Te Kaunihera-ā-Rohe o Taratahi
CARTERTON
DISTRICT COUNCIL

Carterton District Council

Infrastructure Strategy

2024 – 2054

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Purpose

The purpose of this Infrastructure Strategy to identify issues that will face Council's infrastructure over the next 30 years, and to identify the options available for addressing the issues.

Infrastructure is essential to connect people and place. In Carterton, the provision of services and facilities that meet the current and future needs of communities falls under the responsibilities of Carterton District Council.

This infrastructure provides the foundations on which the Carterton district is built. It is essential to the health, safety, and land transport needs of the district and has a significant impact on the physical environment.

Effective infrastructure planning is critical to ensure economic prosperity and to enable populations to access fundamental services and facilities of everyday living. However, building and maintaining infrastructure is expensive and requires careful and considered management to ensure the current and future needs of communities are provided for. Strategic and integrated planning is required to review, anticipate, and adapt to changing scenarios.

Themes that will influence the decisions we make about maintaining and managing our infrastructure over the next 30 years are:

- Changing society - Population and demographic change in the demand for infrastructure services
- Funding challenges
- Protecting public health
- Protecting the environment
- Infrastructure resilience

By understanding these themes mentioned above, the strategy will identify the issues facing our infrastructure and then discuss the options available for responding to the issues. As part of the discussion, this strategy will:

- Outline the most likely scenario for managing the infrastructure assets within the district over the next 30 years; and
- how the projected capital and operating expenditure associated with managing the district's assets, and,
- Identify the significant decisions about capital expenditure that Council expects it will have to make; and
- Include the assumptions on which the scenario is based and providing information of the level of certainty or uncertainty associated with the scenario.

This strategy is updated every three years to reflect the changing themes, knowledge of assets and assumptions and to identify the impacts of changing circumstances. The last Strategy was adopted in 2021. Over time our knowledge will improve through improved performance and condition information. This will enable improved accuracy of asset renewal profiles and better investment decisions.

This Strategy shall form the basis or the front end of the Asset Management Plan and provides the overarching "strategic story," including challenges and priorities and what is required over the next 30 years to deliver desired levels of customer service for Carterton district.

Context

Geographic

Carterton district located in the Greater Wellington region, encompasses predominantly rural land on the eastern side of the lower North Island. The western boundary is the Tararua ranges with the eastern boundary being the Pacific Ocean. The district is adjacent to Masterton district to the north, and South Wairarapa district to the south. Kāpiti Coast district adjoins its western boundary though buffered by parcels of Department of Conservation land.

Population and Demographics

Population forecasts show that the district's population is expected to reach 13,137 by 2051. It is predicted that approximately 55% of the combined growth will occur in rural areas and 45% in the urban areas. Our society is getting older. For Carterton, the percentage of the population 65 and over is expected to increase by 75% in 2051.

Economy

The predominant land use in the district is pastoral agriculture, mainly beef and dairy farming, with a significant amount of forestry in the eastern hill country. The main employment sectors are agriculture, forestry, and fishing, with all of these sectors highly dependent on CDC's infrastructure services for transport connections. Small pockets of viticulture and winemaking exist in the Gladstone area.

Future challenges and opportunities

The next thirty years will present multiple challenges and opportunities that will influence the way we manage Council infrastructure. Front-footing and adapting to change is an important part of our strategy. Decisions also need to factor in the wider context, risks and considering social, cultural, economic, and environmental trends.

Our journey towards achieving our strategic outcomes will require us to consider the following:

Funding challenges

Carterton District Council, much like other Councils in the region will face increasing levels of asset renewal and replacement expenditure over the coming years; although the extent of this varies across each council. Affordability is therefore a pressing issue for councils with ageing networks and limited ability to increase revenue.

Funding infrastructure to support new development is also challenging as it involves expensive upfront costs. Because most underground three waters infrastructure lasts around 80 years, the payback period is long and returns on investment are low in the initial years. This can mean high borrowing and interest costs – particularly if growth is slower than anticipated.

Funding growth through development contributions will become increasingly important, to ensure the condition of the remaining network is maintained.

Three waters infrastructure generally has a low profile. By nature, it is designed to be unobtrusive and it is challenging for the community to appreciate the value of these buried pipes and remote treatment plants which are taken for granted.

Alternative funding models and tools could be an effective means addressing some of these affordability issues.

Environmental Limitations

Urban development supports the social and economic well-being of communities. As the region's population increases, there is a need to ensure that new houses and infrastructure services are developed in a sustainable way, which meets aspirations of the community and is sensitive to the environment.

Contributors to the degradation of freshwater bodies include wastewater overflows and leakage, and contaminated stormwater run-off. For water supply, most of the district's major rivers are either fully allocated, or in some cases even over-allocated. This means at normal to low flow there is only just enough water to meet all consented water takes while still remaining within consented levels.

Enabling urban growth, while maintaining and improving water quality, will be an important focus looking forward. But there are other challenges at play too. Urban expansion is limited by the availability of suitable land, which means that marginal land, such as low lying areas, become options for greenfield development. Affordability is also an issue, with difficult trade-offs required for levels of service across all three waters.

These issues require us to challenge conventional thinking about infrastructure provision and consider more affordable options, which may have multiple benefits. Non-asset solutions such as hydraulic neutrality and on-site systems for reducing wastewater discharges (e.g., greywater recycling) may reduce the pressure on our existing networks while minimising impacts on the environment. Water sensitive urban design solutions such as wetlands, rainwater detention storage facilities will become increasingly important for managing the impacts of stormwater and flooding.

Extreme Natural Events

The Wairarapa district and the Greater Wellington region is vulnerable to a range of natural disasters. We know it is not a question of if an event will strike our region, but when. Events such as Cyclone Hale and Gabrielle are a stark reminder that significant events can result in serious damage to buildings and infrastructure, while disrupting business and everyday activities.

Our networks are vulnerable and susceptible to breakage. Approximately 30% of water reticulation pipes are made of cast iron and asbestos cement. These pipes are fragile and prone to sudden bursts as they age. Further, our water storage tanks are considered to be vulnerable to extreme shocks.

We also have low resilience in our wastewater network with 45% of pipes made from asbestos cement, concrete or earthenware, meaning they are likely to break under disruptive forces. This in turn leads to inundation of public areas with untreated wastewater which may result in illness and disease.

The change in weather patterns due to climate change means there are more frequent heavy rain events and damaging sea swells. These weather patterns mean that the ground is saturated, resulting in landslips that disrupt road access to parts of the districts.

The Eastern Hills access roads have a history of significant land movements occurring when the ground is saturated. The sea level is also predicted to rise with climate change. This will exacerbate the coastal erosion and has specific ramifications for the district coastal communities e.g., Flat point

Legislation Changes

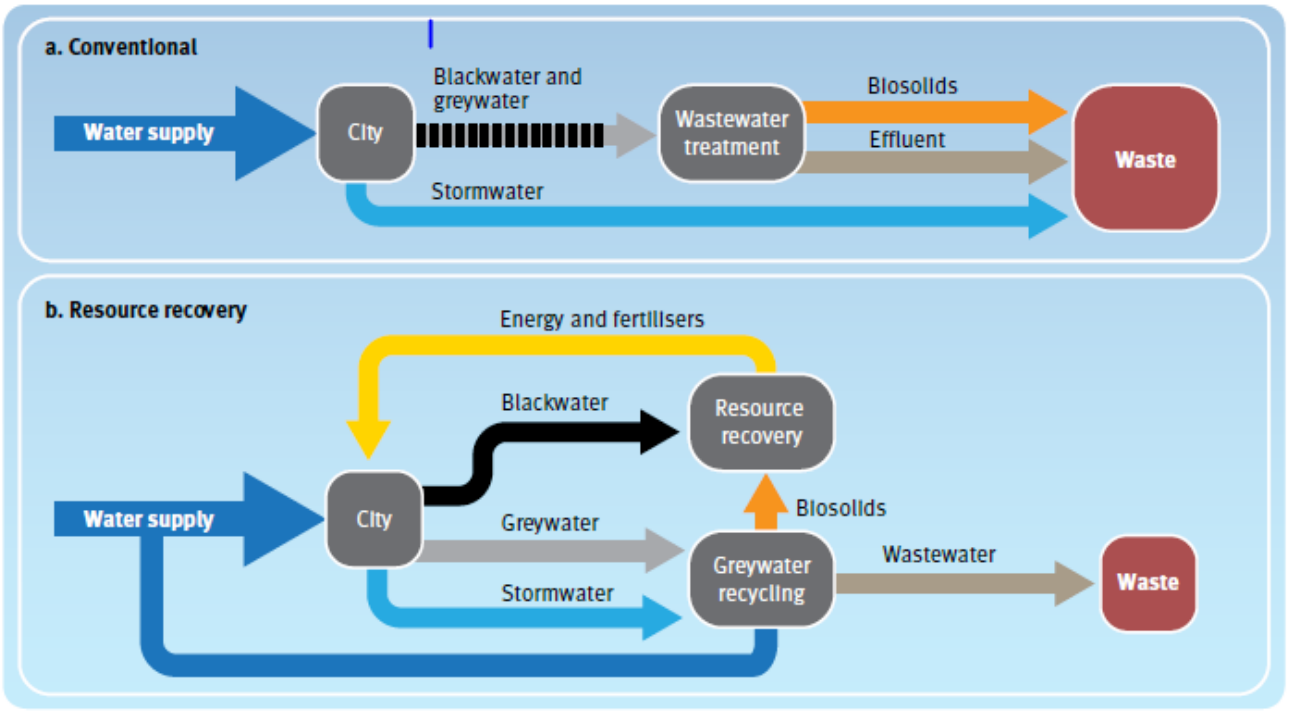
Management of the region's 3-water networks is influenced by a range of statutes and legislative instruments (including regulations) spanning governance, asset management, health and safety and protecting environmental values. The Health Act (1956), Local Government Act (2002); the Resource Management Act (1991); the Health (Drinking Water) Amendment Act (2007) and the Building Act (2004) are particularly relevant to the management of three waters.

The regulatory environment and institutional arrangements for managing three waters are constantly changing; with multiple drivers for these changes. Some of these outlined below.

- Increasing community expectations around safe water supply
- Environmental quality and resource scarcity
- Fragmented water governance structure with multiple entities
- Joined up and more efficient service delivery
- Financial incentives and the need to fund the bow wave of renewals
- Housing supply and affordability – supporting high growth
- More robust building standards
- Public health and safety

Technology

Technology and innovation will continue to provide opportunities to improve services; mitigate environmental impacts and reduce costs. Technology provides exciting opportunities, but also brings challenges around cyber security, and the flexibility of our current systems to adapt. Many cities across the world are already transitioning towards what is referred to as the "fourth generation" of water infrastructure. This is characterised by improved water efficiency; source control; separation of resources and pollutants at source; improved management and control of flows in the system; and resource recovery of energy, carbon and nutrients.



Adapted from Prosser, IP 2011, *Water: Science and Solutions for Australia*, CSIRO Publishing, p. 86.

Water efficiencies are being achieved through the implementation of "smart" metering. It provides our users with the ability to monitor their consumption patterns and avoid wastage. This is an integral to our demand management strategy.

Pipelining and trenchless technology is increasingly become a cost effective and less disruptive option for renewals, upgrades and new works.

The use of automated systems to operate mechanical systems more efficiently is helping keep pace with future pressures such as climate change and population growth. Installation of variable speed drives is one example where individual control of pumping rates can reduce overall energy consumption in rising main pumping systems.

New technologies will also encourage more effective capture of physical asset data, reducing the cycle time between asset installation and asset management.

We aim to transform our plethora of operational and 'core asset' data into meaningful information to support decision-making. The transformation of source data to useable information is driven by two trends. First, the 'convergence' of operational data (for example, data captured from sensors) with asset and compliance data. Second, automation allows the pace of data collection to increase. Both trends place a greater role on the development of accurate, fast-paced tools that can support three waters decision-making.

Levels of Service

The Council is responsible for providing infrastructure services for

- Roads and footpaths, all as required by Local Government Act 2002.
- collecting, treating, and providing safe drinking water.
- collecting and treating wastewater and
- managing stormwater within the urban environment

The Council is also responsible for the efficient delivery of services in relation to the following matters, including, but not limited to

- ensuring all statutory requirements and environmental standards are met
- installing and maintaining water meters and undertaking meter reading for billing purposes
- managing and maintaining all parts of the network so that water is available on demand and at a pressure appropriate to the area.
- monitoring water quality to meet national drinking water standards sot that a risk to public health does not develop
- responding to and fixing all leaks and faults in the respective networks within agreed time frames
- upgrading areas of the respective networks that are either non-existent, too small, or not performing
- flushing wastewater mains to allow wastewater passage.
- developing, promoting, and implementing water conservation measures
- undertaking forward works planning in order to anticipate future demand, the effects of climate change and the district's growth and development
- ensuring that the environment is protected from any adverse effects from the three water activities; this includes, where possible and practical, the contamination of surface waters from treated wastewater effluent.
- providing a fit for purpose roading network by maintaining road surfaces, footpaths, culverts, channels, and bridges.
- resealing 5% of the road network per annum.
- maintaining traffic signs, road markings and street lights
- managing vegetation within the road corridor.

Current levels of service

In 2010, the Local Government Act was amended to require local authorities to report non-financial mandatory performance measures via annual reports. The aim was to help the community to contribute to discussions in determining levels of service and allow them to compare the level of service provided by different councils.

