CARTERTON
DISTRICT COUNCIL

WATER ASSET MANAGEMENT PLAN

Te Mahere Wai Taonga Whakahaere

PART B

REVIEWED 2021

Doc ID 90783

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Revision history

Plan Version and Control Date	Revision	Checked by:
From Doc 39332		
March 2018	Version 1	D Gittings
August 2019	Version 2	T Pritchard
November 2021	Version 3 – Doc 90783	T Pritchard

1 Executive summary

What we do

Carterton District Council (CDC) provides safe (treated), clean, drinking water to the urban population of Carterton District. Water from the Kaipatangata River and Lincoln Road well-field (and associated catchments) is delivered via approximately 60km of pipes with around 2,500 connections to those pipes. Relatively rare in New Zealand is the provision by CDC of nearly 320km of water races for stock and irrigation use.

Why we do it?

If you are providing water – it has to be safe.

In New Zealand, all water suppliers have a duty to ensure their water is safe to drink. CDC exceeds the drinking water standard (Drinking Water Standards NZ) which defines the minimum requirements for drinking-water in New Zealand. The DWSNZ aims to protect public health, minimise unnecessary monitoring and be appropriate for all large or small, publicly or privately owned water suppliers.

The community expects that CDC provide sustainable infrastructure and services. This plan provides the basis of management, legislative, financial, engineering and technical practices to ensure that we deliver on the community's expectations at an optimum cost.

Levels of service

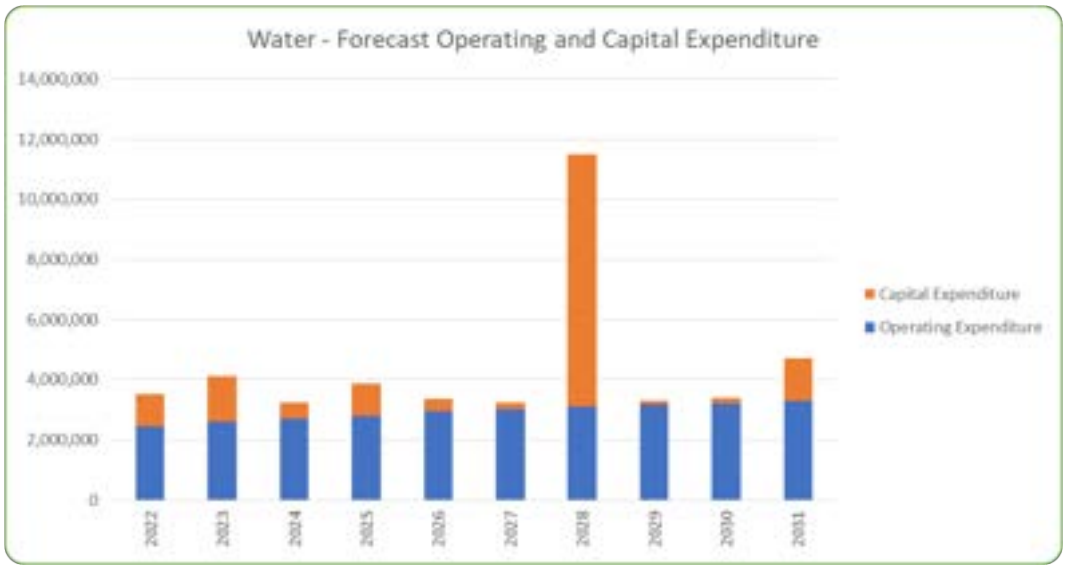
The level of service for water assets is defined on nationally accepted standards, current appropriate practice, and any relevant legislative compliance requirements. How the customer regards the level of service provided by CDC is gathered from surveys, meetings, trend analysis, annual plan submissions, service request analysis and general customer responses.

From this evidence we have established that the community is generally satisfied with what we are doing and how we are delivering the service.

What does it cost?

The estimated replacement cost (i.e. value) of CDC's water assets is approximately 26.9 million dollars based on the 2019 Opus asset valuation. Maintenance and upgrading of those assets to provide the current levels of service to the community is forecast at around 2.2 million per year in the next ten-year period with the split between operational expenditure and capital expenditure graphically displayed below in Figure 1

Figure 1: Projected Operational Expenditure and Capital Expenditure



Growth and demand

Data for the AMP's is based around the Wairarapa Population Projections – June 2020 report from Infometrics Limited.

