demand management, will be required. If they are not, the absence of such measures is unlikely to be regarded favourably at the time of renewal. There is also no guarantee that the consent limits will keep pace with population growth or demand. It may well be that per-capita abstraction limits are held constant or even reduced.

It will be important, as renewals approach, to investigate the consenting environment and if necessary to plan for, or actually implement, these sorts of measures in advance.

The wastewater consents are large and significant, especially for the Wilkins Road and Ocean Farm treatment and disposal sites, and are likely to come under significant scrutiny, and may be publicly notified. It is likely here as well that consent limits will be made more stringent, or at least not keep pace with growth and demand.

A notional amount has been set aside in the financial programme for future land purchases to expand the disposal areas to lower the average effluent loading on the sites. This may be negated by technological or operational improvements, or regulations may change to render the current disposal methods unviable, but the forecasts presented here assume more or less similar technology and systems to the present.

There are two current resource consents directly related to ongoing transportation issues. These permit river bed disturbance at the three sacrificial “sunshine” bridges on the Hinds River when required for repair/reinstatement. They expire in 2040 (Boundary Road and Winslow Road sites) and 2042 (Hackthorne Road site). ADC expects no issues with renewal of these consents.

There will be future consents required for specific bridge replacement or construction – the Ashburton River Second Bridge is a significant project that includes the resource consent costs and application process within its scope.

4.6 Climate Change

Climate change is considered as a critical consideration in Council’s Long-Term Planning. This Council uses guidance from the New Zealand government, based upon the best available climate science, to support the planning.

Planning for the effects of climate change, and preparing communities, is a fundamental of good governance.

The primary effects expected to be experienced in this district include mean temperatures increasing by around 2.5°C, changing rainfall patterns, including less winter rainfall and more intense rainfall leading to floods, and sea level rise.

It is important to note that there is uncertainty about the scale of the impacts expected. Broadly assumptions are based on national- or regional-scale forecasts, and in particular the projections issued by the Ministry for the Environment in 2016[3], although other data may be used where these are available. For example, the stormwater hydraulic model from February 2015, which was used in part to develop the programme, used ECan recommendations.

The Canterbury region has recently established a Regional Climate Change Working Group. One of the key work streams identified is to assemble or obtain information on the specific local impacts of climate change on infrastructure. This is a work in progress, but should help inform decision-making and prioritisation.

Information and models are continuously being refined and forecasts refined, but over the lifetime of significant infrastructure there will always remain some margin of uncertainty. We address this in planning by taking account of published and accepted forecasts when

3 Ministry for the Environment 2016. Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment. Wellington: Ministry for the Environment

sizing and specifying infrastructure. It is not our standard procedure to add capacity (via "safety factors" or otherwise) above these levels.

Looking at the key activities, the most significant impacts are outlined below:

Water

- Summer water demand becomes higher and more intense as temperatures rise, putting pressure on networks and supplies.
- Decreased river flows, lower winter rain and decreased groundwater recharge put supplies at risk.
- Reduced water availability means self-supplies (rainwater, shallow bores, small streams) may become unviable and demand for municipal water scheme expansion increases.
- Lower river flows lead to poorer water quality, including higher risk of algal bloom.
- Increased likelihood of flooding overwhelming urban stormwater systems, caused by fewer but more intense storms.

Transportation

- An increased frequency of extreme rainfall events would require stormwater drainage design improvements for existing and new works to remain efficient and effective. Asset damage would nevertheless be greater with increased storm intensity.
- Reduced rainfall and increased drought conditions affects soil permeability reducing the efficiency of roadside swale drainage.
- Higher mean temperatures increase the drying effects on unsealed roads leading to surface material wind erosion and sealed roads may melt.
- Sea level rise increases erosion thus endangers coastal roads.

4.7 Improving Infrastructure Resilience

Customers have a high and increasing expectation that services continue to function, regardless of external factors. Much of the thinking in this area is focused on the effect of natural disasters on services, but it is important to consider other scenarios. For example, making sure that networks are still usable in the event of vehicle accidents or during periods of maintenance or repair (perhaps through redundant routes) or ensuring that financial crises or temporary funding shortages can be weathered and services maintained. Many other examples exist. This is achieved by planning for, designing for and building in resilience, and improving it over time.

Resilience is the ability to cope with and recover from adverse events. It requires active planning to cope with an event, restore functionality, and rebuild the societal and economic fabric. Communities that actively plan for resilience are less impacted by disaster, recover faster, and endure less hardship than those that do not.

Resilience is based on a design philosophy which acknowledges that failure will occur. Resilience requires early detection and recovery, but not necessarily through re-establishing the failed system.

Overall resilience is a product of four activity areas:

- **Reduction**: Identifying and analysing long-term risks, taking steps to eliminate these risks if practicable, and, if not, reducing the magnitude of their impact and the likelihood of their occurring.
- **Readiness**: Developing operational systems and capabilities before an event happens; including self-help and response programmes for the general public, and specific programmes for emergency services, lifeline utilities and other agencies as required.
- **Response**: Actions taken immediately before, during or directly after an event to minimise impacts and to help communities recover.
- **Recovery**: The coordinated efforts and processes to bring about the immediate, medium-term and long-term holistic regeneration of a community following an event.

Note that resilience is about physical strength or redundancy as well as systemic factors like adaptability, community preparedness and graceful degradation of service. It is also important to work collaboratively with other authorities and agencies so that approaches are consistent. For example, if an event affects multiple districts temporary resources from neighbouring areas may not be available.

When planning for resilient infrastructure, all four areas are touched on. At the time of design and construction, building infrastructure that will survive adverse events, or which will be able to function afterwards, reduces the impact felt when an event happens. Good design also helps with the recovery phase. For example, being able to readily access assets for assessment, repair or replacement, or have ready access to spare parts, or modular systems where damaged parts can be isolated, can all dramatically speed up a return to service.

In order to improve resilience Council's approach will be to continue to:

- Actively participate in Civil Defence Emergency Management and Lifeline Utility planning and activities, at both regional and local levels;
- Promote design and construction standards that ensure infrastructure is able to withstand natural hazards and long term changes in circumstances such as those resulting from climate change (where cost effective);
- Identify critical assets and system vulnerabilities and ensure that mitigation methods are developed for them;
- Investigate and instigate options for alternative service provision and built-in system redundancy;
- Obtain insurance where this is deemed to be the most cost effective approach;
- Invest in business continuity and succession planning and training.

The following general risk areas have been identified to date:

- Snow – can directly damage roads and above-ground assets, and can cause access difficulties preventing repairs and delaying maintenance. Snow can also cause power outages.
- Earthquake – a significant earthquake event (such as an Alpine Fault rupture, or earthquake on another unknown fault) would have a major impact on infrastructure assets, including damage to roads and pipelines and interruptions to power and communications networks. Depending on the scale and localisation, the damage may affect our neighbouring districts as well, so our response and recovery plans need to take this into account and not rely on outside assistance.

  GNS currently estimates that the Alpine Fault has a high probability (29%) of rupturing in the next 50 years.
- Tsunami – coastal areas vulnerable to tsunami and high seas. We have limited infrastructure in tsunami zones, although there are minor roads and some small communities which would be affected. The Ocean Farm wastewater treatment plant is coastal but is elevated on cliffs and generally at or above the 20m contour. Most infrastructure is below-ground. The Hakatere settlement and water supply is partially below the 20m contour, but also at the top of cliffs and the end of the reticulation is approximately 40m inland. Major erosion could pose a threat to this scheme, as could significant inundation of the water treatment plant. Lasting saltwater contamination could also be a threat, since the bore is relatively shallow.
- Floods – prolonged rainfall or an acute period of very heavy rainfall results in surface flooding, resulting in threat to roads crossing rivers (land erosion), inundation of drainage pathways, blockage of water supply surface intakes (sediment), and power outage disruption to water consumers. Access to infrastructure is likely to be impeded so reinstatement might also be delayed. The Ashburton River is believed to be well-protected against all but the most severe of events by the stopbank network.
- Wind – risk of power disruption from high winds through fallen trees bringing down power lines, and of directly impairing access by blocking roads. The likelihood of an event occurring is moderate.
- Fire
- Technological emergencies (e.g. air crash, rail crash, hazardous chemical spill, LPG incidents, water supply contamination or a combination).
- Finance/funding – sources and levels of income or funding relied on historically may alter due to circumstances beyond council's control.

In the Canterbury region as a whole the single greatest hazard, with the most potential to cause widespread significant damage, is the Alpine Fault 8 event. There is estimated to be a 29% per cent chance of a magnitude 8.1 or 8.2 Alpine Fault earthquake hitting the South Island within the next 50 years, which would be 1,000 times more powerful than the Christchurch earthquakes.

Specific resilience issues for the various activities and approaches to addressing them are summarised below.

4.7.1 Planning for resilience

Planning for resilience can be done at each of the key stages (reduction, readiness, response and recovery).

Planning for risk reduction is a crucial component of the process, and is addressed below and throughout this document and the AMPs. For example, resilience is factored into renewal and upgrade programming.

In the readiness area, criticality (and vulnerability) assessments have been completed for the three water assets, while the road network operations and maintenance contract includes emergency event response requirements, and these reference an emergency event road hierarchy plan that provides response/reinstatement timeframes.

For response and recovery, high level emergency response plans have been created at the national and regional level, and Council has business continuity plans and general emergency response plans; all of these plans link together to help provide a coordinated response to an incident. Civil Defence prioritisation is the governing factor when an official Emergency Operation is activated. Overview response plans exist for service delivery. Detailed scheme-specific emergency response and recovery plans for the three waters are being developed, while transportation, as noted above, builds this into the operations contract.

4.7.2 Activity-specific measures

4.7.2.1 Three waters

Resilience is an important design consideration for reticulation design and construction, and was built into our standard design specifications when they were reviewed and revised in 2016-17. This was an opportunity to learn from the experiences in Christchurch and neighbouring areas following the Christchurch earthquakes. Improving physical resilience will not happen overnight, but through continuous improvement we reduce the risk exposure and the recovery time and cost.

Specifically in the drinking water area, we are increasing the valving of the reticulation, typically allowing individual blocks to be isolated. This improves our ability to respond to a widespread event by allowing damaged areas to be bypassed and service to be restored rapidly to undamaged areas as pipes are checked and repaired.