Levels of service provided by Council is assessed by the:

- Non-Financial Performance Measures Rules, Department of Internal Affairs, 2013, known as the Non-Financial Mandatory Performance Measures and
- Regional resource consent compliance (based upon information provided by regional councils in 2022), and
- Ruamāhanga Roads also uses and monitors Waka Kotahi ONRC[1] and ONF[2] performance measures to support the delivery of the high level measures set by the Council. The monitoring of these measures informs the development of strategy and plans for future delivery.

Levels of service are measured through the non-financial mandatory performance measures in CDC's performance framework and is reported on in the Annual Report.

[1] ONRC – One Network Road Classification
[2] ONF – One Network Framework

Approach towards managing assets

Changing society

Population growth

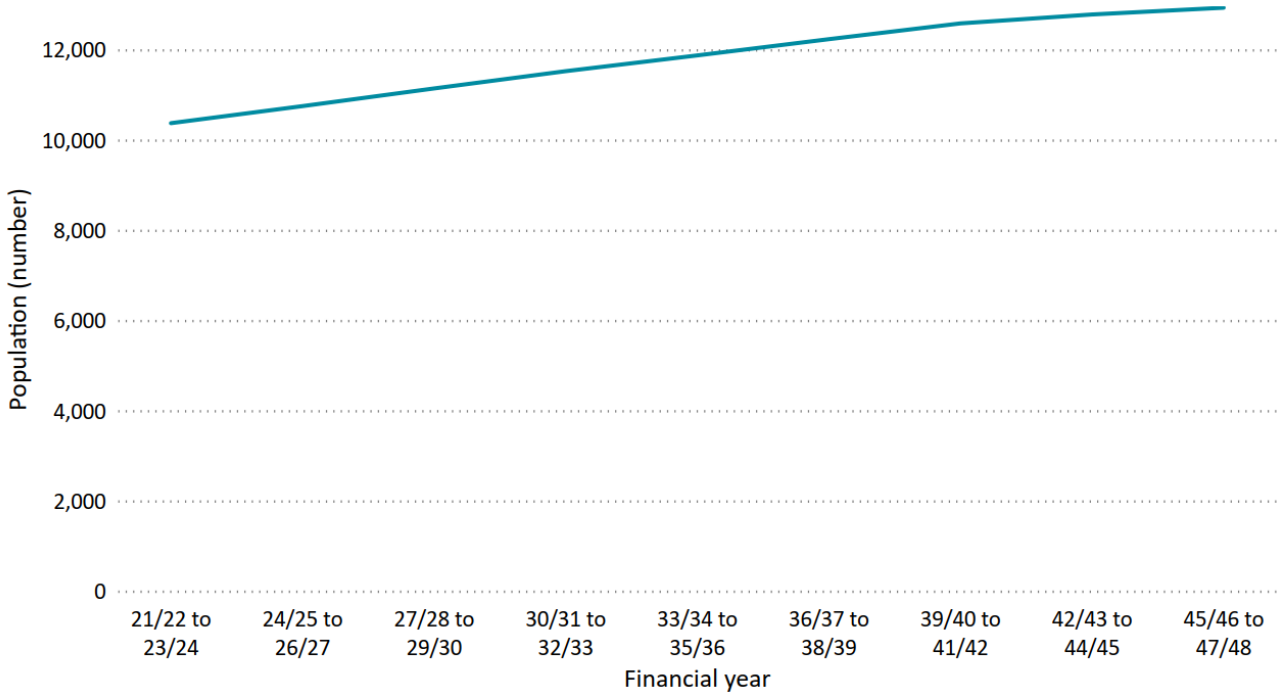
Demographic change, and the needs and preferences of particular groups, will affect the way we manage our Infrastructure.

Population forecasts show that the district population is expected to reach 13,137 by 2051. It is predicted that approximately 55% of the combined growth will occur in rural areas and 45% in the urban areas. It's worth noting that these predictions could play out quite differently as a result of a major event, unprecedented pandemics such as COVID-19, natural events such as an earthquake etc.

Alongside population growth are other demographic changes which will impact on our district. Our society is getting older. For Carterton, the percentage of the population 65 and over is expected to increase by 75% in 2051.

As the population trends upwards, it is expected that household numbers will grow at a higher rate. However, changing social preferences and an aging population mean that households across the region are also expected to become smaller – i.e., the household occupancy rate is expected to decline on average from 2.8 to 2.6 people per household. This means new dwellings are expected to decrease in size but with greater intensity.

The capacity of our networks is also impacted by a significant transient population who commute to city centres for work and other reasons. However, this may change in future as technology influences how we work and where we work from.



Social preferences

People's social preferences are constantly changing, and this is impacting on community expectations for infrastructure services.

Advances in education and technology have helped empower individuals, and this is leading to increasing demands to participate in decision-making processes. Communities are becoming more concerned about levels of expenditure, environmental outcomes, and hazard events such as flooding, climate change and earthquakes. At the same time there is an increased focus on recreation, aesthetics, and the liveability of our cities. Technology is also empowering people to modify their lifestyle and understand the way that they utilise water services (e.g., smart metering).

Our involvement with the community takes many forms – from broadcasting information (e.g., social media); through to a representative that can express their preferences in an informed way. The future is likely to involve more 'influence' from the community, with customer feedback directly linked to decision making processes.

Responding to growth

Given that we are operating in a world of limited funding and difficult investment trade-offs, we need to be smarter and more efficient about the way we support future growth. Better integration and alignment, along with a more systematic approach to modelling, is setting us in the right direction.

The dynamic and changing environment within which we manage infrastructure assets means that we need to revisit assumptions and forecasts as new information comes to hand.

Our best advice will be underpinned by systematic and comprehensive modelling undertaken on a catchment basis so that cumulative impacts and interrelationships can be identified and factored into future planning decisions.

Carterton District Council has proposed a long-term modelling plan in place which will provide a more robust platform from which to determine capacity issues and constraints, which in turn will be prioritised in our future Annual Plans.

The criticality and condition of our networks has been a key driver behind investment and management of our pipe networks. In order to accommodate growth, network capacity is rapidly becoming the primary focus of the district's capex programme. By applying a 'systems' lens to three waters management, we can ensure the necessary inter-connections are made across boundaries.

Te Mana o te Wai

Understanding that we are an entity responsible for water, which is a taonga for Māori, highlights a need to ensure our planning and investment approach does not directly or indirectly exclude the views and values of our iwi partners. This means going beyond 'consulting,' 'including' or 'involving' our iwi partners in the planning process and ensuring that they form a part of our decision making processes.

To recognise and respect the Crown's responsibility, an overarching requirement in the Water Services Entities Act 2022 is that all persons performing or exercising duties, functions, or powers under the Act must give effect to the principles of Te Tiriti o Waitangi/the Treaty of Waitangi. They must also give effect to Te Mana o te Wai, to the extent that Te Mana o te Wai applies to those duties, functions, or powers.

Water Services legislation sets out the process for mana whenua to make Te Mana o te Wai statements and for entities to respond to such statements.

Carterton District Council will engage with mana whenua to develop our response to any Te Mana o te Wai statements and develop how these are integrated and implemented in future. Our efforts to give effect to Te Mana o te Wai are essential for ensuring the protection and sustainable management of water resources and assets and therefore integral to this strategy.

Roading Infrastructure

The roading infrastructure are being managed by Ruamāhanga Roads. Ruamāhanga Roads is a multi-party funding agreement with between Carterton and South Wairarapa District Council.

Ruamāhanga Roads is the joint network of 110 km of urban and 991 km of rural roads of Carterton and South Wairarapa District Councils. These roads are critical for the farming, forestry, and wine industries and for the social, economic, cultural, and environmental well-being of the wider community of ~21,000 residents.

The road network is the primary asset that enables the people in the community to interact with each other. The population of the two districts is small and the roading network is large. This means that the cost per person for maintaining this network is high.

We need to invest in road pavement renewal to ensure continued access across the district.

Key Issues:

- **Historic underfunding of operational maintenance & renewals**

Maintenance and renewals have been under-invested in past years. The under-investment in pavement renewals will cause unsustainable maintenance volumes and costs in future years. At present, only 0.3% of the network undergoes pavement renewal each year, which means it would take 300 years to replace all pavements at this rate.

If pavement renewals are not increased, the pavement maintenance costs will continue to increase, in real terms, by approximately 30% per year. If we invest in sufficient pavement renewals, we will start to see a real reduction in the quantity of pavement maintenance required. When we address the backlog of pavement renewals, the pavement maintenance costs will be lower.

- **Road safety**

The rate of serious and fatal accidents is increasing, and this is negatively impacting the welfare of the community.

- **Network resilience**

The increased scale and frequency of damage caused by weather events on some parts of the network will be beyond the ability of the Community to fund the required repairs.

Note the investment in renewals, road safety and resilience will also reduce the carbon footprint of the Council's Road Transport Activity.

Our Strategy

Programme of Work & Funding

The following actions are proposed improve the efficiency of maintenance & renewal and are best practices for sustainable management of the network's assets.

Our long term plan plans for funding of pavement rehabilitation to enable 1% of the network to be renewed annually. Our long term plan also plans for funding of road resealing to enable 8% of the network to be resealed annually.

We also provide the maintenance funding to address the backlog of maintenance over the next 3 years.

Network Safety

The recommended programme to reduce road crashes on the network is the following combination of options:

- To continue with the current level of road safety education.
- To invest from the Low-Cost Low Risk or R2Z funding category, on speed management.
- To invest from the Low-Cost Low Risk funding category, improvements to Guard Railing, delineation, and signage to ensure standards are uniform within each ONRC/ONF Customer level of service.

Network Resilience

The identification of sites where there is a high risk and impact of the road being closed due to slipping and select one site for the development of a stabilisation plan with the adjoining landowner(s).

Fund the implementation of a trial section of slope stabilisation.

Action Plan

Strategy	Initiatives	Timing
Fit for purpose Road Network	Increase funding in maintenance activities such as pothole patching, drainage maintenance and grading	Ongoing
Pavement rehabilitation %	Rehabilitate 1% of road network per annum	Ongoing
Resealing of network	Reseal 8% of road network per annum	Ongoing

Protecting public health (Water)

Carterton District Council provide water services to ensure safe drinking water and work to minimise the public health risks from wastewater and stormwater over time. A safe and reliable water supply is essential to public health and the social and economic progress of the district. Delivering current levels of service to the reticulated areas of the district requires the abstraction, treatment and delivery of an average 2.3 million litres of water each day and providing sufficient capacity for fire-fighting supply when required.

Once this water has been used, the untreated wastewater needs to be safely conveyed through reticulated networks then treated and disposed in an appropriate way to minimise risks to human health.

Water Sources

Carterton district is fortunate to have most of its water sourced from protected catchments. Activities on land upstream of surface and groundwater abstraction points are managed by Greater Wellington Regional Council and Carterton District Council through the provisions of the Resource Management Act 1991.

Water supply for the Carterton district comes from two sources

- The headwaters of the Kaipatangata Stream, abstracted from an intake, treated at the Kaipatangata Water Treatment Plant and stored in the two water storage tanks located at that site.
- Groundwater abstracted from three bores located on Lincoln Road and Frederick Street, treated at the Frederick Street Water Treatment plant and stored in four water storage tanks located at Frederick Street and Dalefield Road.

Bulk water sourced from the Kaipatangata Stream is limited by consents which require minimum flows to be maintained so that the ecological health of the stream is sustained. This source at the Kaipatangata Stream has limited raw water storage capacity and requires the intake to be turned off during rain events.

Water extracted from the three underground bores at Frederick Street is also limited by consents which are intended to maintain the allocation limitation set on how much water can be taken from groundwater sources to protect the health needs of the people. During periods of low demand, some water is diverted to the new storage tanks on Dalefield Road. Stored water from these tanks is then pumped back to Frederick Street treatment plant during period of high demand.

Providing Safe Water

Safe drinking water is crucial to public health. To be deemed "safe", drinking water needs to meet the requirements of the Drinking Water Standards for New Zealand. However, meeting these Standards is only part of the story. The delivery of safe drinking water is also dependent on the security of supply in terms of quality and quantity. We are also aware of customer perceptions of what is considered 'safe' water. This can be driven by aesthetic qualities such as taste, odour, and appearance.

In line with international best practice, we use a multi-barrier approach for managing risks of contamination. That means protecting the source water from contamination; treatment plant processes; management of distribution system risks; effective monitoring and response; and the protection of water after treatment to prevent re-contamination.

Fluoridation

Over the last couple of years, fluoridation of drinking water has been in the news a lot. Fluoridation has been subject to battles mainly between oral health fluoridation advocates and the implacably opposed.

Fluoridation is the process of adding the micronutrient fluorine to drinking water to raise its concentration above the level it occurs naturally in source water. Fluoride is typically added in the final stages of treatment.

The Ministry of Health recommends the adjustment of fluoride to between 0.7 and 1 mg/L as the most effective and efficient way of helping prevent tooth decay in communities receiving a reticulated water supply. The New Zealand drinking water standards set a Maximum Acceptable Value (MAV) of 1.5 mg/L for fluoride. The MAV of a chemical is the concentration of that chemical which does not result in any significant risk to the health of a 70 kg person over a lifetime of consumption of two litres of the water a day. The 1.5 mg/L MAV for fluoride is based on the latest World Health Organisation (WHO) Guidelines.

Until December 2021, there was no legislation in New Zealand that required the addition of fluoride to a water supply and was undertaken by local councils at its discretion. The Health (Fluoridation of Drinking Water) Amendment Bill came into effect in December 2021 gives the Director-General of Health the ability to direct Council to add fluoride to drinking water. The Council has received no such direction from the Director-General thus far. It must be noted that the current legislation does not take away the ability for Council to use its discretion to add fluoride to drinking water.