Population growth in Carterton District has been strong over the past decade, aided by significant net migration flows in the past five years. Carterton District's current estimated population is 9,690. In Carterton District, growth is more evenly distributed across urban and rural areas, reflecting the historic propensity for rural lifestyle developments in the district and by 2051 the projected population will be approximately 13,098. Growth is expected to slow however in the next term with international net migration falling away due to COVID-19.

Council has however prepared a draft urban growth strategy that would increase the designated urban area with associated water supply demands.

Identified issues

Population projections

It is important to note that population projections are neither predictions nor forecasts. Statistics New Zealand provides projected populations of territorial authority areas based on combinations of fertility, mortality, and migration assumptions. While the projection assumptions are formulated from an assessment of short-term and long-term demographic trends, there is no certainty that any assumptions will be realised. They provide an indication of possible future changes.

CDC has used the available medium level growth projections that current water allocations will have the ability to cater for.

However, potential growth may occur beyond those projected will require investigation into additional water sources and associated infrastructure. It has been recommended that Council to undertake an investigation into potential water supplies in the 2021/22 financial year.

Condition rating knowledge

Water assets (pipes, hydrants, valves etc.) have been condition graded based on age, material and anecdotal local knowledge.

However, age alone does not necessarily portray an accurate assessment of assets. A good knowledge of the assets condition flows into consistent delivery of the aimed for levels of service as well as increased accuracy for long term financial planning.

Council records asset condition assessed from maintenance works and undertakes inspection procedures to be able to gain better a knowledge of asset condition.

Will higher standards be required and therefore costs?

The Greater Wellington Regional Council has prepared a Natural Resources Plan (to replace the Regional Plan) that sets targets and rules for all activities in the Wellington Region that have the potential to affect the natural environment, biodiversity and landscape values.

In July 2020, the Government launched the Three Waters Reform Programme – a three-year programme to reform local government three waters service delivery arrangements in response to the Havelock Water incident.

Both the Natural Resources Plan and Three Waters Reform signal a significant impact on Council's infrastructure requirements and the Council's delivery of services. As yet the costs of the water reform proposals are unknown.

The Health (Fluoridation of Drinking Water) Amendment Bill passed its final reading in Parliament in November 2021. The Bill moves decision making authority on community water fluoridation from local authorities to the Director-General of Health. It is likely that fluoridation will be required to be implemented by Council as soon as mid-2022.

Private water supplies will not be required to be fluoridated

Climate change

Climate change is likely to result in both more extreme storm and drought events. It may require Council to re-consider the capacity of all three waters. The council relies on adequate water flows from the Kaipatangata River and Lincoln Road bore-field and has limited stored capacity for a sustained drought. If drought conditions do become more extreme and more often an alternative water source or storage requirements may be needed.

Greater Wellington Resource Consent

The current resource consent for the water take at the Kaipatangata Stream expired with current conditions being rolled over while the new consent application is being processed. The new consent (if granted as applied for) may place pressure on the supplementary bore fields in Lincoln Road. The lower level of take from the Kaipatangata may switch primary use during dry conditions (December to March inclusive) to the supplementary bore field.

Investigations into further potential supply points may need to be planned for alongside a strategic approach to demand management.

Seismic risk

Many critical facilities, such as the pump stations, reticulation and treatment plants, were designed and constructed before the adoption of seismic design standards that reflect the current state of knowledge of regional seismicity.

Pipeline networks include extensive use of non-ductile (inflexible) materials which tend to fail during strong ground motion. Pipelines are especially vulnerable to failure from permanent ground deformation (resulting from liquefaction), because the deformation causes push-on pipe joints to separate.

Council will investigate methods to improve the resilience of the main trunk feed from the Kaipatangata Supply to the urban area.

Three Waters Reform

The New Zealand Government has initiated a wide-ranging reform of the three waters sector which will be ongoing from 2021 and is intended for implementation 1 July 2024.