Facility design standards are yet to be revised, but a process of systems investigation, testing and review is under way and will provide general and specific recommendations to improve the reliability of operations, controls and data-gathering. As plants are upgraded or renewed, improved resilience will be considered and incorporated, where practicable.

4.7.2.2 Transportation

To enable and improve network resilience, and economic growth and productivity, components of the rural network that restrict heavy commercial vehicle movements (including high productivity motor vehicles (HPMV) and agricultural machinery) need to be dealt with. The main problems are bridge loading restrictions and inadequate seal widths. Council is planning to address these problems via the maintenance program and in capital renewals. It should be noted that enabling wider network access for HPMVs will also improve State Highway resilience by allowing these vehicles on district road detours that were previously unavailable.

State Highway 1 (SH 1) is the main route through Ashburton and Tinwald, and also functions as a core traffic distributor. A number of factors combine to sometimes cause standstill congestion through the urban area, and other regions are increasingly reporting effects in their localities from this issue. With the Ashburton River Bridge (on SH 1) creating a pinch point, a second bridge has been identified as a critical solution. Design for the second bridge is currently planned for 2020/21 with physical work likely for 2026. Council consider this project should be brought forward and connected with the NZTA Tinwald SH 1 Corridor Improvements.

4.7.2.3 Drinking Water

The water reticulation networks are composed of different materials and thus have varying degrees of resilience. The majority of the brittle (AC) pipeline remaining is in Ashburton and is being replaced steadily with PVC and PE. Transitioning to non-brittle pipe increases resistance to the sorts of seismic events predicted for the Ashburton District in the event of a major earthquake.

The district has a number of small schemes with single water sources, which are vulnerable to disaster or failure. Should a single small scheme be affected these can generally be supplied with tankered water from another scheme. On the other hand a

multi-site failure, or failure of a larger site would be more problematic, and detailed plans for complex events like these are being developed.

There are some other critical points in the network:

- Some schemes have long trunk mains between the source and treatment plant and between treatment plant and reticulation.
- Schemes with single water sources are vulnerable to contamination of or damage to the source. Especially Methven and Rakaia which would be difficult to supply using tankers from other schemes.
- All schemes rely on electrical power either for treatment, supply pressure or both. Generators are available.
- Lake Hood is distant from Ashburton and supplied by a single pipeline.
- The Ashburton scheme has no storage, although it has redundancy in multiple sources.

4.7.2.4 Wastewater

In contrast to the drinking water networks the wastewater networks are more resilient to an electrical power loss, operating mostly by gravity. Exceptions are the small pump stations serving subdivisions, which can be powered by portable generators if a power outage lasts longer than the storage capacity of the wet wells.

Partial treatment at Ashburton and Methven can be provided through oxidation ponds, although the aeration stage of both requires power. Land disposal at Ashburton relies on pumps, although overflows to the Ashburton River are available. Methven's land disposal can operate on gravity alone. Rakaia however requires power for both treatment (pumping and UV disinfection) and disposal.

A significant proportion of the pipework (approximately 55%) is brittle (typically glazed earthenware, with some older concrete) and the brittle areas are also often the areas where pipes run through private property, complicating inspection and repair. These pipes are being replaced progressively through the renewal programme with non-brittle materials, generally uPVC, and relining is being used to address the impacts of working in private property. At the moment we are not accelerating the programme beyond matching depreciation; this may change, but is more likely to change in response to increasing failure rates and maintenance costs before earthquake risk becomes the primary driver.

4.7.2.5 Stormwater

Distribution, treatment and disposal of stormwater is all provided by gravity and passive means. The majority of the piped network is relatively modern reinforced concrete (RCRRJ) or PVC, which are more resilient than brick, earthenware or unreinforced concrete. Failure at joints is the typical failure mode and, while not ideal, this usually does not impede the delivery of the service in the short term.

4.7.2.6 Stockwater

The stockwater network mostly comprises overland earthwork channels, with some culverts under roads, waterways or the rail corridor. Generally these are resilient to seismic events, although culverts are a potential point of weakness; culverts though are generally accessible for inspection and repair. The intakes are at moderate risk from washouts following heavy rain events and high river or stream levels. In these cases they can generally be restored in a matter of days, depending on how quickly water levels return to normal. There is water storage in the network and alternative or supplementary intakes can be increased to minimise the effect of a shortfall.

The network does not guarantee 100% uptime under ordinary circumstances, so the expectation is that users will have on-site water storage or a backup supply. This makes the stockwater service less immediately critical than the other services identified.

4.7.2.7 Transportation

Acknowledging that failures will occur on the roading network, being resilient is having the capability to; withstand disruption, absorb disturbance, act effectively in crises, adapt to changing conditions (including climatic) and grow over time. Assets that are most vulnerable to resilience issues are bridges (failure can sever the network, restrictions can impede growth and accessibility) and drainage assets (where water is not controlled it becomes a road's worst enemy). The district has a network well-suited to alternative routing and while detours can be long they do exist and this assists with maintaining a generally good level of resilience.

Long-term resilience of pavements relating to traffic growth (especially heavy vehicles) is a concern that is being managed through life-cycle planning and renewal programmes.

4.8 Aging infrastructure

Infrastructure is always aging. Each of the activities has distinct challenges around managing the aging of the assets, and different strategies are employed to maintain levels of service. The remaining life of an asset may reduce with population growth and increased use, and asset lives should be regularly updated to ensure forward plans reference the current status.

In the three waters, the district is in a period where significant proportions of the asset base are reaching end of life at similar times, and renewals need to be managed and staged appropriately. To smooth the peaks in the renewal expenditure while avoiding incurring increased maintenance costs and unscheduled failures it is necessary to renew some assets before their nominal end of life while deferring renewal of others as indicated by condition assessments. This 30-year period sees an increased focus on CCTV and other pipeline assessment tools as an information-gathering and forward-planning measure compared to previous years.

Pipeline renewal expenditure is pitched approximately at the level of total scheme depreciation, less an allowance for facility assets. This represents a distribution of renewal spending that focuses on renewing pipes over facility assets. With no strong evidence that widespread pipeline failure is happening or is imminent, and evidence from pipeline inspection that many pipes are in reasonable condition and are likely to be able to be deferred, there is no indication of a need to spend money above depreciation. We anticipate moving past the asset end of life peaks over the next two decades, at current renewal rates. As time passes it may be necessary to increase the pace of renewals if this is indicated by rising maintenance costs; this is a position we review at least every three years.

Annual renewal programmes for footpaths, reseals and rehabilitations, and the ongoing road network and streetlights maintenance and operations contracts address most of the aging transportation assets. Strong economic growth over the last ten years has increased traffic volumes (especially heavy vehicles), which in turn accelerated road faults and damage requiring more maintenance and renewals to meet levels of service. This means that current spending is almost double depreciation. It is anticipated that costs will decrease to match depreciation within 5-10 years. Bridge renewals are dealt with as individual projects as the stock nears end of life. Only 2% of bridges are predicted to require renewal due to age before 2048, and for the following 30-year period 2048-2078 this drops to 1%.

When renewing assets, we have to also account for the projected growth of the population and economy, and greater demand on services. Growth is projected to continue at a modest rate and reach 25% above 2017's level by 2048. This means that renewal programmes must consider the need to upsize or strengthen infrastructure to cover likely future development scenarios. For transportation assets, population or economic growth can result in increased traffic volumes which in turn are likely to shorten lives and degrade the condition of existing transportation assets. Changing traffic composition is of particular importance as increases in heavy vehicle numbers and weights need only be a fraction of light vehicle increases to produce the same wear/damage.

4.9 Surface Water Strategy

As noted previously, Council has recently begun developing a Surface Water Strategy (SWS). The goal for the SWS is to provide links between the different activities and values Council manages for with regards to the water race network, urban streams and stormwater to provide a strategic approach to how Council manages the closures of the water race network and future management of other surface waterbodies.

First and foremost this will affect the stockwater activity. The strategy will guide how water races are managed and maintained, including what happens with races after they are no longer needed or desired for their original purpose. This in turn will mean changes to the pace, cost and approach to race closures, and may mean responsibility for some water races moving elsewhere to suit their eventual purpose.

The effects will also be observed in the stormwater activity. The SWS does not cover stormwater entirely, but does cover surface waterways, rural and urban, which currently receive and convey a significant proportion of the stormwater in the district. In urban areas these include Mill Creek/Wakanui Stream, Carters Creek and Lagmhor Creek in Tinwald, and the stockwater race which runs through Methven.

The strategy is in the early stages; a draft is expected to be adopted in August 2018 for public consultation, although this is subject to change. Once the SWS is adopted, it will be implemented as budgets, consents and other constraints allow. It may also be necessary to make minor modifications to the stormwater strategy to realign the two activities, given the overlaps.

5. Thirty Year Strategy

This section links the current and emerging issues identified above to their implications for Council assets, ending with a summary of the main strategic decision points. Specific issues and projects are then explored in further detail in the subsequent section.

5.1 The Organisation's Priorities

The key focus for the Ashburton district is to keep building on quality infrastructure and amenities in order to encourage and allow for future growth. Our challenge as a district is to create an even more enjoyable place to live and do business. Providing quality services and facilities helps attract new people and improves existing residents' quality of life, and ensuring that they also meet the district's needs for the next generation.

The high-level goal for each of the activities covered in this Infrastructure Strategy is:

Water: *"To promote the health and safety of the community through provision of an efficient, safe and reliable drinking water supply."*

Wastewater: *"To help protect community health and safety and the environment, through provision of reliable and efficient wastewater schemes."*

Stormwater: *"To ensure property and the environment are protected and roads and footpaths continue to be accessible during rain events."*

Transportation: *"To enable efficient travel throughout the district to support economic activity and social interaction."*

Stockwater: *"To promote the productivity of rural land through the efficient provision of clean, reliable stockwater."*

5.2 Asset and Service Management Strategy

In providing services to residents and visitors through the use of infrastructural assets, Council's goal is to ensure that services are constructed and maintained in such a way as to provide agreed-upon levels of service while remaining within approved budgets and complying with applicable consents.