The Director-General of Health wrote to Council in September 2023 stating that no further action was required from Council towards community water fluoridation. Based on this proviso, our strategy and long term plan at this stage does not include addition of fluoride to drinking water unless the Director-General of Health directs Council to do so.

We have assumed that any future direction from Director-General to add fluoride to drinking water will be supported with capital funding from central government to install the necessary treatment equipment, however it must be noted that the Health (Fluoridation of Drinking Water) legislation does not commit central government to provide capital funding towards the upgrades. In the event there is no central government funding support, the necessary upgrades required to add fluoride to drinking water, its operation and ongoing maintenance will need to be funded by Council's annual budgets.

Providing Water for Firefighting

The protection of peoples' lives and property from the hazards of fire is dependent on an adequate supply of water for fire protection and firefighting. In general terms this means that the design of water supply networks must have adequate water pressures and flows available for in property fire protection systems and for use by Fire and Emergency NZ personnel. Sufficient water storage is also critical should supply to networks become unavailable.

Our water supply network is generally adequate for firefighting purposes. However, there are localised areas where water pressure and available flows could be improved. Future improvements will be based on improved knowledge of network performance and through dialogue with Fire and Emergency NZ. Changes may involve reconfiguring the water supply network so that firefighting supplies are more accessible to emergency services.

Protecting Public Health

The district urban areas and some rural areas are serviced by our reticulated wastewater networks, which are designed to protect public health and the environment by transporting contaminated water away from private property without exposing people to harmful pathogens that are contained in human waste.

Stormwater services are also essential to protect public health as rainfall needs to be drained away to prevent damp ground and the various illness that can develop affecting people and property.

Key Issues

Monitoring Source Water

In the last 12 months, about 70% of the Carterton's water supply has been sourced from the underground aquifer, abstracted at Frederick Street.

Greater Wellington Regional Council (GWRC) is responsible for protecting the aquifer (and source) and does this by regulating water takes, discharge and land use activities that may adversely impact on quality and supply of water.

The National Environmental Standard for Sources of Human Drinking Water require regional councils to protect drinking water sources through water and discharge permits and consent conditions. The Natural Resources Plan (NRP) identifies a community drinking water protection area (Schedule M2) for the aquifer which controls certain discharges to land (e.g., on site wastewater effluent in rural areas). As development intensifies in this protection area, it will become increasingly important to manage and monitor the effects of land use activities on the aquifer.

On-going investigations are increasing our understanding of the aquifer and testing previous assumptions. We need to be responsive as new information comes to hand on the integrity of the aquifer and potential sources of contamination (e.g., Nitrates). This may require changes to the way we monitor and respond to aquifer water quality; and changes to our mode operation. Also, depending on what investigations reveal, other forms of treatment or upgrades may be necessary.

The detection of emerging risks in our primary source water such as Nitrates (or Nitrate-Nitrogen) will require a greater focus in the future. Epidemiological evidence that has observed associations between nitrate in drinking water and a range of adverse health outcomes including colorectal cancer, congenital anomalies, preterm births, and childhood cancer are far below the current MAV[3] in the NZDWS[4]. However, the evidence base is not conclusive with respect to whether the relationship is causal or coincidental.

In those studies that found an association, the concentration of nitrates in drinking-water associated with bowel cancer were about the same as obtained from Carterton's drinking water from Frederick Street WTP[5].

There is a growing interest in potential health risks associated with nitrates in drinking water and whether the MAV is set at an appropriate level.

During 2022, Taumata Arowai publicly consulted on the drinking water standards and received submissions advocating for a lower MAV. In the event of a legislation change could result in MAV for nitrates drop below existing values obtained from Carterton's primary water source (Frederick Street WTP). In such an event, the source from Kaipatangata WTP will play an important role as a low nitrate-nitrogen source to dilute the nitrate levels obtained from the primary source at Frederick Street.

[3] Maximum Acceptable Value
[4] New Zealand Drinking Water Standards
[5] Water Treatment Plant

Health impacts from wastewater and stormwater

During heavy rain events, stormwater and groundwater can enter the wastewater network resulting in overloading the capacity of the wastewater networks and overflow to the environment. These overflows are exacerbated by cross connections where stormwater downpipes are incorrectly connected into the wastewater system and local flooding which can directly enter gully traps.

Wastewater overflows can also occur in dry weather; often from blockages from private household drains and tree roots blocking pipes resulting in overflowing gully traps. These blockages can result in untreated wastewater seeping onto neighbouring properties and causing a health risk. Untreated wastewater can also enter the environment by seeping through old and fragile pipes; with detection difficult. Overloaded networks often result in uncontrolled flows; overflowing through manhole lids and onto land.

The potential public health impacts from blockages and overflows can be significant. As well as impacting on the environment , wastewater overflows can result in disease and gastrointestinal upsets in people who have direct contact with the contaminated ground surface. Children who inadvertently play in polluted areas are particularly at risk. Although most of our urban streams are not generally used for swimming, high levels of E. coli bacteria can still indicate a health risk to children playing in or near the water.

Our Strategy to protect public health

Effective treatment of water supply

We are fortunate that source water supplying the Kaipatangata water treatment plant plants is from a protected catchment. This means a reduced risk of contamination from human and animal sources that introduce disease-causing organisms such as protozoa, bacteria, and viruses.

However, we cannot fully rely only on the natural filtering processes of our underground aquifer to provide a safe supply of drinking water. Following the Havelock North water contamination incident, treatment methods such as chlorination and UV light (for the treatment of protozoa) are now required to ensure customer safety. Ongoing investigations may also reveal the need for different treatments.

We will continue to manage risk through assessing the condition of pipes and storage reservoirs. Water safety plans remain an important tool for managing risk and driving operational improvements and investments. We will continue to ensure these plans reflect the best available information and manage public health risk at an appropriate level.

Minimising the impacts of wastewater leaks and overflows

Addressing these issues will require a combination of asset (pipe renewals) and non-asset solutions. A programme of investigations is underway to determine inflow and infiltration, and where possible, the occurrence of cross connections.

Addressing these issues will require a combination of asset (pipe renewals) and non-asset solutions. A programme of investigations is proposed to determine inflow and infiltration, and where possible, the occurrence of cross connections.

Regulatory measures, such as bylaws, and design measures may also play a role in mitigating overflows. Some design elements include storage at pumping stations (to allow for failure), ensuring gully trap heights are maintained, and understanding when to replace leaking lateral pipes will aid in controlling this inflow and infiltration to a manageable level.

Action Plan

Strategy	Initiatives	Timing
Effective treatment of water supply	Regular monitoring of source and treated water quality	Ongoing
Minimising the impacts of wastewater leaks and overflows	Inflow and Infiltration reduction works	Ongoing
	Asset renewals and upgrades	Ongoing
	Network performance monitoring	Ongoing
	Wastewater Treatment Plant Upgrades	0-3 yrs.
	Policies, bylaws and design measures to reduce overflows	Ongoing

Protecting the environment (Water)

The district's freshwater bodies including Mangatarere Stream, support a range of ecological values. Water from our freshwater bodies support surrounding reserves, regional parks and forests which serve as popular sites for recreational activities. Our rivers and streams provide habitat and food for hundreds of plants and animals, from tiny algae to two metre eels, and to native freshwater fish - many of which migrate between freshwater and the sea.

Māori continue to have a close relationship with water in all its forms, both spiritually and physically. Water is a taonga of huge importance to Iwi and enhancing the health and wellbeing of our waterways is a priority for Iwi. Māori often consider their personal health and the health of the Iwi to be intricately linked to the health of their water bodies. For Māori degradation has led to traditional values embedded in their water-bodies being either compromised or lost completely.

Carterton District Council continues to have a long-term vision to improve fresh water quality by removing treated urban wastewater effluent from streams.

The Council completed the construction of its new wastewater reservoirs in 2023 and has continued to increase the amount of treated wastewater being discharged to land over time. There is still much more to do. Council recently brought forward its plans to purchase an 85-hectare parcel of land adjacent to its new wastewater reservoirs at Daleton Farm that could see the expansion of its strategy to remove the discharge of treated wastewater into waterways

In January 2018, Greater Wellington Regional Council (GWRC) approved a 35-year resource consent to undertake land-based discharge of treated wastewater onto land owned at Dalefield Road. The consent includes approximately 20ha of pivot irrigation and around 25ha of land for further development. This 25ha has been recently leased to GWRC for a poplar and willow pole nursery, irrigated with treated wastewater.

This agreement highlights a joint effort to conserve the environment and sustainably use the land. Once established, the nursery will double the amount of treated wastewater being diverted away from the Mangatarere stream and discharged safely to land Council and also signed a Memorandum of Understanding, agreeing to work together to help train and develop the required skills within our community.

Our consents

Many of our three waters activities require resource consents to comply with Regional Plan and District Plan requirements. These include stormwater network consents; new consents for capital expenditure (capex) projects; wastewater treatment plant (WWTP) upgrades; wastewater overflows, and water permits for bulk water abstraction. Carterton District Council currently manages eight consents (and conditions) relating to its infrastructure services, but also has a heavy future schedule of new consents and consent renewals that will be subject to greater rigor.

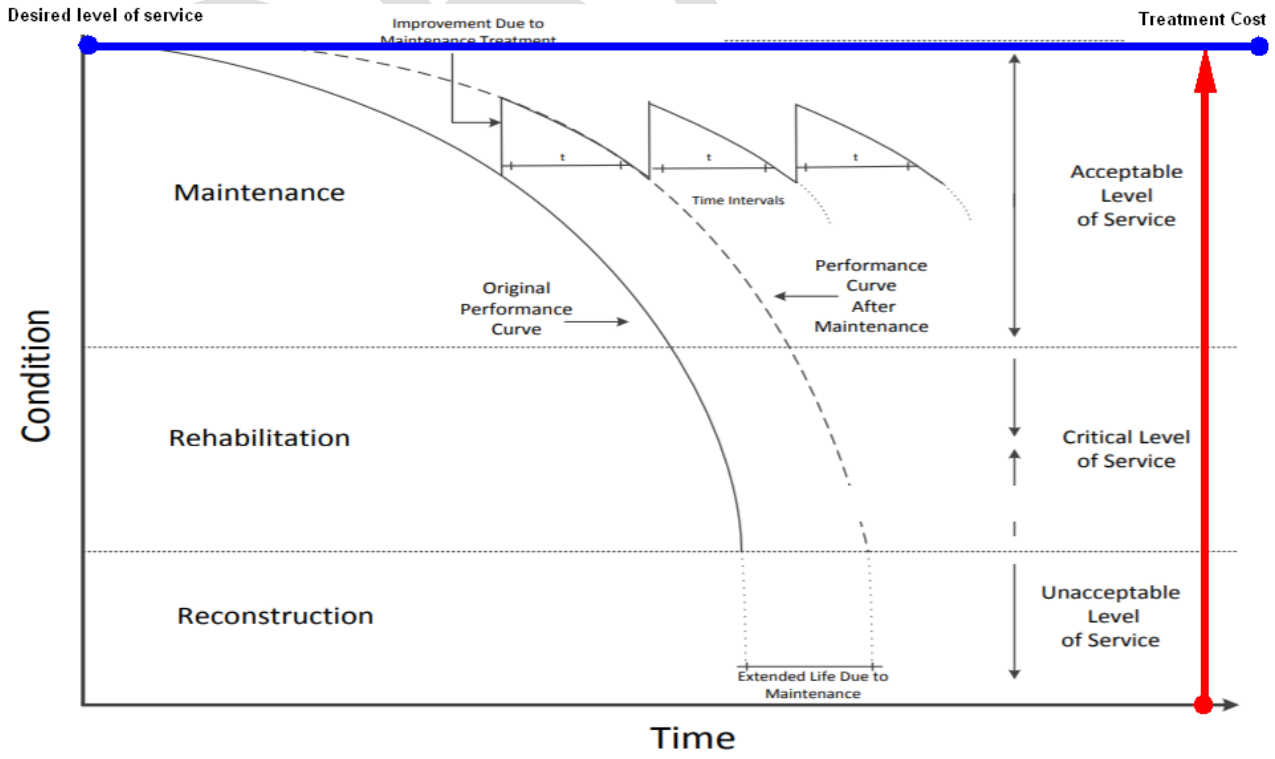
The Natural Resources Plan (NRP) has introduced new and more stringent consent requirements for three waters infrastructure. This includes new consent requirements for stormwater discharges. A key requirement of the stormwater discharge consent is the establishment of a monitoring regime and the development of stormwater management strategies that target water quality improvements.

Key Issues

Aging Infrastructure

A history of deferred maintenance has created legacy issues across the asset hierarchy, which will require significant investment in the future to maintain and improve current levels of service.

To put this into context, around 48% of the district's wastewater pipes are in poor condition and assets at the treatment plants headworks are past its service life, some of which have been in service since 1940s. There are considerable lengths of network that are likely to need repairing before the end of their usual life date because of the poor quality of materials used for construction during the 1960s and 1970s.



Source: Adapted from AASHTO 2012

Infrastructure Capacity

Stormwater networks have historically, been designed to cope with a 1 in 10 or 1 in 20 year storm events. This means networks have been overwhelmed in places as the storm intensity has exceeded the design capacity resulting in private residences and businesses being flooded.

All of our wastewater network is designed to transport wastewater with some allowance for leaks and trade waste flows. However, during periods of heavy rainfall, excessive stormwater can make up the majority of the flow and lead to overflows from the wastewater system. Similarly the wastewater treatment plant is designed to cope with dry weather flows, but in storm events the flows increase significantly. For example, stormwater entering treatment plants can cause variations of more than 300% of the total wastewater volumes on some days. In some cases, the peak flows exceed the capacity of the plants, resulting in treated wastewater being discharged into freshwater bodies as opposed to discharge to land. This is a particular issue for our Dalefield Road Wastewater Treatment Plant where the current capacity for dealing with high flows is limited, especially at the front end i.e., plant intake.

The end result of contaminated water flowing onto land and/or into waterways (overland flow), impacts cultural values, human health, and the ecological health of the receiving environment.

As our networks age and through land movement, this issue will be compounded by groundwater entering the wastewater system. Further, the capacity of our networks will also be impacted by groundwater climate change through more intense and frequent rainfall events.

Urbanisation and stormwater

Given population forecasts for the region, urban growth is inevitable. This growth needs to occur in a way that maintains, and even enhances the environment for residents to enjoy, and for businesses to prosper.

Urbanisation is contributing to the degradation of water quality through increased stormwater volumes flowing directly into water bodies. Greenfield development in particular, results in sedimentation from vegetation removal and soil compaction, or coverings of impervious surfaces such as roofing, asphalt, and concrete. As rainfall runs off over land it picks up sediment, contaminants, petrochemicals, and metals such as zinc, copper or lead and carries them through the stormwater network untreated to streams.

These contaminants, especially heavy metals, can build up over time in increasing concentrations. For example, research suggests that most of the zinc in our stormwater comes from unpainted or poorly maintained galvanized iron roofs. Some contaminants are historical and are expected to decrease over time – e.g., lead contamination from the historical use of lead additives in petrol. Similarly, modern roofing materials have a very low zinc yield compared to traditional galvanized iron. The impacts of stormwater are likely to worsen in the near future.

Disposing of biosolids (Sludge)

Each year, our district produces tonnes of biosolids (sludge), as a by-product of the wastewater treatment process. The disposal of biosolids is becoming an emerging issue for parts of the district because of the limited capacity of landfills to deal with the waste and the production of carbon emissions from the landfills.

Historically, before leaving the treatment plants, sludge would goes through a dewatering process before it is transported to landfill.

Dewatered sludge is generally mixed with other waste streams prior to its disposal, and this is done on a 'ratio' basis to ensure safe and stable storage. However, this mixing ratio isn't sustainable at most landfills as volumes of waste remain static (because of waste reduction measures) against increasing volumes of sludge produced from population growth. One option worth exploring would be the introduction of thermal dryers for the Wastewater Treatment Plant, which would reduce the volume and produce a "Grade A" product which is safe for beneficial use on forestry land, for example.

Our Strategy to protect the environment

Expansion of land irrigation facility

Work will begin on developing options for the additional 85Ha of land adjacent to the new wastewater reservoirs at Daleton Farm that could see the expansion of the existing land irrigation facility using treated wastewater effluent. The initial work will include discussions about expanding the existing Resource Consent with GWRC[6].

Planning Controls

Over the short term we plan to work with our planning and regulatory division to introduce consistent district Plan provisions, standards and codes of practice designed to help mitigate the impacts of stormwater. This can be achieved by incentivising (or requiring) certain approaches to development, such as hydraulic neutrality, minimum floor levels, setbacks from open streams, and the protection of overland flow paths. These provisions can be set at the policy stage; or as a consent condition.

Development Contribution policies can also impose fees on the basis of impervious surfaces and have some influence depending on the relative dis-incentive versus benefit of hard surfaces for any specific case. However, such provisions normally only apply to the non-residential sector.

The NZS4404:2010 'Land Development and Subdivision Infrastructure' has been revised to include specific reference to water sensitive design, stating that solutions that use natural processes and add value to urban environments are the preferred approach to land development and infrastructure design. There may also be an opportunity to better utilise transport routes as overland flow paths.

Managing biosolids

We need a step change around how we manage wastewater sludge, which takes a holistic view of benefits and costs, e.g., better sludge management can have waste reduction benefits.

Thermal drying may not be a viable option as thermal drying is a major capital expense and is energy intensive, resulting in emissions. On the other hand, the ongoing disposal of biosolids may impact on waste reduction initiatives. This in turn has implications for council policies aimed at reducing waste volumes and their associated carbon emissions.

[6] Greater Wellington Regional Council

A sustainable solution for biosolids management needs to be developed within the next ten years, which is championed district wide, environmentally sound, economically viable, and socially accepted. This will be a medium to long term focus for Carterton District Council in partnership with various internal and external stakeholders.

Energy Efficiency

The growing emphasis on energy efficiency and reducing resources will become an increasingly important issue for the management of three waters. Electricity is a significant proportion of the operating costs for the water supply network. The cost of pumping is the single largest component of power usage.

Wastewater treatment also represents significant energy consumption for aeration, pumping and UV disinfection. Wastewater treatment plants could potentially focus on conserving or producing energy from digestion of biosolids. For example, the combustion of sewage sludge with fuels or other types of waste may be a feasible alternative use that could generate income through energy recovery. Approximately 55%[7] of Australia's wastewater treatment plants are capturing biogas and generating bioenergy.

We will continue to look at ways to run our systems more efficiently, as well as leveraging new technologies as they become available. Regional and national climate change policies could require sustainable solutions to be implemented over the medium to long term. This will become an increasingly important priority for us over the next ten years.

Community awareness

We want a community that is well-informed and engaged about how their actions may affect our networks and their environment. Community awareness programmes are an important part of our strategy to reduce environmental impacts across all three waters. It involves providing information that our communities can act on by changing their perceptions and behaviours.

Community awareness can help minimise blockages caused by inappropriate items being disposed in the wastewater network, which can result in dry weather overflows. Simple messaging relating to what can be flushed down the toilet, location of tree planting and avoiding cross connections between the stormwater and wastewater networks can go a long way towards mitigating adverse effects. Education and work training programmes aimed at reducing litter and the disposal of contaminants into the stormwater system (e.g., heavy metal concentrations, oils, and detergents) can also be effective.

[7] Beca Consulting (November 2015) – Opportunities for Renewable Energy in the Australian Water Sector – Prepared for Australian Renewable Energy Agency (ARENA)

There are a range of tools that can be used to encourage efficient water usage. Educational campaigns can help customers understand how they use water and encourage them to reduce their demands on the system, particularly when supply is low. A major reduction of water demand has been the improvement of the efficiency of appliances over the last 20-30 years. For example, it has been possible to bring clothes washing water usage down from an average of 140 litres/wash to under 75 litres/wash. Other demand management options, such as leak detection and universal metering has been put in place to manage water demand.

Action Plan

Strategy	Initiatives	Timing
Planning Controls	Regular monitoring of Stormwater Discharge Consent	Ongoing
	Provide advice on suitable planning controls to mitigate the impacts of stormwater run-off	Ongoing
Managing biosolids	Future Study: Sludge Management	0-7yrs
Energy Efficiency	Future study: Carbon reduction	0-3yrs
Community awareness	Education and community awareness campaigns across the district	Ongoing

Infrastructure water resilience

Resilient three water networks are vital to the prosperity, well-being and safety of our communities.

Resilient networks can recover and remain functioning after shock events, such as earthquakes or landslides. Restoring essential services to the is vital to communities and for sustaining the economy.

Resilient networks are also adaptive to on-going stresses such as the impacts of climate change, and uncertainties such as social and political change. Minimising the impacts of flooding on people's lives is an important focus for the district as climate change is likely to exacerbate the frequency and severity of flooding events.

Key Issues

Network Capacity

Our three waters networks are being placed under increasing pressure from new development. The impacts from infill housing are becoming a significant issue for networks already overloaded during wet weather and a regulatory environment requiring the reduction of overflows over time. For example, by increasing the amount of impervious areas in the catchment, there is a risk that water quality in our receiving environments is adversely affected and that higher peak flows may cause flooding.

Historically, investment in three waters has largely focused on network condition - arguably at the expense of capacity or environmental outcome.

There are an increasing number of occurrences where the cumulative demands from our already overloaded networks are resulting in adverse health and environmental impacts – e.g., increasing wet weather wastewater overflows.

Continuing to deliver current levels of service (and improved environmental levels of service), whilst at the same time supporting new growth, will require increased levels of investment. This issue is also compounded by a network already overloaded. Accommodating unanticipated growth needs within our investment envelope requires on-going re-prioritisation which has the potential to impact on current and future levels of service.

Security of water supply

The water supply system for Carterton is primarily 'run of the bores'. It relies on an aquifer source and additional tank storage backup (Dalefield Road). Looking forward, this could be exacerbated by climate change. There is also a need to maintain operational resilience, in the event that one plant is off-line.

All current water take consents, including the Kaipatangata and Frederick Street bores, are from sources that are identified as over-allocated in GWRC's Natural Resources Plan. That means it would be extremely difficult to secure new consents for additional water takes. These limits also apply to other catchments earmarked for future use. More stringent limits could impact on future water takes when consents expire from 2024-2034, further supporting a strategic case for demand management.

The alternative water source investigation undertaken by WSP was brought to a conclusion by Carterton District Council in 2023 on the basis that levels of service, based on current rates of abstraction, is likely to meet projected demand for the next twenty years (2043).

Issues which could impact future supply are restrictions on the renewed water take consents and unanticipated natural events, such as seismic disruptions. More specifically, limits set by Greater Wellington Regional Council for the source from Kaipatangata Stream require a reduction in water abstraction to meet objectives under the National Policy Statement – Fresh Water Management.

Flooding

Flooding is one of the most costly natural hazards not only in Carterton but across New Zealand. Its impacts on households and communities can be severe and long lasting. Managing urban flood hazards involves an integrated combination of infrastructure, urban planning, community preparedness and emergency response. To avoid costly damages in extreme rainfall our district has relied on overland flow paths and buildings with elevated floor levels.

Flooding risk in our district is increasing as a result of the changing land use, forms of building construction, climate change, growth and the loss of connectedness and understanding of the natural drainage systems as our district expand and intensify. To continue to effectively manage flood risks into the future will require our developers and planners to rethink and innovate our current approaches with a strong emphasis on reducing our dependence on pipe infrastructure.

Our Strategy to achieve infrastructure resilience

Minimising the impacts of flooding

Reducing the impacts of flooding through soft and hard infrastructure underpins our future investment strategy is the need to better understand the limitations of our networks so that improvements can be planned on the basis of risk and the achievement of service standards.

Hydraulic modelling is an important tool for understanding the "capacity" of our pipe networks. Although complex and costly to develop they not only assess the potential impacts of flooding but determine the effectiveness of proposed mitigation options.

An effective way of managing the impacts of flooding is through widespread application of planning measures that will over time raise the resilience of our communities. These include measures such as hydraulic neutrality policy, water sensitive design guidelines, designated overland flow paths, controlling land uses and flood hazard maps that can withstand scrutiny and legal challenge.

The are national guidelines available on applying hydraulic neutrality principles, which is also promoted by Proposed district Plan.

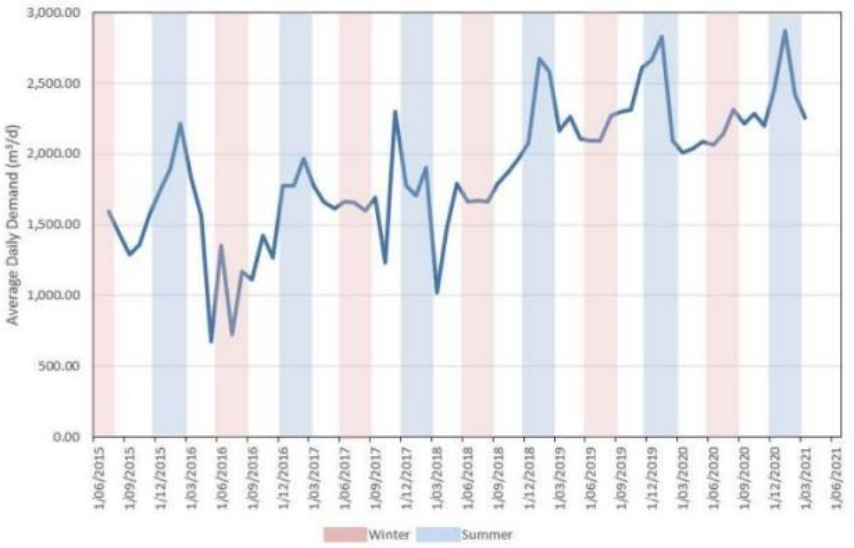
Asset solutions such as renewals and replacement remain part of our future strategy; particularly in developed areas, which flood frequently. However, the economic viability of infrastructure solutions will become an increasingly important consideration. There may be a need to look for alternative solutions like storage in parks and reserves as more affordable asset solutions.

An effective way of mitigating the impacts of flooding is through resilient building solutions, such as raising floor levels and flood resistant buildings. Some of New Zealand's residential buildings are not well suited to this type of approach. We know from the international experience that these types of solutions can take time to

implement. Discussions with our buildings division and research entities such as BRANZ could set us in the right direction.

Reducing demand for drinking water

Demand per capita for water in Carterton has been trending upwards over the last decade. Demand reduction will remain an important focus in the future – not just from an environmental outcomes perspective but as a means of deferring capital investment in source development.