This is achieved through an iterative process:

- Review current and forecast (status quo) resource allocations, drawing from existing long-term or annual plans and budgets.
- Assess how these projections would affect the asset condition and performance, and dependent levels of service, into the future, based on current rates and trends of maintenance and failures. The question to be answered is whether, based on forecast expenditure, the networks will still provide an adequate level of service throughout or by the end of the planning period.
- Adjust the work plan as necessary to achieve the best possible life cycle asset condition and performance within available constraints. Approaches include re-ordering or re-prioritising work items, changing methodologies to provide, for example, a different cost-lifespan ratio, or developing a business case for adjusting the budget. This last option would typically be taken up where it can be demonstrated that it is likely to pre-empt higher maintenance costs or more expensive remediation later. Where none of these options is available or sufficient, some assets may be left to decline in condition to the stage that they require more expensive remedial action later, but at a more convenient time (for example to avoid a short-term spike in spending).
- Work with the Finance team to understand the financial impacts of this programme, and to develop budgets, options and scenarios. This is an iterative process in itself and ensures that the infrastructure and financial strategies are aligned.
- Report the anticipated effects on performance targets, and the impacts on resources, funding and rates, to senior management and elected members, to allow them to provide input and fulfil their leadership and governance roles. Ultimately the balance between performance and expenditure is one which can only be struck in consultation with the relevant stakeholders, including the community at large.
- Manage the 4 Waters and Transportation infrastructure in accordance with Council's assessment of appropriate asset management practice and asset management policy.
- Monitor trends in asset condition and performance, and in maintenance expenditure, as input for the next long-term planning cycle.

The focus in the drinking water and wastewater areas is to manage the ongoing reticulation renewal programme, being watchful for signs that maintenance costs or asset failures are increasing faster than expected which would indicate that renewal expenditure needs to be increased. Networks which were first installed over a handful of years need to be replaced, a process which will take approximately another 10-20 years to complete at current rates.

To enable this to take place in as cost-effective a way as possible, there is an increased focus on condition assessment of wastewater pipes across the age and condition spectrum, to guide renewal expenditure to where it can do the most good.

This replacement programme also allows the opportunity to plan for the future needs of the communities, and pipes are being reviewed and sized appropriately. The new river crossing wastewater pipe and pump station, which will be under construction shortly, are a key part of this strategy.

Across water and wastewater, the operational cost budget has been held approximately constant in 2018 dollars, except for a small increase associated with going to the market and procuring a new long-term contract. The new contract allows for the "locking-in" of contract costs and rates (excluding inflation) which is a significant factor in the stability of the operational budget. The other factor which contributes is that the projected increases in variable costs due to growth (for example the costs of pumping more water from bores, or of treating and disposing of more wastewater) are broadly expected to be offset by improvements in operational practices. For example, while annual population growth of around 1% is projected, the water and wastewater networks are also being renewed at a rate of 1-1.5% pa, providing reductions in I&I and water leakage that are on the same order.

Stormwater is focused on the development of new infrastructure, especially treatment areas to clean the water before it is discharged, and trunk mains to convey water to these treatment areas. This will also address the growing demands for higher levels of service and minimising flooding risks under wet weather conditions.

The emphasis in transportation is to ensure that stated levels of service are met, mindful of the need to modify these where required to balance customer expectations with responsible (and reasonable) fiscal management. This will be achieved by consolidating and optimising the maintenance strategy and renewals programmes, along with improving data condition collection and analysis.

5.3 Cost Effective Delivery of Services

Section 10 (Purpose of local government) and Section 17A (Delivery of services) of the Local Government Act 2002 place a clear requirement on councils to meet the current and future needs of communities for good-quality local infrastructure and local public services, in a way that is most cost-effective for households and businesses, and to review these arrangements regularly.

In the three waters, Council engages consultants to carry out or review designs to keep up to date with current best practice in the industry. Transportation use a design/build contract approach to achieve the same. Where consultants are used, despite the upfront cost, this is a conscious decision taken, in part, to retain access to the breadth and depth of engineering knowledge and experience available to an engineering consultancy, which it would be cost-prohibitive to employ as full-time in-house staff. A transition to using in-house staff for contract supervision has taken place in recent years, which has produced cost savings and added benefits of closer knowledge of the work being carried out and the quality of practices.

Council also has well-established procurement processes, which help make sure that work being carried out is being done at the lowest reasonable cost to the ratepayer, and also to mitigate the risks of fraudulent or inappropriate spending.

To take a wider look at the cost-effectiveness of the services in general, service delivery reviews (LGA 2002, Section 17A reviews) have been carried out on the council's activities to determine whether the existing means for delivering a service remains the most efficient, effective and appropriate mechanism of delivering that service. Most of these have been desktop level reviews, to test whether a more detailed review is necessary. The results are summarised on the following page:

	CURRENT MODE OF DELIVERY	FURTHER REVIEW REQUIRED
Three Waters	**Mixed** Governance and management in-house, daily operations outsourced.	**No** Recommends that options for daily operations are revisited and investigated when the contract is reviewed.
Transportation	**Mixed** Governance, management and road safety in-house, physical works outsourced	**No**
Stockwater	**In-house**	**No** Dependant on Surface Water Strategy

The three waters daily operations is currently covered by a multi-year operations and maintenance contract, negotiated directly with one party. This means that demonstrating cost-effectiveness was not possible. The review has resulted in a decision by Council to progress the development of a new contract during 2018/19, with the aim to competitively tender the work the following year.

A key question raised by the review is whether a fully contracted out delivery model is the right approach for council, and in particular whether there is value to be gained from bringing all or part of the operation (facility operations) in-house. This carries both risks and benefits, and the options will be considered further as part of the contract development process.

Stockwater is currently operated and managed in-house. The service delivery review notes that the service delivery model provides adequate value for money and recommends that Council continues to provide the service in the short term (1-3 years) while there is considerable uncertainty about the future direction for the activity that may undermine any efforts to package and outsource effectively. It also recommends keeping an open mind and returning to this question when the Surface Water Strategy is complete and there is greater certainty.

ADC is part of the Aoraki Roading Collaboration (ARC) along with the Mackenzie, Timaru and Waimate District Councils. ARC works under a Memorandum of Understanding, which includes objectives to improve asset management, investment decision-making and governance. The intent is to develop shared delivery of asset management and network operations. Achievements to date include a shared maintenance contract, improved data management through shared skills and strong technical support through inter-council communications.

5.4 Evidence Base

Council acknowledges there are limitations with its data that affect decision-making. A commitment to improving data collection and analysis is indicated below.

Table 5.1: Data Improvements

ACTIVITY	DATA TO BE COLLECTED OR ANALYSED	VALUE THIS DATA PROVIDES
Transportation	Heavy Commercial Vehicle (HCV) traffic counts	Classification counts are historically poor - this data will identify key routes, and confirm or refute current assumptions. Heavy vehicles cause the bulk of pavement damage and accurate data is vital for forward planning.
Transportation	Pavement condition	Through high speed data surveys, modified visual rating surveys and continued pavement strength testing, the pavement modelling outputs can be used with greater confidence and provide more robust evidence for forward planning.
Transportation	Asset condition surveys	Not all assets are surveyed regularly, or at all, to establish their current condition. Asset condition allows a more accurate determination of remaining lives and asset performance. Recurring surveys will also provide history and show trends.
Transportation	Asset valuation unit rates	Some unit rates used in the valuation process, while acceptable in national comparisons, could be aligned with local rates to provide a more realistic replacement cost and thus depreciation value.
Water supply	Water consumption – universal metering of usage (not for charging purposes)	Allows true consumption and demand to be quantified, and when compared to water supplied this allows public-side loss to be estimated and monitored more accurately. In particular, this can indicate whether maintenance or renewal expenditure needs to be increased or reduced to deal with unknown leaks. At present, we use standard estimates of night-time use and attribute the remainder of minimum night flow to leakage, which may be overstating the scale of any problem. While we would still proceed with the renewal programme, we would alter the details if indications showed that areas or pipe types were more likely to have leaks. If the ratio of metered consumption to leakage is especially high, it may even cause a shift in focus from public leak detection and asset renewal to demand management and private leak detection, or might lead to a rethink of approaches to charging to ensure fairness. A key benefit of metering is that it allows much quicker detection and resolution of private leaks. All combined this means more efficient water use, and delays the need to build increased capacity.
Water Supply	Reticulation pressure	Pressure is currently monitored primarily at the plants and assumptions made about pressure losses and the experience of customers. By verifying actual reticulation pressure, plant pressure can be adjusted in near-real time as demand varies to minimise both costs and losses.

Water Supply	Reticulation water quality	Monitoring water quality in the reticulation is currently through manual sampling only. Following the improvements made to process monitoring at treatment plants, we will now investigate the costs and benefits of automated monitoring in the reticulation. This would allow better understanding of variability around the network and might allow treatment optimisation, e.g. varying chlorine dosing in response to an actual residual.
Wastewater	Critical manhole levels and flows	This can give early warning of capacity problems, blockages and surcharging in critical areas, which provides guidance on areas which may need upgrading or increased maintenance focus.
Stormwater **Wastewater**	Rainfall and groundwater levels	Knowledge of rainfall and groundwater levels helps understand the effectiveness of soakage as a treatment and disposal method, as well as indicating infiltration- and inflow-prone areas. Better information will be fed back into the maintenance, renewal and upgrade programmes to ensure that resources are allocated appropriately.
Three waters	Facility asset condition and performance	While we have a programme of asset inspection and condition grading for reticulation assets, knowledge of condition, lifespan and operational efficiency is relatively poor for facility assets, including the buildings themselves as well as equipment like pumps and sensors. Understanding this helps refine useful life and depreciation calculations, as well as preventing unexpected failures.
Three waters	Telemetry/SCADA cybersecurity audit	As we increasingly rely on data for decision-making, one undervalued aspect is the integrity of the data itself, and the vulnerability of the systems providing and archiving it. At present no upgrades are proposed related to cybersecurity, but work is planned to renew and enhance the existing system. If the cybersecurity audit identifies unacceptable risks with the current system we would need to consider redirecting resources to mitigating those risks, or if that cannot be achieved acceptably, a different system may be needed.

The approach to data collection and management will be discussed in the respective asset management plans and budgets included where appropriate.