Leak detection, infrastructure replacement programmes, on-site storage, along with better management of reticulation systems remain an important part of demand management. Further, trends such as reduction in garden sizes through infill housing and apartment developments, and a decline in water-intensive industries will play its part in reducing demand.

Acton Plan

Strategy	Initiatives	Timing
Minimising impacts of flooding	Modelling programmes to understand limitation of networks and overland flow paths	Ongoing
	Planning measures to reduce reliance on hard infrastructure solutions	Ongoing
	Asset solutions such as renewals	Ongoing
Reducing demand for drinking water	Leak detection and replacement programmes	Ongoing
	Promoting water conservation	Ongoing
	Review residential water charging methodology	1-2yrs

Infrastructure Renewals Strategy

CDC's infrastructure renewal strategy is, in general, to rehabilitate or replace assets when justified by:

- Risk: The risk of failure
- Economics: Renewals are programmed with the objective of achieving:
    - the lowest life-cycle cost for the asset (the point at which it is uneconomic to continue repairing the asset), and
    - a sustainable long term cash flow by smoothing spikes and troughs in renewals programmes based on the estimated economic lives of asset groups, and
    - efficiencies, by co-ordinating renewal works with capacity upgrade work or other planned works in the area.

The concept of **Risk** which is closely linked to consequences and likelihood of failure. Infrastructure assets also need to be assessed in relation to its consequence and likelihood of failure which largely reflects its criticality, life expectancy, and the extent of deterioration that has occurred. Assets that exhibit both high consequence, and high likelihood, of failure carry the highest risk of calamitous failure and has been the primary focus for asset management.

Likelihood of failure of an asset is derived from its current known condition and performance of the asset. Criticality is a key component in risk management and has been considered to be synonymous with consequence. Critical assets have been defined as an asset where failure could have significant consequences, either in the ability of the system to provide services to customer or the effect on the environment.

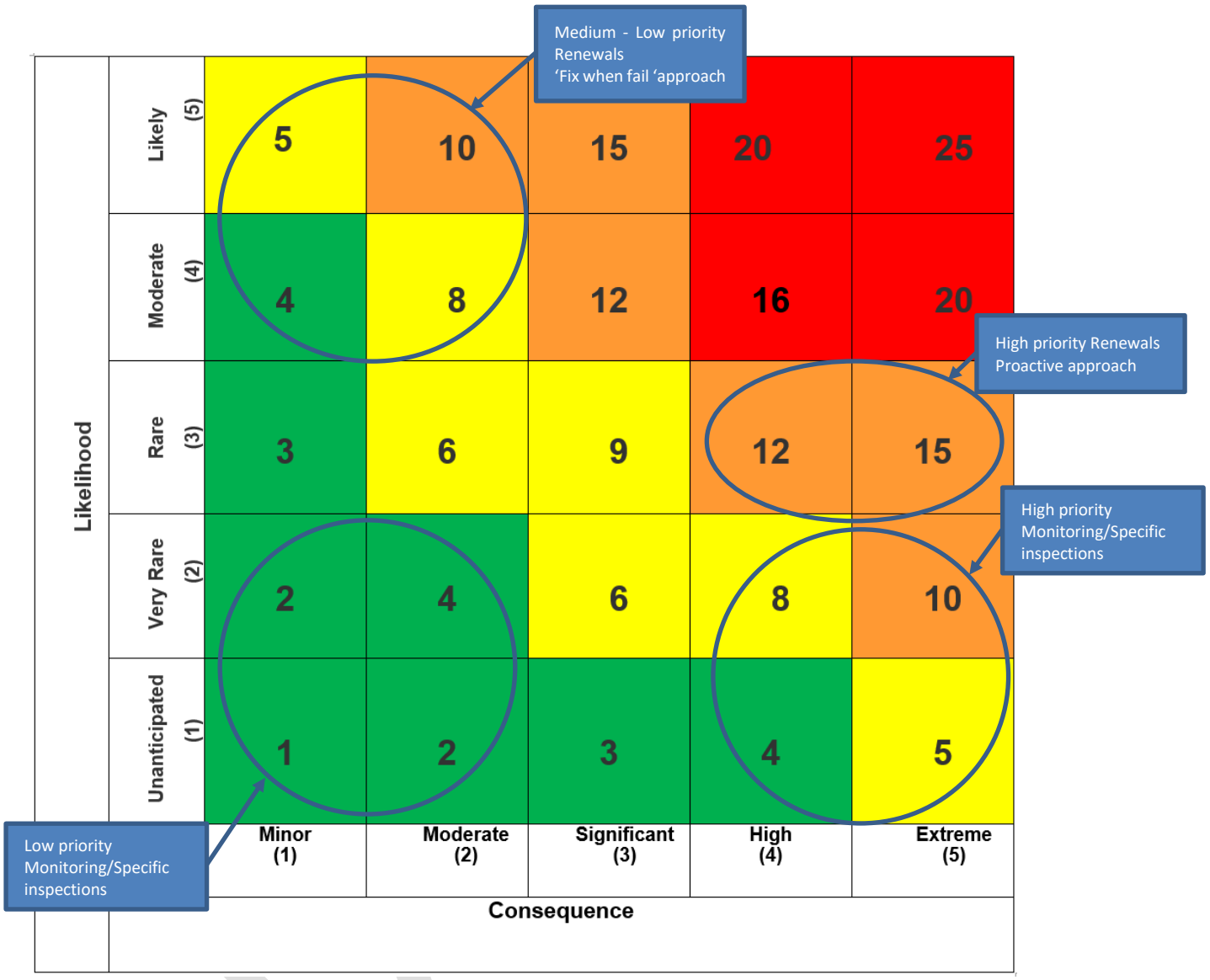
Carterton District Council's risk management framework has been incorporated into the planning and decision making process for the infrastructure renewals programme.

The objectives of incorporating the CDC risk management framework into the renewal planning are to

- Provide a simple method and balanced approach for all staff to minimise exposure, loss and damage whilst realising opportunity and delivering improvement.
- Integrate risk management with governance and management arrangements, embedded in major organisational and business processes, and to clearly specify its accountability.
- Align the Council's risk management approach with the ISO 31000 Risk Management Standard
- Provide a consistent language in the consideration of risk across all Council activities.

The largest drawback of developing a separate framework in isolation is that the outcomes do not get utilised across the organisation in actually managing the assets. For example, the Operations Manager might not be aware of the implications for 'Critical Spares', contingency planning, or escalation. The Communications Manager may be unaware of the potential for an asset failure to result in the council making the national television news and senior management may be unaware of the potential impact of budget restrictions on the organisation's ability to properly manage critical assets.

The risk analysis makes a **risk rating** using the **likelihood** and **consequence** criteria and is considered in the context of existing controls. The various combinations of consequence and likelihood are then further broken down into priority categories when developing renewal programme and allocating financial resources.



By definition assets with high consequences of failure, and hence high criticality lie at the right hand end of the matrix and can creep into the 'Not Acceptable' red zone if the Likelihood of Occurrence is too high. A newly constructed asset will typically start life with a low likelihood of failure reflecting its 'as new' condition and this will apply irrespective of its Criticality. As it ages and deteriorates the likelihood of failure will gradually increase and the asset will gradually move up the matrix. This is an important point as it illustrates that the risk associated with an asset is not static but will vary over time to reflect its gradually deteriorating condition.

Other points to note are that low criticality assets can still be low risk (and associated low profile management approach) even if the likelihood of failure is high i.e., the top left corner of the matrix. These assets fail and are repaired. if such assets fail too often, these are then renewed.

Operations and maintenance

Operational activity is work or expenditure which has no direct effect on asset condition, but which is necessary to keep the asset functioning, such as the provision of staff, inspections, consumable materials (chemicals etc.), resource consent applications and compliance, monitoring, and investigations.

Maintenance can be defined as the activities that preserve an asset in a condition which allows it to perform its required function. Maintenance comprises regular servicing and immediate repairs necessary to keep the asset operational. The ongoing efficiency of routine maintenance is critical to achieve optimum asset life cycle costs that best suit the desired levels of service.

Maintenance falls into two categories, planned and reactive, each having quite different triggering mechanisms but similar objectives.

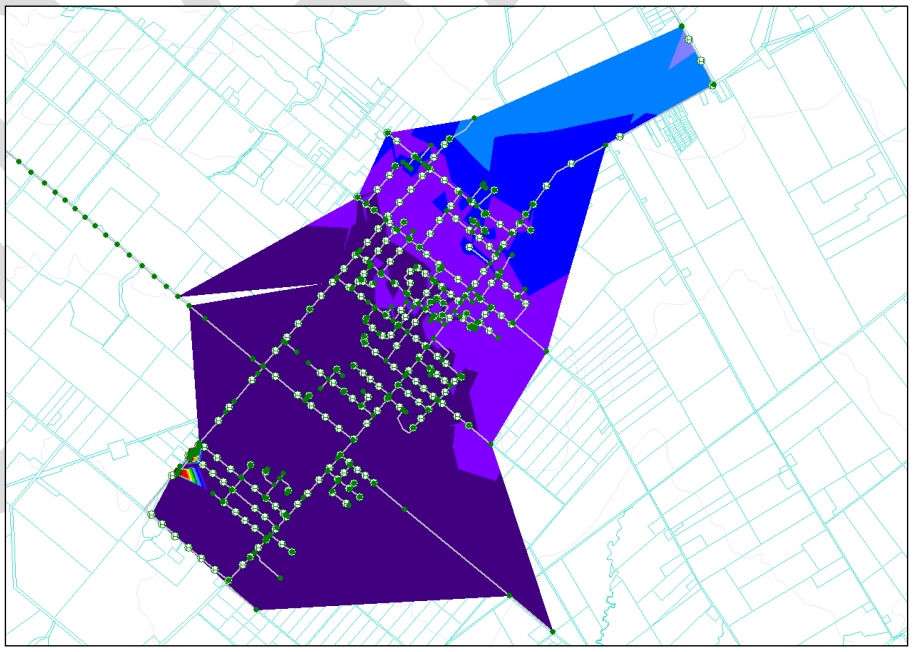
Planned maintenance comprises routine servicing of assets to maintain day to day functionality. It often entails scheduled servicing of key asset components on a rotational or seasonal basis – e.g., servicing of pumps, flushing of mains, mowing of roadside vegetation, etc.

Reactive maintenance entails responses to unplanned asset failure such as burst water mains, roadside slips, sewer overflows, etc.

The strategy is to maintain levels of service through timely and effective maintenance interventions until the age or condition of the asset makes it uneconomic to continue to maintain. Within this, striking a balance between the frequency of planned maintenance and the incidence of reactive maintenance, is key.

Investment based on evidence

Quality data and information is pivotal to understanding the performance and capacity of our assets and driving optimal investment decisions. We are continuously building and refining our information base by integrating new and existing asset information from all five councils. We also generate data and information through modelling the capacity of our networks and capturing real-time operational data through our monitoring systems. Collectively this information steers our strategic and operational decision making.



Fragile and aging networks, coupled with a limited funding base means we have to be smarter about our investment decisions. Addressing this complexity will require evidence from multiple sources; not just asset data - but social, economic, and environmental sources. Our technology strategy hinges on creating tools that transform data into accurate and user friendly decision support tools (e.g., GIS, Dashboards)

Hydraulic modelling is an important tool which helps us understand the capacity and performance of our networks. Modelling information supports operational and strategic decisions ranging from the capacity of existing infrastructure to support urban development through to priorities for future upgrades.

We monitor the performance of our assets through range of mechanisms, such as Supervisory Control and Data Acquisition (SCADA) monitoring, incident reports (e.g., blockages and overflows); feedback from operations contractors; customer feedback; performance testing; and network modelling. Performance monitoring assesses whether we have achieved our goals and associated levels of service.

Another increasingly important part of our monitoring regime focuses on water quality and regulatory requirements. A new stormwater consent is likely to requires us to monitor stormwater discharges and investigate where there are acute effects on water quality. This will provide us with the information to improve the quality of discharges in the future.

Our focus is to manage the provision of accurate data (i.e., 'clean' and 'complete') that is accessible for users as information to support their decision-making. Various programmes are underway to support this, with a focus on solutions that integrate, share data with regulators and provide tools (such as a GIS, WaterOutlook) that makes sense of data for users. We have worked to align our asset data to a set of national metadata standards for three waters. This has enabled us to standardise data with different councils and will inform future programmes on simplifying the IT tools that store data.

Collaboration and Partnerships

Just as it is essential to recognise and manage resources in an interconnected way, it is also vital to involve people in a meaningful way. Our strategic outcomes cannot be achieved through network investment alone, but through involvement and engagement with the wider community and other agencies.

Managing future demand for potable water through water efficiency initiatives is another area that that will require influencing and changing the behaviour of the community. Further on-site infrastructure solutions, such as water sensitive design and hydraulic neutrality are an important means of managing impacts on the environment and mitigating the impacts of flooding.

Achieving a water sensitive and resilient network will require us to think differently about the way we provide three water services. We will adapt and respond to future challenges by thinking about three waters as part of a broader "system". This will allow us to better understand the interrelationships between those involved in delivering

service outcomes, our customers, and the broader socio-political environment within which we operate.

Our strategy over the next 30 years will involve a combination of understanding our community better; influencing the community and creating behaviour changes; and mitigating impacts through both asset and non-asset design solutions.

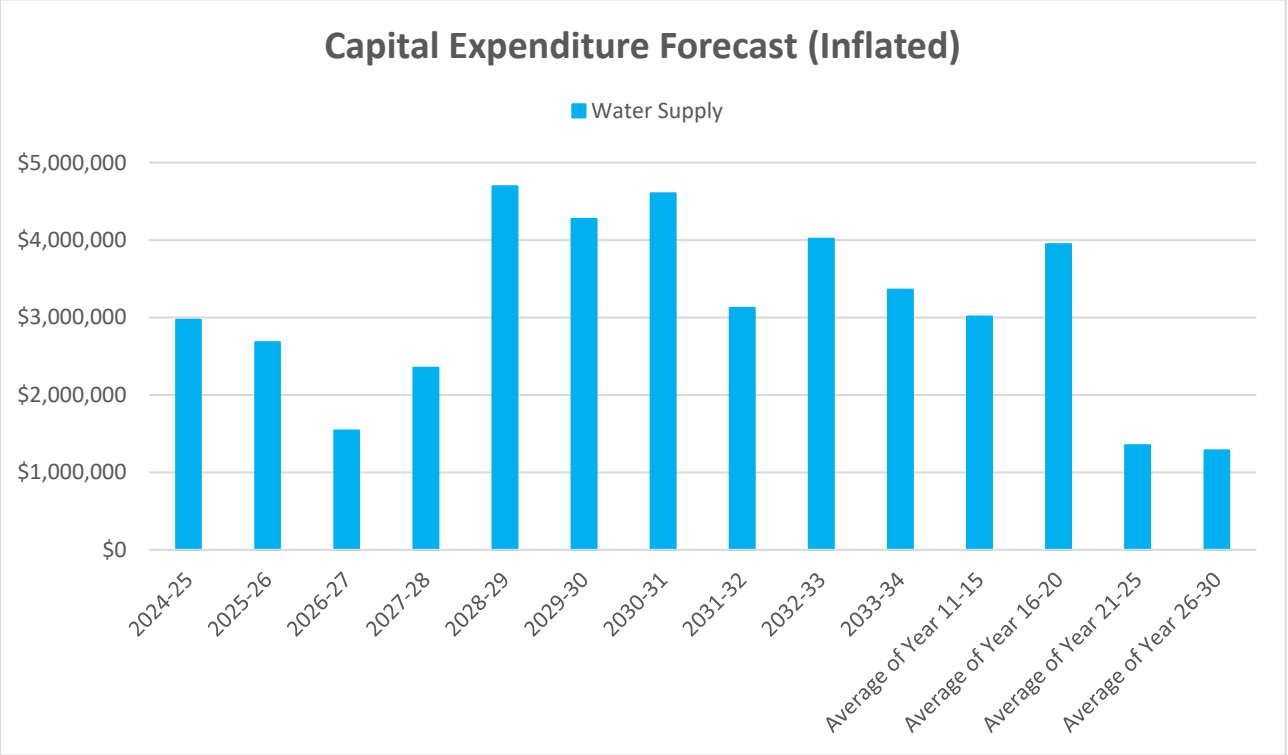
We have limited ability to deliver better outcomes through traditional asset-based solutions. By encouraging and activating individuals, households, neighbourhoods, and communities to raise their awareness of the three waters, and make changes in their behaviour, those outcomes are likely to be achieved sooner and at lower cost.

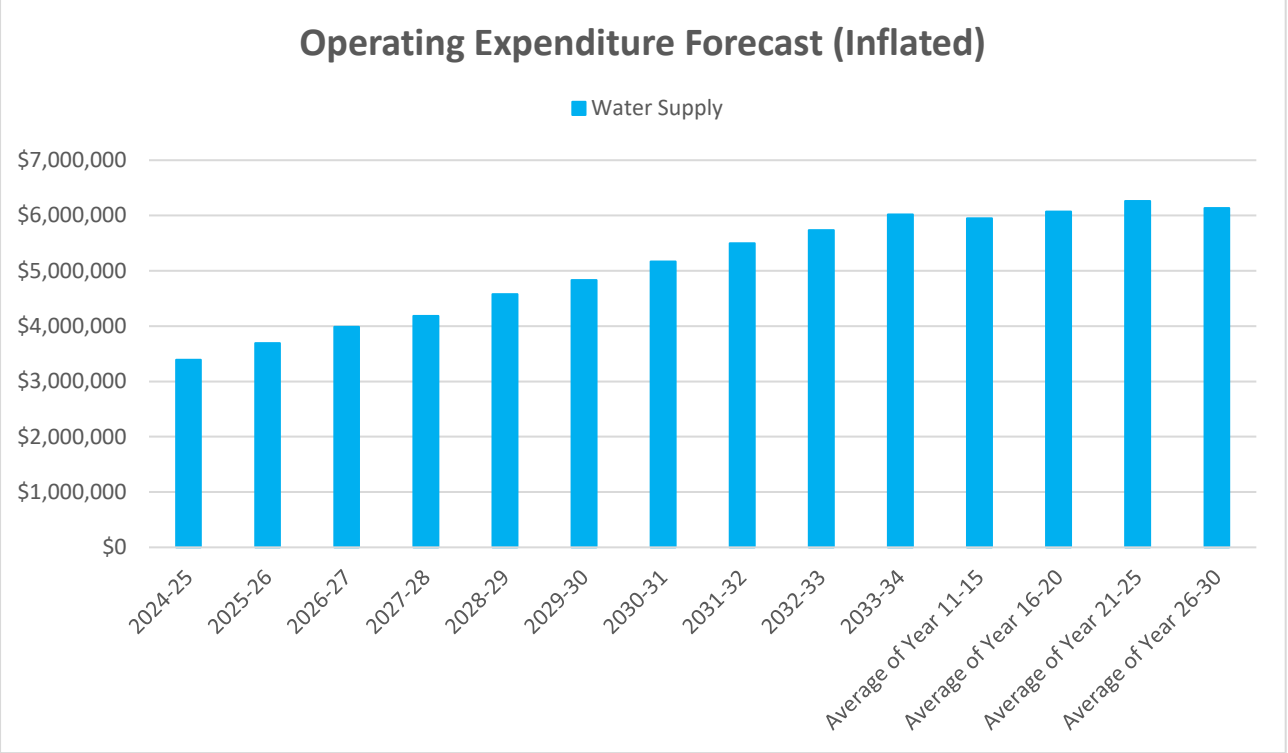
The development of partnership arrangements is crucial to achieving a participatory approach of Māori values and principles in the Council's planning and decision making processes. The challenge for Carterton District Council and our iwi partners moving forward is to understand the imbued differences and to contemplate how a 'co-existence' framework based on shared values and mutually desired outcomes for water may be meaningfully implemented.

Financial Projections

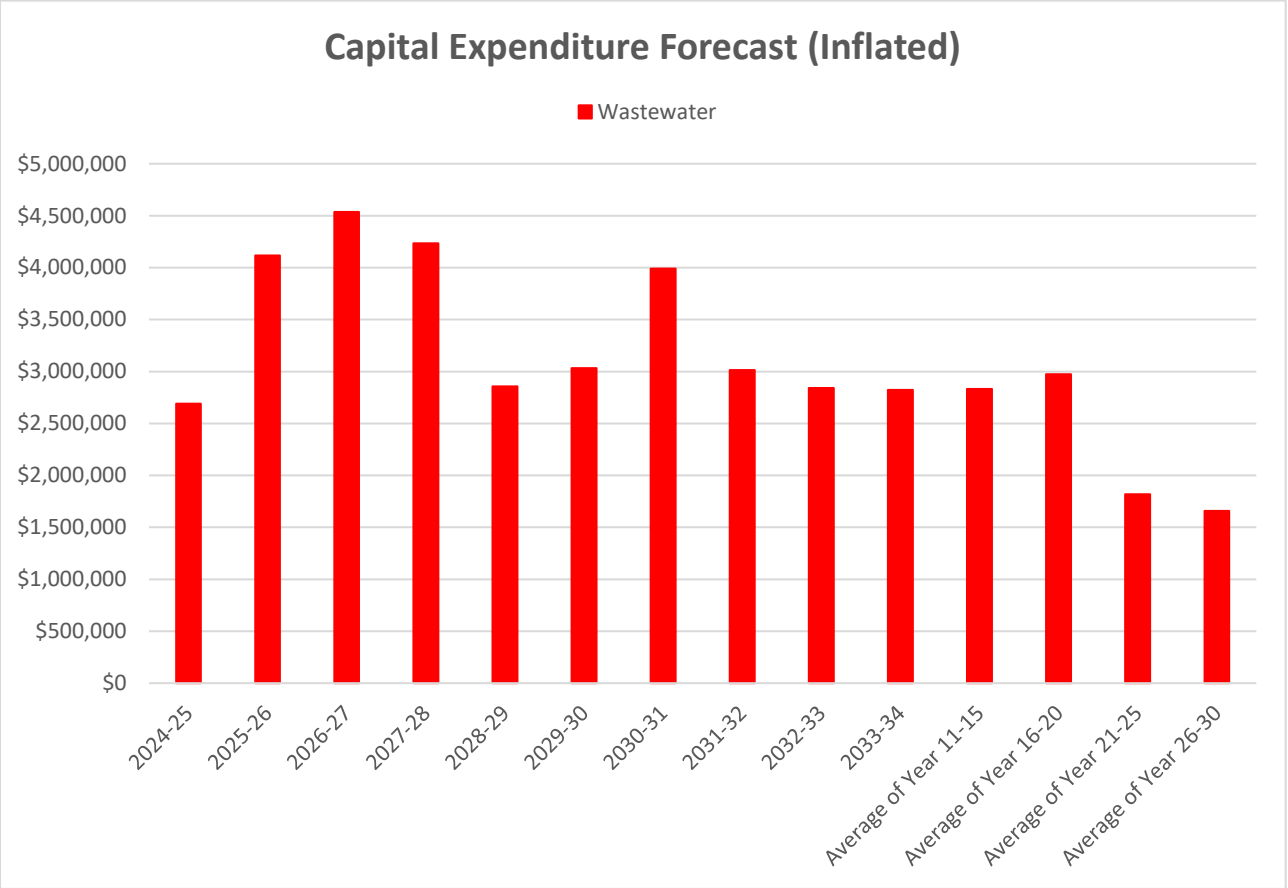
The following section illustrates the indicative forecasts of capital and operational expenditure for the next 30 years.

Water Supply





Wastewater


Capital Expenditure Forecast (Inflated)
Wastewater
$5,000,000
$4,500,000
$4,000,000
$3,500,000
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$0
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
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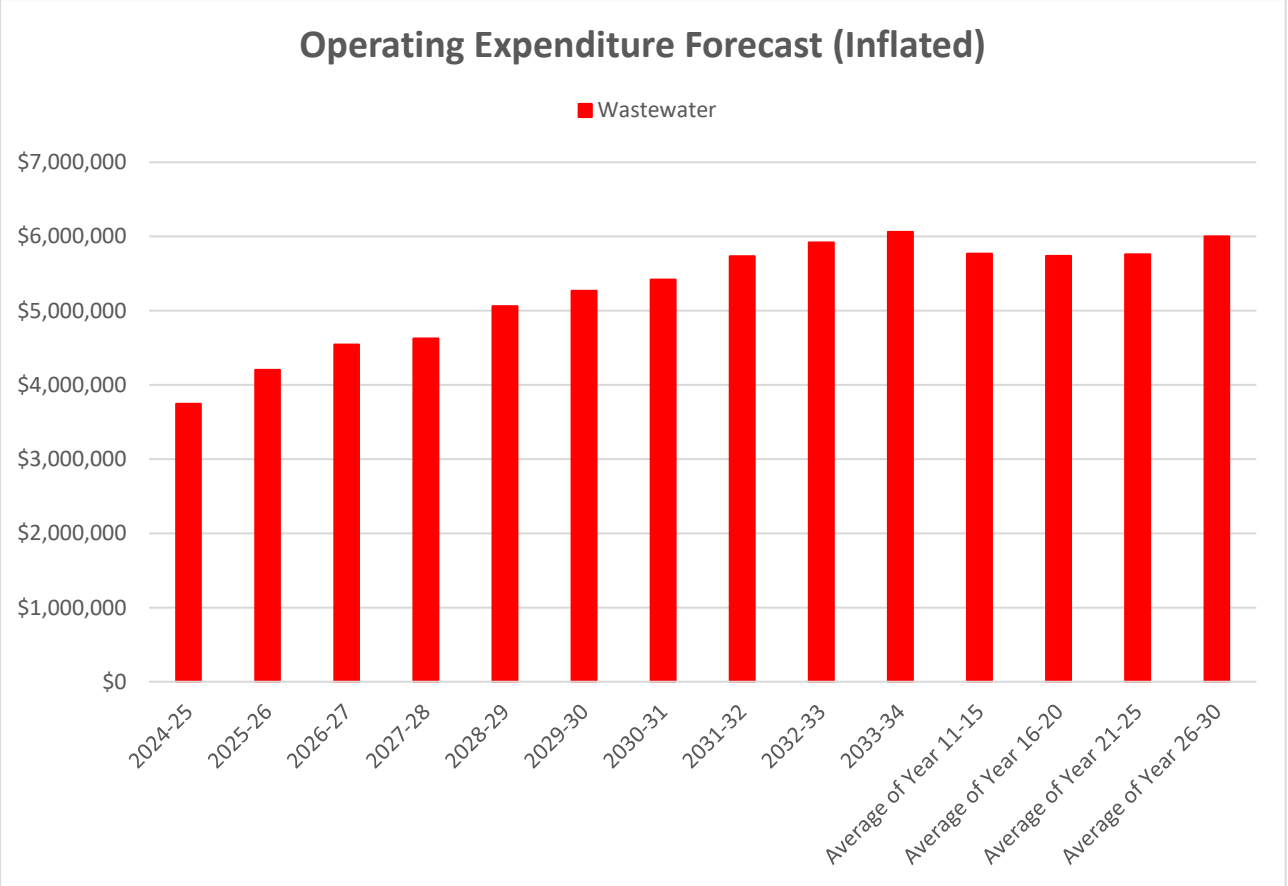
2032-33
2033-34
Average of Year 11-15
Average of Year 16-20
Average of Year 21-25
Average of Year 26-30