5.5 Significant Decisions Required

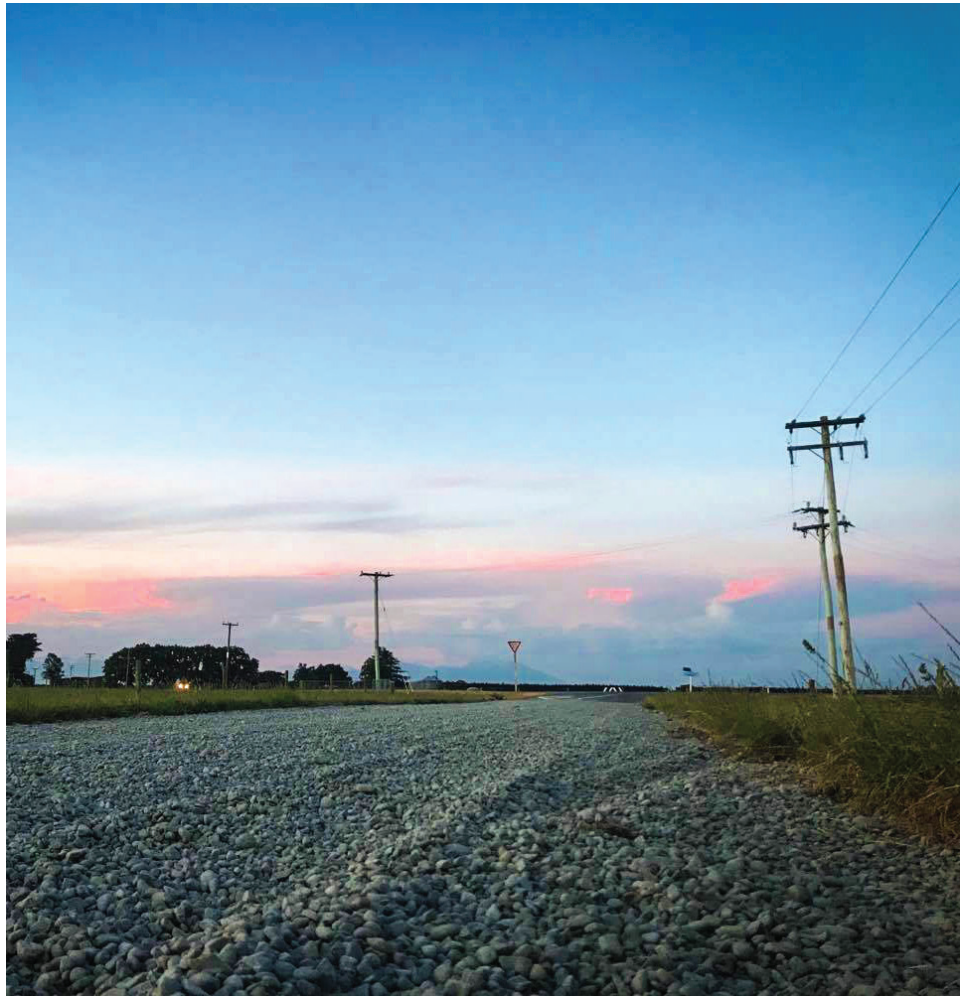
Taking a long term view to the management of infrastructural Assets, Ashburton District Council needs to make key decisions in a timely manner. In addressing community desires and priorities the following key decisions have been identified. Timeframes given in the table are indicative; where a range is shown, this either represents a series of decisions over a number of years (e.g. for resource consent renewals that occur separately over a number of years) or a decision where the timing is uncertain (e.g. response to new drinking water standards where the timetable is outside our control).

KEY DECISION	INDICATIVE TIMEFRAME
Three Waters Delivery of operations services model – in house, contract, mixed. As recommended in the service delivery review, the operations and maintenance contract needs to be put out to tender to demonstrate value for money. As part of the process, a decision will be needed on the delivery model for plant and facility operations. There are strong arguments in favour of taking this aspect in-house, but a cost-benefit analysis needs to be undertaken.	Contract Reviewed 2018/19 Tendered in 2019/20 Start date 1 July 2020
Water Supply Response to near-future standards changes. Following the Havelock North contamination incident, and given the length of time since the last revision, it is expected that drinking-water standards will be reviewed, or at least new recommendations will be forthcoming, although it is not clear precisely when this might occur. This will require significant decisions to be made about treatment approaches and acceptable risk models for service delivery. Placeholders have been added to the programme for at least the first three years for some upgrades in response to Havelock North, but there is likely to be more to come.	2018-20
Water Supply Demand management approaches. At present water restrictions are the primary water efficiency and demand management tool available. In the last 18 months the use of universal water metering for asset management has been trialled with good success observed. Extending this approach, or additional water efficiency measures, may be required to manage peak demand while remaining within environmental and cost limits; otherwise alternative, potentially more costly, interventions like new consents or additional capacity may be needed.	2018+

Water Supply ADC's various resource consents for water are due for renewal between 2030-2045. As they approach renewal, decisions will be required on any approach to renewal. The indicative timeframe given allows a few years before the first consent expires in 2025, to allow time to review options and make capital investments (if required). There is likely to be a significantly different consenting environment in place in 12 years' time, but it is almost certain that renewal of the consents will entail stricter conditions being applied. Potentially reductions in per-capita abstraction might be sought, or at least a commitment to active leak detection or demand management. More involved measures such as merging or closing schemes might also be considered, and these would take time to prepare for. How we approach this next phase will be an important area of decision-making in the coming years in preparation.	2025-2045
Wastewater ADC's various resource consents for wastewater are due for renewal between 2033-2039. As they approach renewal, decisions will be required on any approach to renewal. The indicative timeframe given allows a few years before the first consent expires in 2033, to allow time to review options and make capital investments (if required). Significant land purchase, the consideration of alternative treated wastewater disposal options or significant reduction in stormwater inflow and groundwater infiltration (I&I) in both public and private assets, or a combination of these strategies will be required.	2030-35
Wastewater The Ocean Farm wastewater treatment and disposal site has some operational problems, especially around the wetland, which has impacted on consent compliance and irrigation efficiency. The solutions identified need to be considered holistically. Decision-making and creation of a work plan covering a number of years will be developed during the 2018-21 LTP period, ready for programming in the 2021-24 period. However, some work may be completed early if this ties in with equipment renewals as they come due.	2018-21
Stormwater Prioritising the stormwater needs of the district: The Stormwater Management Plan for Ashburton, Tinwald and Fairton produced an indicative programme of projects to bring our stormwater discharges into compliance, including both pipeline projects and treatment system upgrades. Some adjustments have been made already, prioritising treatment infrastructure over pipeline upgrades, but this balance between localised flood mitigation and environmental impact reduction will need to be kept under review, especially in light of a future stormwater consent. As the Surface Water Strategy, Stormwater Management Plan, Stormwater resource consent and other work is implemented over the 2018-21 LTP period, attention will shift to planning for the next steps. Some may be straightforward and be completed in the 2018-21 period, while others will be programmed for 2021-24.	2018-21

Table continues on following page...

Stormwater Any resource consent applied for will only include the Ashburton, Tinwald and Fairton urban area, leaving the remainder of the district not covered, including semi-rural and rural areas. Extending resource consent coverage from urban Ashburton to the district as a whole will require further investigations, including an Assessment of Environmental Effects (AEE) to consider waterway health, soils and geology, erosion, contaminant loads, contaminated land, effects on groundwater, industrial sites, hydraulic modelling, rural land drainage and identification of overland flow paths. Then decisions will need to be taken about the balance of costs, benefits and risks and a plan put together to achieve the desired outcomes for stormwater across the district. Some of this will be covered under the surface water strategy work.	Initial decisions are expected in 2018, but there is uncertainty in the scope which may delay decision-making or require a multi-stage approach.
Transportation The Ashburton River Second Bridge is a Priority 3 project within the Draft June 2018 RLTP. Council are lobbying for the project to be aligned with the NZTA Tinwald SH 1 Corridor Improvements. Council are also urging NZTA to increase their funding proportion beyond the current 51% due to the benefits it will provide to the State Highway network.	2020+
Transportation There are 25 Rangitata Diversion Race (RDR) bridges that carry ADC roads. They are being formally transferred into Council ownership. Council and Rangitata Diversion Race Management Ltd. are negotiating emergency management issues.. None of these bridges are able to carry HPMVs, and some also have restrictions for standard heavy vehicles. To meet the Council's stated transportation goals and levels of service some of these bridges need to be upgraded. Council intend to upgrade one bridge per year over the 2018-21 period, with reassessment of future works undertaken for the 2021-24 period. The 2018-21 Transportation AMP provides more details.	2018+
Transportation Council has a Town Centre Working Group and in February 2018 allocated $250,000 to develop a new parking strategy in parallel with a streetscape renewal project, including landscape and urban design concepts. It is anticipated that the plan will be completed in 2018/19 with work to commence from year 2 of the Long-Term Plan, subject to Council approval.	2018+



6. Significant Infrastructure Issues and Option Development

The preceding sections have identified and discussed a number of emerging issues faced by Ashburton District Council over the next 30 years or more, some of which relate to specific activities and some that are more general. Some key risks, implications and assumptions have also been discussed and provide context.

This section lists the main strategic decision issues that the council will face in the next 30 years, and identifies options to address them and implications associated with the options. Where the decision is near-term or options are well-developed the discussion is specific; in other cases the decisions may be more about setting a general direction or directing investigation.

In most cases costings are provided for the preferred option only, and are intended to give an indication of the significance of the issue and the implications of choosing the given option. The cost represents the increase in the budget over and above the status quo. Where a project or option involves reallocation of existing resources (for example, using an existing staff member for a new project) the cost is shown as “$0 (existing resources)”. We acknowledge that there is a cost associated with employing that staff member or using those resources, but there is no, or negligible, change in the budget versus status quo.

6.1 Water

Council's principal goal for water over the next thirty years is:

To promote the health and safety of the community through the provision of an efficient, safe and reliable water supply.

Significant infrastructure issues are tabled below. The highlighted option is the preferred approach for addressing the identified issue.