Operating Expenditure Forecast (Inflated)
Wastewater
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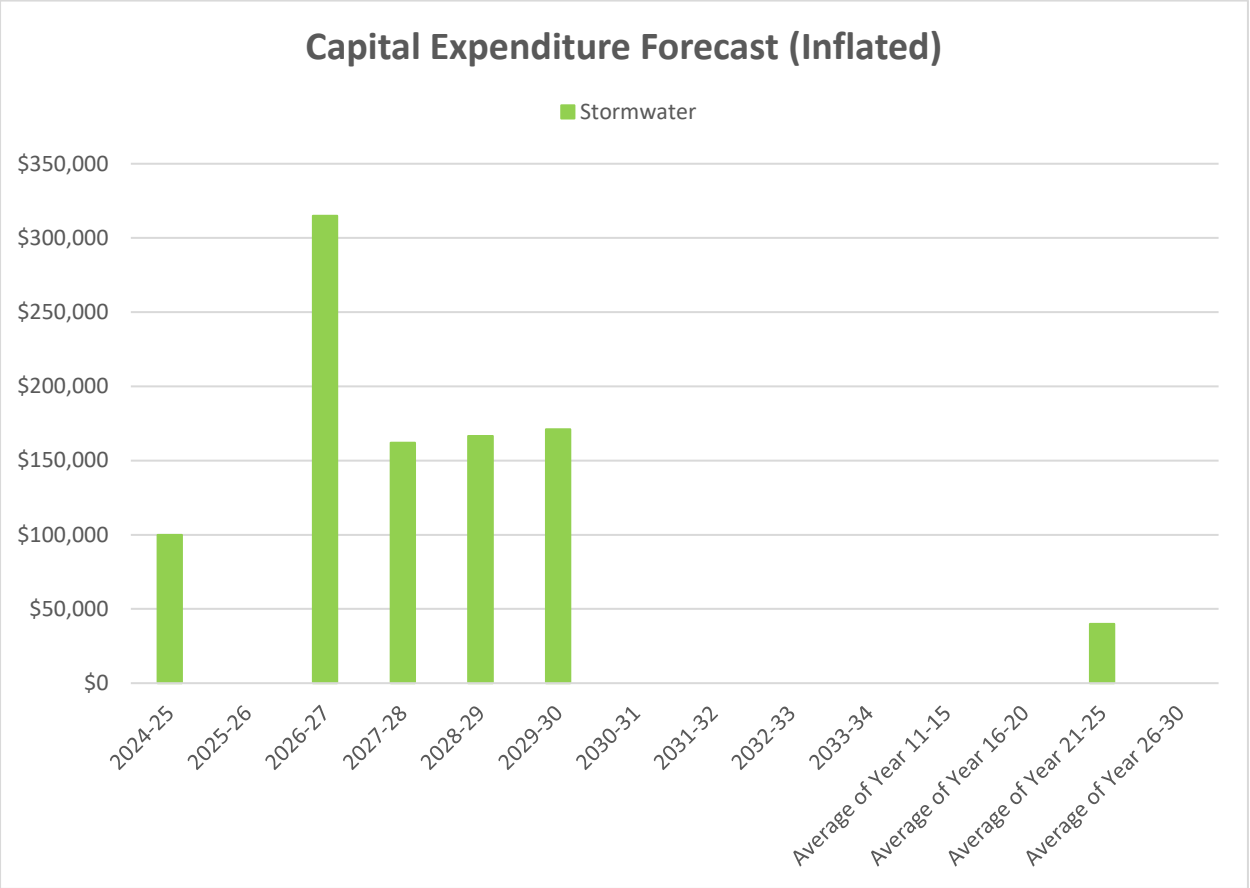
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$0
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
2030-31
2031-32
2032-33
2033-34
Average of Year 11-15
Average of Year 16-20
Average of Year 21-25
Average of Year 26-30

Stormwater


Capital Expenditure Forecast (Inflated)
Stormwater
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$300,000
$250,000
$200,000
$150,000
$100,000
$50,000
$0
2024-25
2025-26
2026-27
2027-28
2028-29
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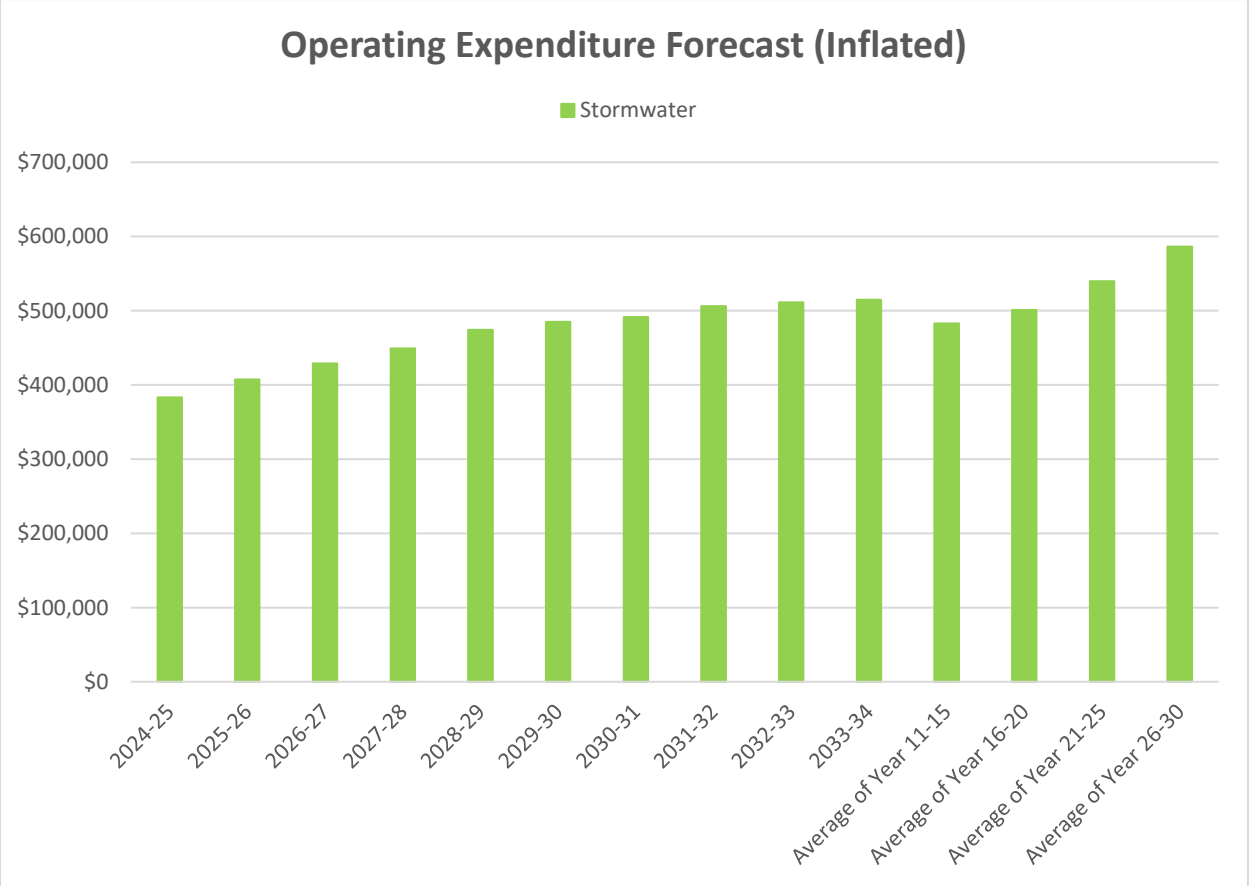
2032-33
2033-34
Average of Year 11-15
Average of Year 16-20
Average of Year 21-25
Average of Year 26-30


Operating Expenditure Forecast (Inflated)
Stormwater
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$300,000
$200,000
$100,000
$0
2024-25
2025-26
2026-27
2027-28
2028-29
2029-30
2030-31
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2032-33
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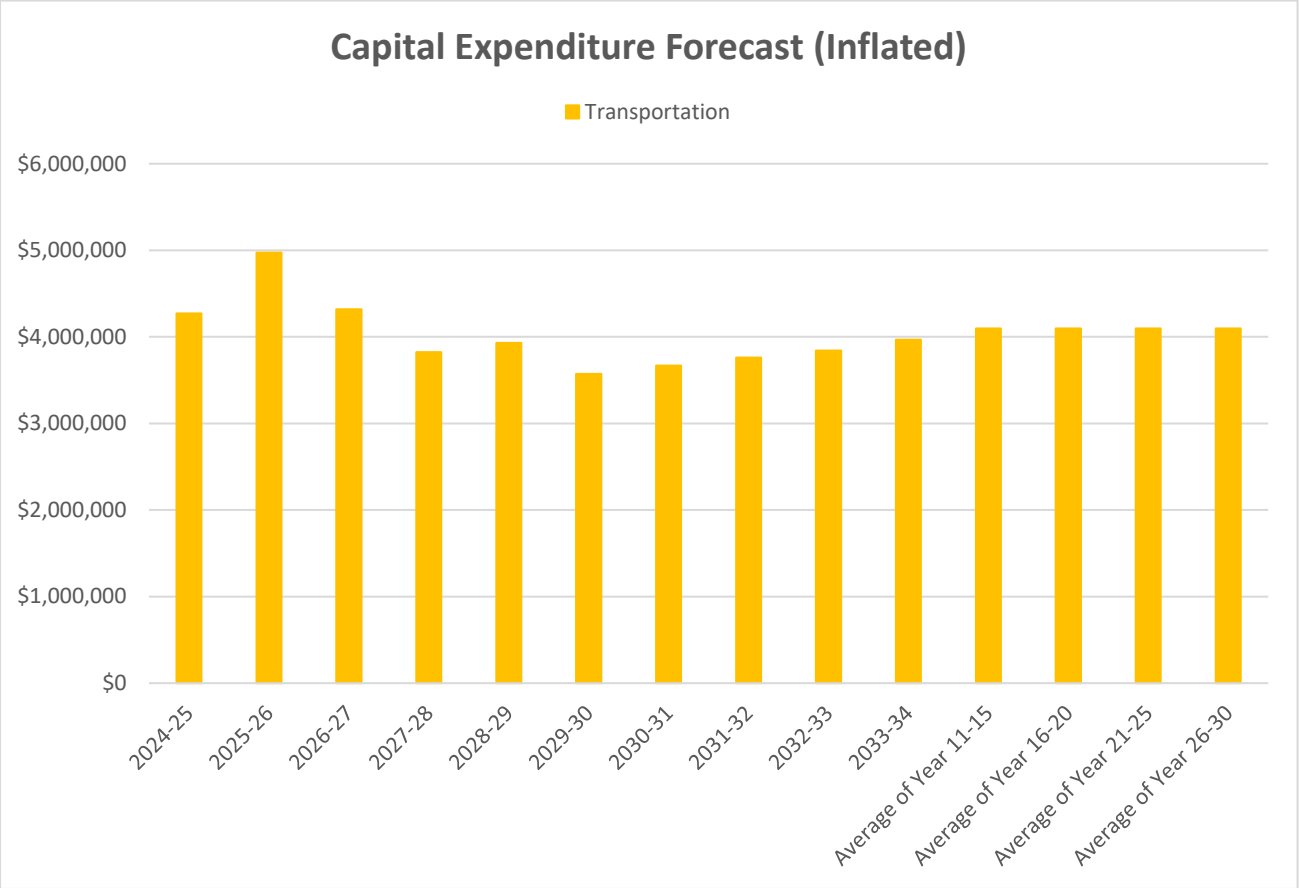
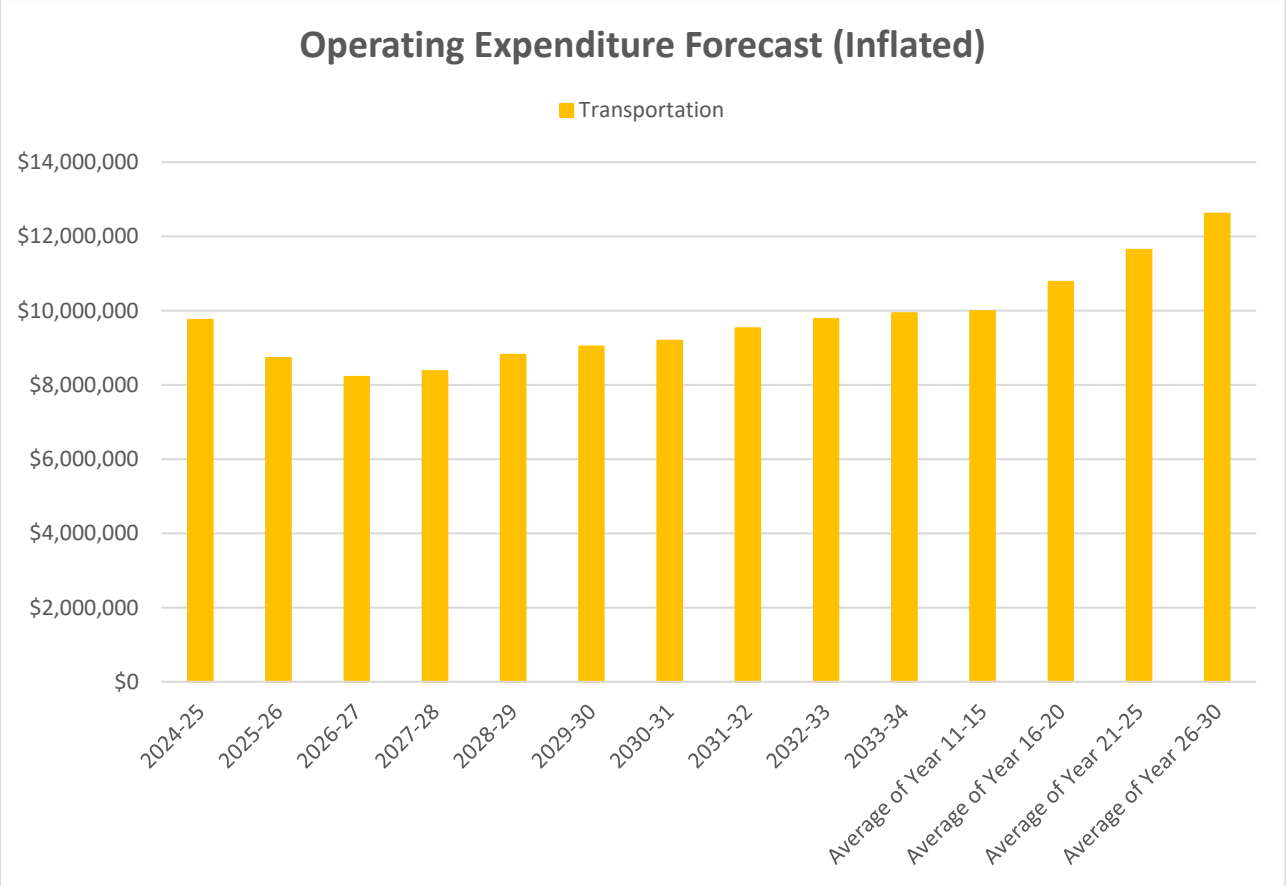
Average of Year 11-15
Average of Year 16-20
Average of Year 21-25
Average of Year 26-30