Issue – Renewal Programme

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Reduced renewal rate	Under this option renewal expenditure will be reduced and renewals deferred. It may be that assets might only be renewed when they have failed or are positively identified as about to fail ('just-in-time'), or it might be simply that the programme is prioritised as now and then stretched out. A 'just-in-time' approach to renewals means that pipe lifetimes are maximised, which promises a cost saving, but doing this effectively relies on good knowledge of pipe condition and failure likelihood; otherwise there is likely to be a higher rate of unplanned interruptions due to failures, and higher maintenance costs due to unplanned repairs. Just-in-time renewal also risks expenditure being more variable from year to year, and thus smoothing is likely to be required either in the programme or by monitoring long-term average expenditure. Either version of delayed renewal also risks creating a backlog of renewals (a 'bow wave')
Option 2 – Increased renewal rate	This option increases the rate of renewal expenditure over and above the rate of depreciation. It may be advantageous to get ahead of the 'bow wave' and smooth the renewal profile by bringing forward some renewals rather than delaying some. It is also likely to help reduce water loss through leakage from old pipes and connections, and minimise future repair and maintenance costs, which may offset some of the cost. However, there is a risk that pipes with years of useful life remaining may be renewed early. This option also carries increased costs for the community, and at this point it is not clear that the failure rate is increasing dramatically. Repair and maintenance records should be reviewed regularly to ensure that this conclusion is still valid.
Option 3 – Renew in line with depreciation; weight expenditure towards reticulation *[PREFERRED OPTION]*	This option keeps overall renewal expenditure within the envelope of total water supply depreciation, but weights expenditure towards the reticulation rather than the facilities. This allows the pipes to be renewed slightly faster than indicated by their own depreciation by delaying a portion of facility renewal expenditure. This is supported by facility equipment replacement costs being lower than anticipated, possibly due to low granularity in recorded asset lives, and partly due to increased maintenance.
Time period	2018+ (ongoing review at least every 3 years to check assumptions)
Cost	$12.4M (2018) over 10 years | $14.5M (inflated) over 10 years
What is the benefit	Maintains the current levels of service Financially prudent for the community Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community
Assumption	This assumes that maintenance and repair records are reasonably accurate and therefore that trends are correctly identified.

Issue – Backflow prevention

MAIN OPTIONS	IMPLICATION OF OPTIONS	
Option 1 – Do nothing	Council would not be enforcing its own bylaw, and water supply customers would be exposed to health risks, contravening section 69W of the Health Act 1956, requiring reasonable steps to be taken to ensure that water supplied is wholesome.	
Option 2 – Accelerated roll-out project	This option would involve providing additional resourcing to progress implementation of the policy in a shorter timeframe. This includes inspections and checks, but also advice and public messaging. It may also be unpopular with the community if pushed too aggressively, especially where the risk is perceived to be low or the action seen as disproportionate. The cost implication of this option is likely to be the cost of 0.5-1.0FTE, or on the order of $50,000pa.	
Option 3 – Phased roll-out as part of business as usual, focusing on highest risks first *[PREFERRED OPTION]*	This option allows the process to be managed under business as usual, while making steady progress towards mitigating the outstanding risks, working from the most significant first. There is a chance however that without dedicated status and resources the activity may slow or stall. This will also reduce the availability of staff for other competing projects which may arise.	
Time period	2018 onwards	
Cost	$0 (existing resources) This proposal is to continue with status quo.	$0 (BAU, inflated)
What is the benefit	Maintains the current levels of service and ensures compliance with the Health Act 1956 Financially prudent for the community by including as a part of our usual business Supports our strategic priority of 'planning and providing fit for purpose services'.	
Assumption	The recommended option assumes that under business as usual this activity will be able to proceed and will not be de-prioritised. It also assumed that our estimates of the number of properties in each risk category are accurate.	

Issue – Future drinking water standards compliance– raising below-ground boreheads

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Do nothing, even if future standards do not permit below-ground boreheads	Council would be non-compliant with drinking water standards or unable to obtain an approved WSP if these bores are deemed to be insecure or unsafe, leaving Council exposed to prosecution under the Health Act 1956. This being a highly public risk factor, community perception of water supply safety and Council's approach to risk management may decline if we are seen not to act. Not mitigating a known risk factor exposes water supply customers to increased risk relative to other options. However this option also carries the least up-front cost.
Option 2 – Raise below-ground boreheads only if required by new DWSNZ or other rules	Delaying any action until directed to act may avoid capital cost if the eventual requirements in fact allow below-ground chambers, possibly with increased monitoring or minor modifications. A lesser but not trivial factor is that this option retains the character of the existing bore sites, which in some cases are in public areas (for example, in the Ashburton Domain). However this could be easily ameliorated through context-sensitive design. Some of the same reputation risks exist here as for Option 1, including a perception of a lack of proactivity in protecting public health or of doing the bare minimum. This option does also leave a known risk factor unmitigated. Even if a measure is not explicitly required, Council still has a responsibility to consider it fairly and to balance the risks and benefits to the community. Recent inspections have found that there are some minor water-tightness concerns with ADC's boreheads. Delaying a response also means that the timeframe to make modifications may be out of Council's control, complicating financial planning and possibly increasing overall costs.
Option 3 – Raise below-ground boreheads proactively *[PREFERRED OPTION]*	This option involves proactively raising seven boreheads in Ashburton and one in Rakaia above the ground and constructing an appropriate protective structure for them to prevent damage (whether from the elements, accidental damage or vandalism). The new structures will affect the character of the existing bore sites, which in some cases are in public areas (for example, in the Ashburton Domain). However this could be easily ameliorated through context-sensitive design. This option mitigates a known, and much-publicised, risk to public health. Recent inspections have identified that there are some minor water-tightness concerns with ADC's boreheads. This option clearly demonstrates Council's commitment to protecting public health and mitigating foreseeable risks associated with the water supplies. This is important for demonstrating compliance under the Health Act 1956, requirement to take reasonable steps to provide wholesome water. It also improves public perception and confidence.

Time period	2018-19	
Cost	$220k (2018)	$220k (inflated)
What is the benefit	Maintains the current levels of service and ensures compliance with the Health Act 1956 Financially prudent for the community Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community	
Assumptions	The Havelock North Stage 2 report is widely expected to recommend that below-ground boreheads be phased out. This analysis also assumes that ADC's boreheads are generally of an acceptable standard at present, barring minor, repairable deviations, and would achieve secure status under the DWSNZ (2008 revision).	

Issue - Future drinking water standards compliance – Groundwater bore water treatment

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Do nothing, even if future standards remove secure status and require additional measures	Council would be non-compliant with drinking water standards or unable to obtain an approved WSP if these supplies are deemed to be insecure or unsafe, leaving Council exposed to prosecution under the Health Act 1956. The community perception of water supply safety and Council's approach to risk management may decline if we are seen not to act, especially if non-compliances are publicised. Not mitigating a known risk factor exposes water supply customers to increased risk relative to other options. However this option also carries the least up-front cost.
Option 2 – Upgrade supplies only if required by new DWSNZ or other rules	Delaying any action until directed to act may avoid capital cost if the eventual requirements are less stringent than foreseen. On the other hand, delaying also means that the timeframe to make modifications may be out of Council's control. Not planning and budgeting for anticipated changes risks inconvenient cost increases being required later. This option leaves a known risk unmitigated. Even if a measure is not explicitly required, Council still has a responsibility to consider it fairly and to balance the risks and benefits to the community. Similar reputation risks exist here as for Option 1, including a perception of a lack of proactivity in protecting public health or of doing the bare minimum.

Table continues on following page...

Option 3 – Implement a phased programme of proactive upgrades *[PREFERRED OPTION]*	This option involves proactively budgeting and planning for the installation of additional equipment to provide protozoal treatment or additional monitoring equipment on 8 supplies which source their water from bores. This option mitigates a known, risk to public health and clearly demonstrates Council's commitment to protecting public health and mitigating foreseeable risks associated with the water supplies. This is important for demonstrating compliance under the Health Act 1956, requirement to take reasonable steps to provide wholesome water. It also improves public perception and confidence. This also dovetails with a need to review the performance and condition of the supplies, which are at or approaching 10 years since they were upgraded. Some of the equipment is due for renewal, and there is efficiency to be gained by joining these work streams together. There is a risk that the standards may deviate from any approach we may expect to take. It is proposed to allocate funds and to work with the drinking water authorities on the details of any upgrades to ensure that any equipment actually installed is going to line up with their expectations.	
Time period	2018 - 2022	
Cost	$500k (2018)	$ 525k (inflated)
What is the benefit	Maintains the current levels of service and ensures compliance with the Health Act 1956 Financially prudent for the community Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community	
Assumption	The Havelock North Stage 2 report is widely expected to recommend that the 'secure' status for groundwater be phased out. This analysis is based on the assumption that direct measurement of protozoal protection continues to be based on statistical measures of microorganism removal, because testing is expensive and complicated.	

Issue – Reduced water availability in the future

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Focus on demand management	Under this option there is a strong push made to conserve water and delay the need for upgrades. A full range of techniques is employed, including leak detection, pressure management, restrictions, metering and education. This option focuses capital investment on demand management rather than supply capacity upgrades. This option is likely to be the most cost-effective in the short- to medium-term due to the multiplier effect of investing early to avoid greater capital expenditure on sources, consents and reticulation later. This option also helps Council to meet its obligations to use water carefully and responsibly, and may be necessary to ensure that resource consents are not breached. However there is a risk that this may be insufficient, or that water availability may be affected by factors outside Council's control (such as falling river or groundwater levels due to drought or excessive abstraction).
Option 2 – Focus on expanding supplies	This option involves improving existing sources, increasing storage or adding new sources, with the goal of expanding the supply capacity. Interventions include deepening wells, renewing and extending infiltration galleries, drilling new wells or sourcing water from rivers or streams. This option assumes similar techniques to those used at present. It is important to note that this option is very likely to also require resource consents to be amended to allow increased water takes, since many of the schemes are technically capable of drawing enough water to breach current consents. If resource consenting restrictions are tightened, this option may be rendered irrelevant. Demand management techniques might be tried first (and this may be required to obtain new resource consents) but any major capital investment would be targeted at expanding water sources and supply, rather than investing in demand management approaches such as meters. There are likely to be significant capital costs. There is also a chance that these techniques may ultimately not succeed or last for the whole 30-year period.
Option 3 - Seek alternative sources or strategies *[PREFERRED OPTION]*	This option is not a recommendation, but is instead a catch-all for other unidentified options, if neither of the approaches above are acceptable or if the identified approach is proving insufficient. At its simplest this might mean a hybrid approach combining features of demand management and supply management. It could also involve more dramatic changes, such as: combining schemes; withdrawing supply where it is proving impractical; or new (to Ashburton) technologies like desalination or potable reuse of wastewater (indirect or direct).
Time period	2018+ Planning should begin immediately to set a strategic long-term direction.

Table continues on following page...

Cost	$0 (existing resources) While implementing any strategy identified will come with costs, the strategy development identified here will be done as part of ongoing work.	$0 (existing resources)
What is the benefit	Maintains the current levels of service Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community	
Assumption	This analysis assumes that water demand will increase (or at best, remain constant) in the absence of active intervention. It assumes that the existing consents are not significantly altered by ECan before they expire.	