Roading/Transportation





Total Expenditure Summary

In addressing the issues identified in the previous sections of this strategy, CDC expects to spend $282.4 million on new or replacement infrastructure between 2024 and 2054. Over the same period, $667.8 million is expected to be spent on operating costs, including direct labour, depreciation, materials, and maintenance.

Operating expenditure relates to day-to-day administration, financing, and maintenance of the respective infrastructure assets.

The forecast totals are distributed across the four infrastructures asset activity areas as shown in the table below:

Asset	Capital Expenditure ($m)	Operating Expenditure ($m)	Total Expenditure ($m)
Water Supply	81.6	169.2	250.8
Wastewater	80.6	167	247.6
Stormwater	1.1	15.2	16.3
Roading	119.1	316.4	435.5
Total	**282.4**	**667.8**	**950.2**

The table above shows that expenditure across the four infrastructure activity areas will continue to be dominated by operational requirements (operating costs, labour, depreciation, materials, and maintenance) between 2024 and 2054. Total operating expenditure is expected to average $22.26 million per year for the period covered by this strategy.

Significant decisions

Asset	Significant decision	Principal option(s)	Scale of costs	Indicative timing
Roading	Increase operation maintenance to address back log	Increased % roads sealed and Rehabilitated. Increased budget for potholes and drainage.	$21.6m	2025 - 2027
Wastewater	Wastewater Treatment Plant Headworks upgrade	Renewal/Replacement of the following existing infrastructure • Grit trap • Intake pumps • Primary Clarifier • Digester	$12.5m	2025-2027
Water	Reduction of Nitrates (Nitrate-Nitrogen) from primary source of water supply (Frederick Street)	Upgrade secondary source at Kaipatangata to dilute nitrates should there be a reduction in MAV for nitrates in the NZ drinking water standards (NZDWS) relevant at the time of decision making.	$6.6m	2028-2029
Water	Establishment of an alternative water source	• Upgrading existing treatment and infrastructure • New surface water take • New groundwater take • Connecting to neighboring water supply (Masterton)	$8.8m	2040-2043

Assumptions

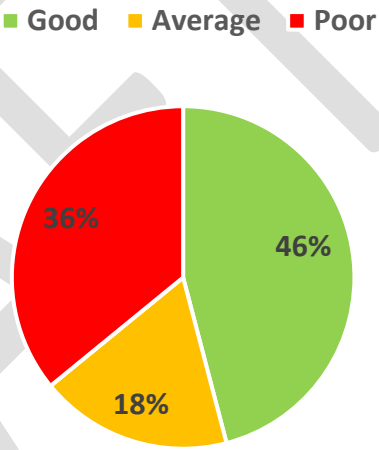
Assumption	Level of Uncertainty	Potential Effects of Uncertainty
No new unfunded mandates from central government. Central government's water allocation strategy is consistent with current policy	Medium	Increase in capital and operating costs associated with compliance
There is no reorganisation of local government that affects the Carterton District Council.	Medium	Comprehensive review of this infrastructure strategy.
Limited structural change to population and demographic projections that for the basis of this strategy.	Medium	Inability to provide infrastructure for growth at the appropriate time and location.
Economic influences that will impact on Council's business that are out of its control.	Medium	Review of this infrastructure strategy to cater for unforeseen economic influences.
Depreciation Average asset lives at a project level for new works have been used to calculate depreciation.	Medium	Depreciation is an annual expense to reflect the reduced economic potential of an asset. Because revenue (cash) covers this expense (non-cash) a cash reserve builds up over an asset's life to help fund the asset's replacement at the end of its life. This depreciation reserve is the principal funding mechanism for asset renewals. If the depreciation is inadequate, renewal projects may have to be reprioritised, or scaled down, or they may be funded through a different source such as increased borrowing or rates.

Assumption	Level of Uncertainty	Potential Effects of Uncertainty
Fluoridation of water supply Council's strategy and long term plan assumes that any future direction from Director-General to add fluoride to drinking water will be supported with capital funding from central government to install the necessary treatment equipment.	Medium	It must be noted that the Health (Fluoridation of Drinking Water) legislation does not commit central government to provide capital funding towards necessary upgrades. In the event there is no central government funding support, the necessary upgrades required to add fluoride to drinking water, its operation and ongoing maintenance will need to be funded by Council's annual budgets.
Natural disasters That there are no major natural disasters requiring additional funding for reinstatement of assets.	Medium	There is medium risk of a natural disaster occurring during the 30-year period requiring additional funds to repair or reinstate assets. Some further provision for increasing the resilience of the assets has been built into this plan but there is still further work to be undertaken to determine the desired level of resilience and the further asset improvements to achieve this.
Service potential Service potential of the asset is maintained by the renewal programme.	Medium	There is medium risk that the service potential of the pipe network assets will not be maintained by implementation of the renewal programme if the latter is not based on reliable asset condition information or planning.
Asset lives Asset lives are accurately stated.	Medium	The risk that pipe network asset lives are inaccurate is medium. Lives are based on generally accepted industry values, modified by local knowledge and condition assessment. The condition of sections of pipe networks has been confirmed using CCTV and other methods of visual inspection. The potential effect is that the effective lives of pipe assets might be overstated, with a consequential impact on depreciation funding and the respective renewals programme.

Assumption	Level of Uncertainty	Potential Effects of Uncertainty
Changes to levels of service It is assumed that no significant changes to levels of service are required other than those specifically identified in this strategy.	Medium	Different levels of service from that assumed could mean higher or lower capital expenditure and associated financing, depreciation, operating, and maintenance costs, or it could impact operating costs and resource requirements. Different technology may be needed.
Maintenance and operational costs These are largely based on historical rates and assume similar contract rates throughout the planning period.	Low	No inflation factors have been applied to the programmes and budgets over the first ten years of this strategy. Budgets for the remaining years of Where the actual inflation rate is different from that forecast, the cost of projects and expenditure will be different from that forecast. Higher than forecast inflation would likely mean higher operating and capital costs and higher revenue; higher capital expenditure could mean greater borrowing; and there would be pressure on rates to increase to cover these costs.
Construction Costs No major changes relative to current cost structure.	Low	It is possible that the price of some components will change relative to others. Budgets are reassessed each year for the Annual Plan process to mitigate this risk.
NZ Transport Agency Subsidies Subsidies will continue at the approved rate of 53 percent.	Low	If the rate or dollar level of subsidy decreases, roading projects may be reprioritised, or scaled down, or they may be funded through a different source such as increased borrowing or rates.
Council policy No significant change to Council policy that impacts on assets and services.	Low	Any significant change will require a full review of asset management plans and implications identified at the time.
Vested assets No assets are gifted to the council as a result of subdivision.	Low	The Council's preference is receive infrastructure or development contributions by way of cash, rather than land or other assets. If assets are vested as a result of subdivision, this will replace cash revenue.

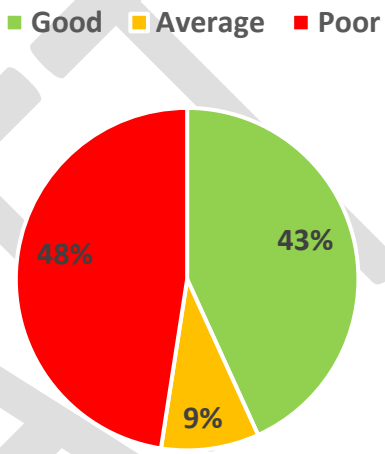
Assets

Water Supply

Asset Class	Quantity	ODRC[8] (2022)
Treatment Plants	2	$2.2m
Reticulation	93 km	$13.5m
Pump Stations	1	$1.8m
Asset Condition Summary		

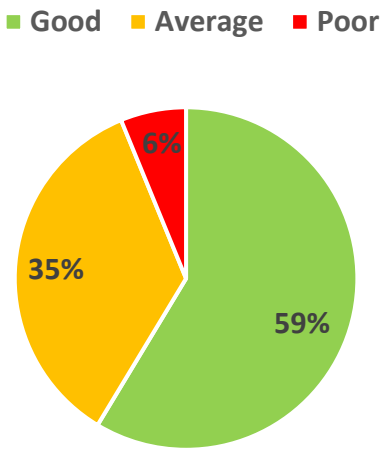
[8] Optimised depreciated replacement cost (ODRC)

Wastewater

Asset Class	Quantity	ODRC[9] (2022)
Treatment Plants	1	$1.9m
Reticulation	72 km	$11.1m
Pump Stations	17	$0.6m
Asset Condition Summary		

[9] Optimised depreciated replacement cost (ODRC)

Stormwater

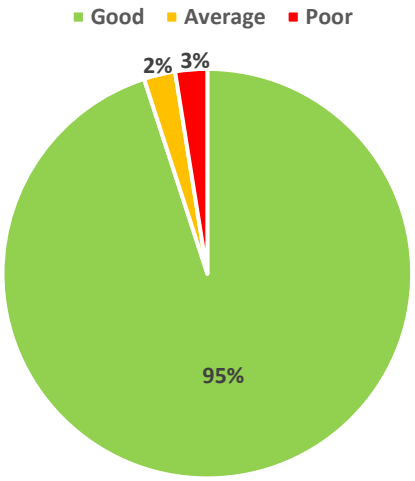
Asset Class	Quantity	ODRC[10] (2022)
Reticulation	21.5 km	$8.9m
Open channels	8.6 km	$0.1m
Asset Condition Summary		

[10] Optimised depreciated replacement cost (ODRC)

Roading

Asset Class	Quantity	ODRC[11] (2023)
Sealed Roads	320 km	119,911,000
Unsealed Roads	160 km	6,758,000
Footpaths	50 km	5,291,000
Bridges	49	18,231,000
Street Lights	1,114	494,000
Road Signs	1,937	484,000
Guardrails	601 m	624,000

Asset Condition Summary



[11] Optimised depreciated replacement cost (ODRC)

Conclusion

This Strategy is aimed to set out the future direction for infrastructure services over the next 30 years. Our planning and investment decisions will steer us towards our desired future state – a welcoming and vibrant community where we all enjoy living.

Our actions combine both asset and non-asset solutions. Some of the key principles driving future investment choices are affordability, adaptable to long term change, flexibility to overcome shock events and resource efficiency and recovery. Our future investments will also result in multiple outcomes, rather than being a single infrastructure solution. These outcomes, for example, may include resilience, water quality, amenity, and so on.

Achieving our strategy will require a shift in thinking from a 'business as usual' conventional approach towards innovative design solutions which embrace new technologies. It may take decades before communities fully realise the benefits of new approaches, so our journey will be incremental. However, it is important that we don't lose sight of our end state and take advantage of opportunities as they arise.

We can avoid risks of over-capitalisation and significant upfront costs by investing in solutions which are adaptive and scalable. The future challenges and opportunities outlined in the strategy will influence future investment decisions. We need to be in a position to front-foot many of these challenges, while responding to unforeseen events. That requires us to constantly review our Strategy and investment priorities as new information comes to hand.

Our investment decisions will be informed by a growing body of knowledge which factors in multiple sources of information. Our Smart Investment approach will ensure decisions are linked to council priorities and aligned to our three company outcomes and service goals.

Finally, by thinking about infrastructure as an integrated system we can better target our investment decisions, and work towards achieving multiple outcomes.

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