Issue – Demand management strategies – water metering

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Status quo	Without interventions water consumption may exceed resource consent conditions leading to non-compliances and enforcement. New consents or additional capacity may be needed to meet demand, both of which are expensive processes. In addition, renewal of resource consents in future is likely to be dependent on demonstrating a commitment to demand management; the Ashburton consent includes conditions to this effect already. While this could be delayed, introducing changes earlier allows the impact to be staged and managed. Demand management can be unpopular with the community, so this option, which gives greater perceived freedom may be politically easier.
Option 2 – Metering and charging (universal or for selected areas)	Implementing a metering and charging regime is likely to provide the greatest saving in water consumption of the options. This option creates a clear link for users between their practices and the cost of the water, which has a strong impact on behaviour. Metering allows private leaks to be detected and fixed more quickly, and widespread metering allows a detailed water balance to be carried out, which helps greatly with quantifying and locating water loss in the public network. Volumetric charging also creates a 'user pays' system, which could be perceived as fairer by the community as heavy users are charged accordingly while people can save money by conserving water. Overall the total cost to the community of providing the service may be lower as consumption reduces and so then does the cost of pumping and treating it. However there is a capital cost involved with installing the metering equipment, and an ongoing cost to read the meters and maintain them. Metering and charging could also prove unpopular in the community if the reasons for and benefits of introducing such a system are not carefully explained.

Option 3 – Metering without charging (universal or for selected areas) *[PREFERRED OPTION]*	This option is a compromise between options 1 and 2, with lower expected effectiveness compared to metering and charging, but with less impact on individual users and possibly less resistance from the community. This could be seen as an interim step or as a final solution in itself. The benefits of meters for leak detection (private and public) still exist, although the incentive to fix private leaks quickly may be lower without a direct financial incentive. Enhanced education of the public can also still be carried out using this information by, for example, sending out dummy bills or usage reports. However there is still a capital cost involved with installing the metering equipment, and an ongoing cost to read the meters and maintain them. The proposal recommended here is to proceed with water meters for asset management on the high-consumption schemes first (Hinds, Dromore, Mt Somers and Chertsey) over years 1-3, and to evaluate the costs and benefits before considering a wider roll-out.	
Time period	2018 - 2021	
Cost	$ 178k (2018)	$186k (inflated)
What is the benefit	Maintains the current levels of service Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community in demonstrating leadership	
Assumption	This approach assumes that leakage is managed effectively and does not increase. It also assumes that reducing leakage alone will not be sufficient over the long term to counteract the effect of increased demand or population growth. We assume that consent limits are the same or lower, rather than higher.	

Not included:

- Fluoridation – there is no recommendation to make because the need for a decision is uncertain.

6.2 Wastewater

Council's principal goal for wastewater over the next thirty years is:

To help protect the health and safety of the community and the environment, through the provision of reliable and efficient wastewater schemes.

Significant infrastructure issues are tabled below. The highlighted option is the preferred approach for addressing the identified issue.

Issue – Renewal Programme

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Reduced renewal rate	Under this option renewal expenditure will be reduced and renewals deferred. It may be that assets might only be renewed when they have failed or are positively identified as about to fail ('just-in-time'), or it might be simply that the programme is prioritised as now and then stretched out. A 'just-in-time' approach to renewals means that pipe lifetimes are maximised, which promises a cost saving, but doing this effectively relies on good knowledge of pipe condition and failure likelihood; otherwise there is likely to be a higher rate of unplanned interruptions due to failures, and higher maintenance costs due to unplanned repairs. A key consideration is that ADC has a lot of pipes in private property in Ashburton and Methven, and for these relining is the preferred option to minimise the impact of renewal. Relining, or other trenchless methods, are impractical where a pipe has collapsed, slumped or is otherwise deformed, so prompt renewal is important to avoid having to dig up gardens or buildings later. Just-in-time renewal also risks expenditure being more variable from year to year, and thus smoothing is likely to be required either in the programme or by monitoring long-term average expenditure. Either version of delayed renewal also risks creating a backlog of renewals (a 'bow wave').
Option 2 – Increased renewal rate	This option increases the rate of renewal expenditure over and above the rate of depreciation. It may be advantageous to get ahead of the 'bow wave' and smooth the renewal profile by bringing forward some renewals rather than delaying some. It is also likely to help reduce water loss through leakage from old pipes and connections, and minimise future repair and maintenance costs, which may offset some of the cost. However, there is a risk that pipes with years of useful life remaining may be renewed early. This option also carries increased costs for the community, and at this point it is not clear that the failure rate is increasing dramatically. Repair and maintenance records should be reviewed regularly to ensure that this conclusion is still valid.

Option 3 – Renew in line with depreciation; weight expenditure towards reticulation *[PREFERRED OPTION]*	This option keeps overall renewal expenditure within the envelope of total water supply depreciation, but weights expenditure towards the reticulation rather than the facilities. This allows the pipes to be renewed slightly faster than indicated by their own depreciation by delaying a portion of facility renewal expenditure. This is supported by facility equipment replacement costs being lower than anticipated, possibly due to low granularity in recorded asset lives, and partly due to increased maintenance.	
Time period	2018+ (ongoing review at least every 3 years to check assumptions)	
Cost	$ 17.8M (2018) over 10 years	$ 20.5M (inflated)
What is the benefit	Maintains the current levels of service Financially prudent for the community Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community	
Assumption	This assumes that maintenance and repair records are reasonably accurate and therefore that trends are correctly identified.	

Issue – High infiltration and inflow

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Targeted repair programme	This option would involve restarting a programme of pipeline, lateral and manhole repairs, specifically targeted at reducing infiltration (and to a lesser extent inflow) in the reticulation. This is separate to, and in addition to, the ongoing renewal programme, and is aimed at achieving quick gains in the short term. A programme like this was originally proposed for 2015-2018 and trialled in 2015, but was discontinued because the results were inconclusive and the programme was unable to demonstrate good value for money compared to renewal. There is no reason to believe things have changed significantly. This option also requires good knowledge of specific sites of high infiltration, rather than just general areas, which is not available at the time of writing. Our CCTV programme is being managed more effectively in-house and this information is expected to become available over the coming years.

Table continues on following page...

Option 2 – Accelerated renewal programme	This option recognises infiltration and inflow as a specific driver of the renewal programme and proposes increasing the renewal rate partly as a means of reducing I&I. This could mean identifying pipes with high I&I and allocating additional funding to renewing them, over and above the ongoing renewal programme; it could also mean substituting high I&I pipes for poor condition pipes. The latter, while involving less capital expenditure, carries greater risk of sudden failure from delaying needed renewals. As an option for reducing I&I it is initially costly, although cost savings from treating stormwater at the wastewater treatment plants will offset some of the cost, and there is of course then no need to renew those pipes. A risk with this approach is that pipes which might otherwise have many more years of life in them are renewed prematurely to reduce infiltration (for example this may be the case in parts of Tinwald), meaning that the renewal programme overall is less efficient.	
Option 3 – Right Pipe Project and ongoing renewals *[PREFERRED OPTION]*	This option is to maintain the status quo but is not a "do-nothing" option. This option means continuing with the renewal programme as outlined in the previous issue analysis and continuing to pursue the Right Pipe Project to minimise inflow during rainy periods from low gully traps and downpipes discharging to the sewer. I&I is already a factor in renewal decisions, albeit of lesser importance than failure risk and consequence. As the older pipes are replaced, at a rate of approximately 2% of the network per year, I&I will be reduced as well. The CCTV programme now underway includes a portion focused on investigating areas of high I&I, to identify where renewals in these areas can be best targeted to maximise asset life, minimise maintenance costs and failures, and reduce I&I, thus increasing the overall efficiency of the activity. Continuing the Right Pipe Project will also provide ongoing improvements in inflow volumes. While the project has been running, approximately 57% of properties inspected have required remedial work of some sort. It is likely that a different approach will be recommended for the next LTP cycle, where more and higher-quality information may well indicate a need to accelerate the renewal programme.	
Time period	2020 - 2022	
Cost	$0 (existing resources) This proposal is to continue with status quo.	$0 (existing resources)
What is the benefit	Maintains the current levels of service Supports our strategic priority of 'planning and providing fit for purpose services'	
Assumption	This option assumes that status quo does not lead to unacceptable levels of surcharging that would necessitate revisiting the preferred option.	

Issue – Ocean Farm operations

MAIN OPTIONS	IMPLICATION OF OPTIONS
Option 1 – Do nothing	This option would see Council in breach of resource consents because the treatment and disposal systems are not operating effectively as originally described and designed. E.Coli results are routinely above permitted levels, and parts of the wetland are bypassed. This option also passes up opportunities to improve the coverage of the irrigation system, increasing the grass yield and quality and thus increasing the income potential from the farm.
Option 2 – Alter resource consents	This option attempts to vary the resource consents to address the areas of concern. Primarily this means to raise the coliform thresholds for the effluent, and to permit the site to operate as it currently does. While this option resolves the consenting issues, and it can be argued that for land disposal the coliform threshold currently in place may not be appropriate, it does not address the fundamental inefficiencies which have arisen at the site. This approach may be successful, but these are high-profile consents with public notification likely, and there is a risk that there may be resistance from the public and other stakeholder groups to what may be seen as a relaxing of standards. At the very least some reputation loss could be expected.
Option 3 – Continue to investigate solutions, to prepare a work plan for the 2021-24 LTP period of changes to the treatment and irrigation systems. *[PREFERRED OPTION]*	This option involves maintaining the status quo: continuing the investigation of options for the treatment and disposal site, with a view to ultimately changing the irrigation system. This involves taking a holistic view of the whole treatment and disposal system and looking at it end-to-end, rather than addressing parts in isolation. The preferred option identified in preliminary investigations is subsurface drip irrigation, but this requires the effluent to be cleaned up significantly. The main areas where investigations and potentially changes are required include: Enabling and ensuring access to the wetland cells for maintenance; Maintaining, desludging and replanting the wetland cells, or removing the wetland if this proves to be the better option overall; Additional steps as necessary to make the water suitable for the final irrigation solution; and Replacing the irrigation system with an alternative (e.g. subsurface drip or pivot/lateral where practicable). Some or all of these aspects may be pursued. This option does not address specific options, but identifies that capital expenditure ought to be invested in the site, as opposed to continuing with status quo. Note that resource consent variations may be needed in this case as well, and at that time the coliform threshold should be reviewed.
Time period	2018 - 2021
Cost	Approximately $10k Approximately $10k
What is the benefit	Maintains the current levels of service Supports our strategic priority of 'planning and providing fit for purpose services'
Assumption	The preferred option assumes that there is no enforcement action by ECan that requires more urgent changes. In choosing the preferred option we also assumed that altering the consent would not be a straightforward option and would carry unacceptable risks; this assumption may change if different information came to light.

6.3 Stormwater

Council's principal goal for stormwater over the next thirty years is:

To ensure property and the environment is protected and roads and footpaths continue to be accessible during rain events.

Issue – Capital work programme and priorities

Significant infrastructure issues are tabled below. The highlighted option is the preferred approach for addressing the identified issue.

MAIN OPTIONS	IMPLICATION OF OPTIONS	
Option 1 – Do nothing, or reduced programme	The Ashburton Stormwater Management Plan, which supports the global resource consent application for the Ashburton urban area, includes a programme of operational improvements and capital works required to convey and treat stormwater to the required levels. Not committing to proceeding with some or all of the programme risks the application being declined, or risks Council being non-compliant in the future. A reduced or eliminated programme also fails to mitigate future flooding, especially in the face of forecast increases in rainfall and flooding events, or environmental harm due to untreated stormwater runoff entering waterways.	
Option 2 – Prioritise flood prevention	The proposed programme includes a mixture of flood prevention (stormwater conveyance) projects, typically large "spine" pipelines to focus stormwater to formal discharge points, and treatment projects at these discharge points. While these work together, since the programme is long-term there is potential to re-order the projects. This option would prioritise the pipeline construction projects over the treatment sites, while retaining the whole programme over the 30 year timeframe.	
Option 3 – Prioritise environmental protection *[PREFERRED OPTION]*	In contrast to Option 2, this option would prioritise the stormwater treatment areas and structures ahead of pipeline construction projects. This approach is likely to be more acceptable to ECan and more likely to ensure that the Ashburton urban stormwater consent is granted with favourable conditions, but also delays the completion of the upgraded pipeline network and exposes ratepayers to flooding risk for longer. Prioritising environmental considerations may also have a positive reputational benefit, with Council being seen as a good citizen, "doing the right thing". Balancing options 2 and 3 requires weighing the full range of advantages and disadvantages. Neither option changes the overall cost in 2018 dollars, since the whole programme needs to be completed either way, but total inflated costs may be different. The effect of the expenditure on rates will also depend on the order, since some projects are more costly than others, and some are multi-year projects.	
Time period	2018-2045	
Cost	$ 15.1M (2018, total programme)	$ 17.2M (inflated)

What is the benefit	Financially prudent for the community Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community
Assumption	This analysis assumes that a resource consent will be applied for by 30 June 2017, and that the consent application will be accompanied by a detailed programme of works. It also assumes that rainfall trends continue as forecast, and that the capacity of the existing network is not exceeded more quickly than anticipated (and thus that the risk of flooding is not increased significantly) or that the infrastructure being proposed is sufficient for the task.

6.4 Stockwater

Council's principal goal for stockwater over the next thirty years is:

To promote the productivity of rural land through the efficient provision of clean, reliable stockwater.

Significant infrastructure issues are tabled below. The highlighted option is the preferred approach for addressing the identified issue.

Issue – Fish screen installation

MAIN OPTIONS	IMPLICATION OF OPTIONS	
Option 1 – Defer installation	This option leaves Council in breach of resource consent conditions and potentially open to enforcement and prosecution. ECan have not taken enforcement action in the past, although this may not continue. The prior approach was to defer pending the outcome of the District Water Management exercise, due to uncertainties around the future of the stockwater network and the desire to avoid constructing assets which would not be fully utilised. However, delays resolving this uncertainty make it increasingly untenable to continue to delay indefinitely, and the risk is growing that ECan may insist.	
Option 2 – Plan for and install fish screens *[PREFERRED OPTION]*	This option proposes to budget for the installation of fish screens at the Brothers, Cracroft, Methven Auxiliary and Pudding Hill intakes as required. The two-year window proposed allows design and investigation to take place in the first year, and a possible hold point if regulatory, planning or other circumstances change or the feasibility work indicates that the cost might be significantly different from the initial estimate.	
Time period	2020 - 2022	
Cost	$ 260k (2018)	$ 266k (inflated)
What is the benefit	Financially prudent for the community Supports our strategic priority of 'planning and providing fit for purpose services'	
Assumption	We have assumed that these intakes will remain in service for the foreseeable future, and for a significant proportion of the life of the proposed fish screens. This option also assumes that enforcement action would result from a failure to install fish screens. This assumption is supported by recent conversations with ECan and recent poor publicity around this issue. If this situation changes the options might be revisited.	

6.5 Transportation

Council's principal goal for transportation over the next thirty years is:

To enable efficient travel throughout the district to support economic activity and social interaction.

Significant infrastructure issues are tabled below. The highlighted option is the preferred approach for addressing the identified issue.

Issue – Ashburton River Second Bridge

MAIN OPTIONS	IMPLICATION OF OPTIONS	
Option 1 –Do nothing	Traffic volumes are only going to increase over time, making congestion worse. Travel time reliability worsens, road user frustration increases thus decreasing safety, and detrimental economic impacts would have both district and regional repercussions. Resilience levels would remain as current, and the resulting impact of emergency events (including natural disasters and crashes) involving ever-increasing traffic volumes detouring over 60km would be heightened.	
Option 2 – Construct as stand-alone project	Congestion eases, travel time reliability and network resilience is increased for both local roads and State Highway. Road user safety is improved. Issues on SH 1 through Tinwald and Ashburton are somewhat alleviated but remain.	
Option 3 – Construct in conjunction with connected SH 1 NZTA projects *[PREFERRED OPTION]*	Congestion eases, travel time reliability and network resilience is increased for both local roads and State Highway. Road user safety is improved. Issues on SH 1 through Tinwald and Ashburton are addressed and cost savings have been made on all projects through consolidation of works.	
Time period	2020-27	
Cost	$ 30M* (2018)	$ 38M (inflated)
What is the benefit	Supports our strategic priority of 'planning and providing fit for purpose services' Financially prudent approach by sharing costs with NZTA	
Assumption	That the project will be approved in the RLTP for the design phase to begin in 2020/21, and that local funding share will be 20%, with the remaining portion shared between the NZTA subsidy and the Provincial Growth Fund. *$30M is the total cost for the bridge and associated improvements as a stand-alone project. This does not separate NZTA and ADC costs. Actual cost for Option 3 is unknown as NZTA have not provided costs or options for combining proposed projects.	

Issue – Rangitata Diversion Race Bridge Upgrades

MAIN OPTIONS	IMPLICATION OF OPTIONS	
Option 1 –Do nothing	Increasing heavy haulage dissatisfaction, impedence of district economy, HCV network resilience compromised.	
Option 2 – Upgrade one bridge per year *[PREFERRED OPTION]*	Increases network HCV resilience (also for State Highways), allows increased economic growth, bridge aging issues pre-empted.	
Time period	2018+	
Cost	$ 7.5M (2018)	$ 8.9M (inflated)
What is the benefit	Maintains the current levels of service Financially prudent for the community Supports our strategic priority of 'planning and providing fit for purpose services' Maintains / improves our reputation within the community	
Assumption	That ownership of the bridges is transferred to ADC, 11 bridges are upgraded.	

7. Financial Estimates

The Local Government Act 2002 Section 101B – Infrastructure Strategy states:

(4) The infrastructure strategy must outline the most likely scenario for the management of the local authority's infrastructure assets over the period of the strategy and, in that context, must—

(a) show indicative estimates of the projected capital and operating expenditure associated with the management of those assets—

(i) in each of the first 10 years covered by the strategy; and

(ii) in each subsequent period of 5 years covered by the strategy

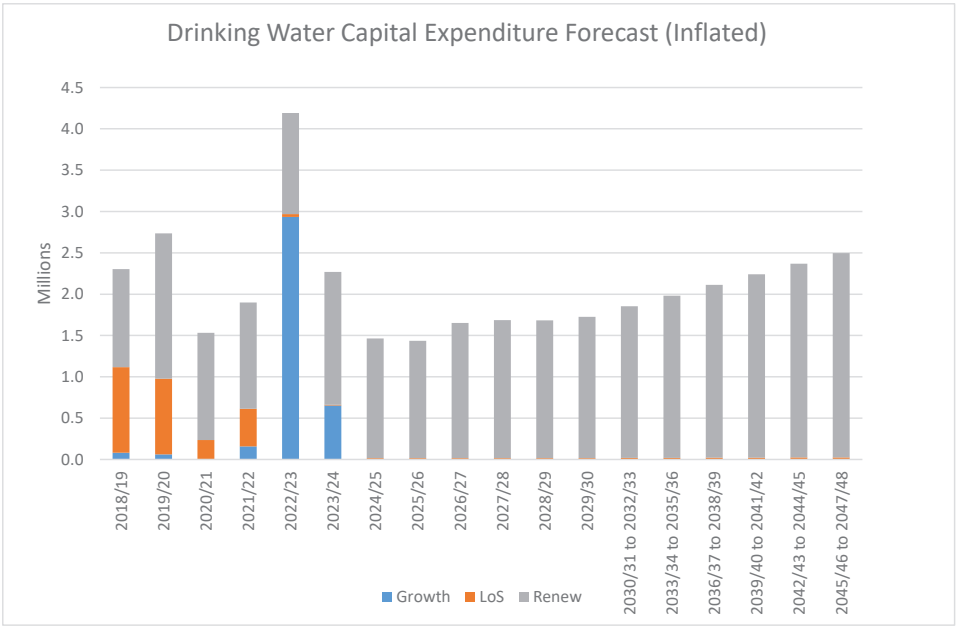
The charts in this section show indicative expenditure projections for each of the asset areas identified. The first 10 years are shown in detail, while the years from 2028/29 to 2047/48 are projections, since detailed capital programmes have not been developed for these years. In Stormwater however, there is a detailed programme of capital development and the projections reflect this.

The years from 2030/31 to 2047/48 are shown in 3-year groups, and the figures used are per-year year averages. The three-year grouping aligns with LTP periods, and matches the inflation figures being used.

7.1 Water

The projected capital expenditure associated with the water infrastructure assets are graphically represented below:

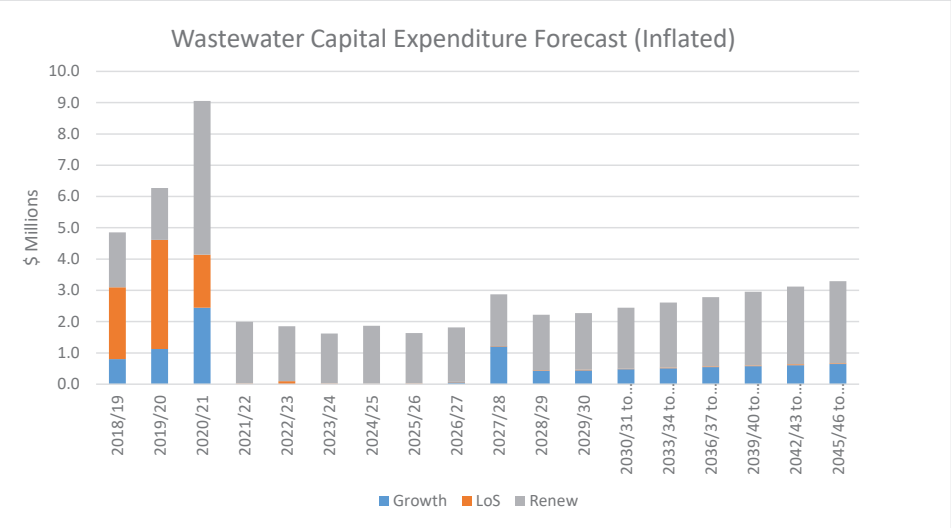
Figure 3: Projected Capital Expenditure – Water



The peak in 2022/23 shows the North-East Ashburton water servicing.

7.2 Wastewater

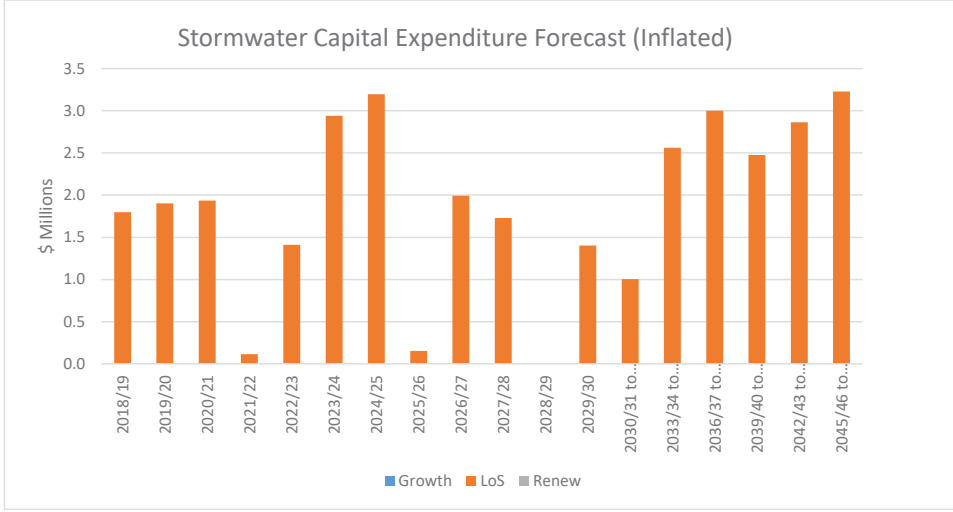
Figure 4: Projected Capital Expenditure - Wastewater



The renewal peak in 2020/21 is due to the sewermain renewal in the Ashburton wastewater network.

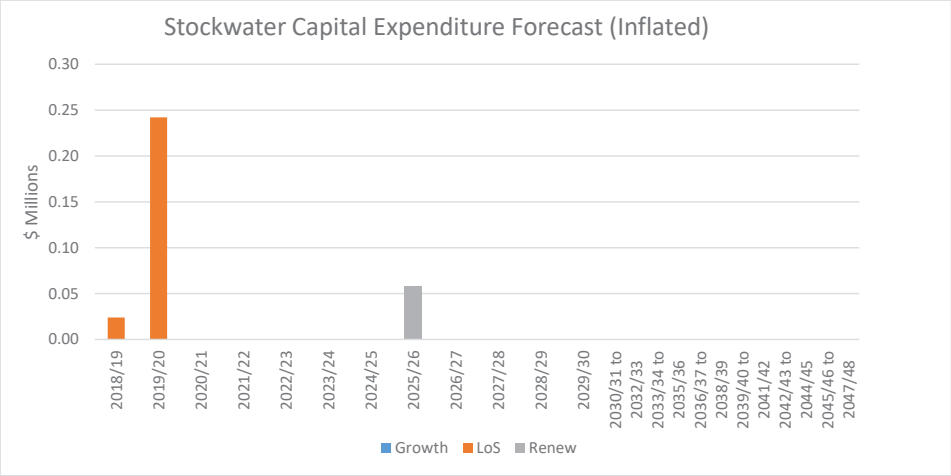
7.3 Stormwater

Figure 5: Projected Capital Expenditure – Stormwater



7.4 Stockwater

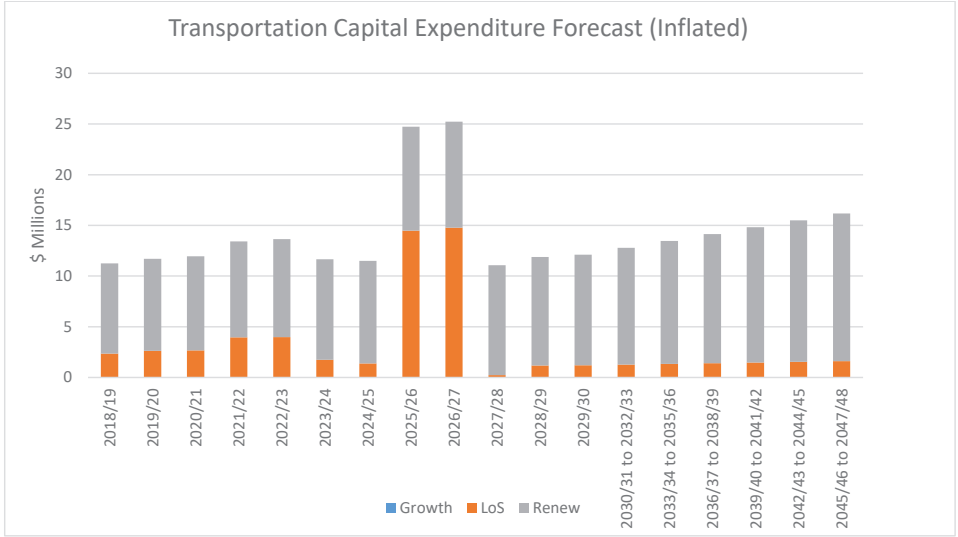
Figure 6: Projected Capital Expenditure – Other Infrastructure One



The peak in 2019/20 is for the planned installation of four intake fish screens.

7.5 Transportation

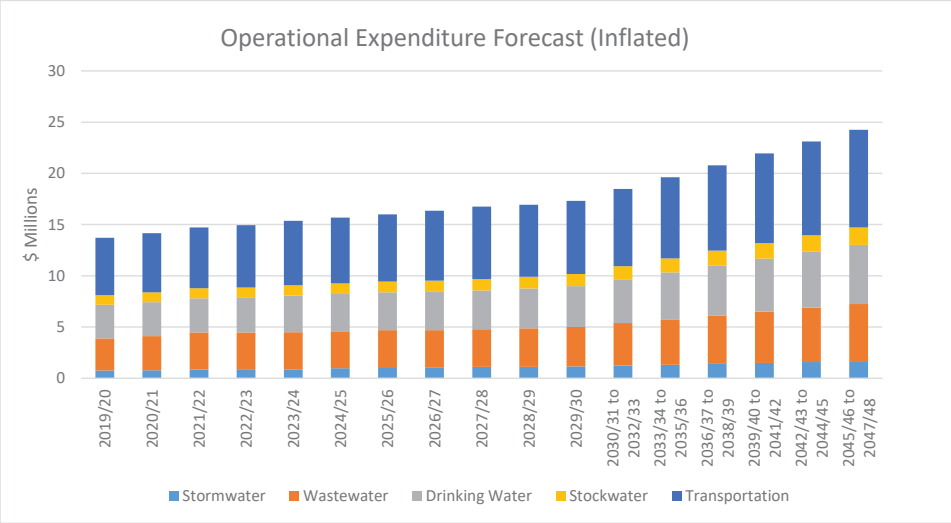
Figure 7: Projected Capital Expenditure – Transportation



The peak in 2025 – 2027 is for the construction of the second Ashburton Urban Bridge.

7.6 Operational Expenditure

Figure 8: Projected Operational Expenditure –Infrastructure Assets



7.7 Financial Impacts of the Infrastructure Strategy

Capital renewal work programmes and budgets have been prepared based on agreed levels of service for each activity, which are set out in detail in the activity sections of the Long Term Plan. The total cost of delivering this capital programme is expected to be over $223 million over the 10 year period.

As assets wear out, funding is put aside to pay for their eventual renewal – this is called depreciation. Depreciation is included in Council's operating expenditure. Different assets have different expected useful lives – the time you can expect them to work efficiently before they need replacing.

Depreciation funding is rated for according to the replacement value of the asset divided by the expected useful life of the asset. Over time, this builds a fund for replacing the asset. This approach to funding is fair as ratepayers who use the asset over its lifetime will fund its eventual replacement (rather than just the ratepayers at the time that the asset is replaced). This is the principle of intergenerational equity.

Council can choose the approach it will take to funding depreciation, ranging from fully funding it, to not funding it at all. In general, Council fully funds depreciation on its network infrastructure assets. Notable exceptions to this are:

- **Road formation** – the base formation of the road. This is not depreciated, and expenditure required to maintain or upgrade the road formation is rated for in the year it is to be spent
- **Stockwater races -** Depreciation is not funded and expenditure required to maintain or upgrade water races is rated for in the year it is to be spent

If depreciation funding is insufficient to cover the cost of asset renewal, Council will normally loan fund the asset replacement. The cost of borrowing is funded according to the funding mechanism(s) specified in Council's Revenue and Financing policy.

Council recognises that funding depreciation, as well as loan repayments and interest, is unfair on existing ratepayers, as they effectively pay for both current and future renewal at the same time. In situations like this, depreciation funding is used to pay loan principal repayments. This approach also avoids significant increases and decreases in rates as loans are raised and repaid.