This is a three-year programme of reform of local government water service delivery arrangements, and includes support for the establishment of Taumata Arowai, the new Waters Services Regulator. A report by Water Industry Commission of Scotland estimated that New Zealand would need to invest between $120 billion to $185 billion in our three waters infrastructure over the next 30 years to meet drinking water and environmental standards to provide for future population growth. It is thought though that the Water Industry Commission of Scotland modelling may well underestimate the necessary investment costs and could give overly optimistic timeframes for implementation.

Once Taumata Arowai is fully functional, it will oversee and administer an expanded and strengthened drinking water regulatory system, new drinking water standards and oversee the environmental performance of wastewater and stormwater networks. This is expected to improve the sector's performance, and to put greater focus on infrastructure performance.

Carterton would belong to 'Entity C' of the Water Service Entities (WSE), along with 22 other Councils. The boundaries have been set with consideration of rohe/takiwā, water catchments, population, economic benefits and the needs and interests of local communities.

WICS has estimated efficiencies of 45% over a 30-year period, roughly 2% per annum achieved through improved and aggregated capability, procurement, governance, scale and economic regulation, ultimately delivering lower costs for communities.

An indicative amount of $6,797,415 has been allocated from this "better off" funding should Carterton Council continue to be involved in the three waters reform programme.

The future investment risk is real and manifesting in the legislative changes such as the drinking water Regulator (Taumata Arowai), the Water Services Bill, the changes to the Drinking water standards and Environmental Regulation (Proposed Natural Resources Plan, National Policy Statement on Fresh Water Management, and the Natural and Built environment Act).

2 Introduction

The *purpose* of this Asset Management Plan is to provide Carterton District Council with a range of tools to assist with the management of its assets. The Plan combines management, financial, engineering and technical practices and is intended to:

- Ensure that Carterton District Councils water supply assets are managed to ensure delivery of the agreed levels of service to defined standards and at optimum cost.
- Have long term sustainability
- Comply with regulatory requirements.
- Help Council to achieve the outcomes the community has defined.

The Water Asset Management Plan has been in use since 1992 and has been reviewed regularly, becoming the primary tactical tool for management and planning of the Council's assets. The last review was carried out in 2019 and included extended forecasting of forward works from 10 years to 30 years in line with the statutory requirement to prepare an Infrastructure Strategy in support of CDC's Long term plan.

2.1 Linkages

The plan is an integral input into the Councils Long term plan (LTP) and infrastructure Strategy and contributes to meeting the identified community outcomes and desires for its expected levels of service. Table 1 below provides an overview of the Plan

This plan is a live document, and that through its life it will be modified to include information and policies that improve or enhance the Council's ability to effectively manage assets on behalf of the community.

Table 1: Plan Framework

Items	Detail
Introduction	Executive summary
Description of activity	Description of assets, goals, frameworks, responsibilities, the asset management systems, and the service.
Levels of Service	Linkage between agreed community outcomes and specified Levels of Service. Translates higher level aspirations into meaningful service level items.
Demand Management	Forecasting future demand based on relevant influencing factors.
Risks and resilience	Identifying opportunities or avoiding loss.

	The assessment and mitigation against failure to deliver levels of service, with mitigation measures provided. Funding and associated justification. Clearly presented funding requirements, linked directly to delivering levels of service.
Assets and Lifecycle management	Prudent acquisition, operation, maintenance, renewal and disposal of assets which optimise asset use in delivering a service to the community throughout its lifecycle
Financial Projections	Existing data is used to estimate the financial implications of the asset management
Improvement Plan and monitoring	Improvement in data collection & application, clear lines of responsibility, and creation of a practical working document. To enable asset management plans to be reviewed and then improved upon.

3 Description of Activity

3.1 What is involved?

The supply of potable water to residential, industrial and commercial properties protects public health, supports city growth and contributes to the general well-being of the Community. In urban areas, potable water is most effectively supplied by means of reticulated (piped) community water supply. This allows the costs associated with maintaining high standards and efficient infrastructure to be spread over a wide population. Council owns or maintains assets on behalf of the Community, providing water at pressure to the boundary of each property in the urban area and also to properties where the main pipeline has been laid. The water is taken from the Kaipatangata stream and several bores located along Lincoln Road.

3.2 Summary of Water Assets

The Water system consists of 75.8km of pipe reticulation and associated assets. The Water Supply network is summarised in Table 2 below.

Table 2: Carterton District Council Water Assets

Asset type	Unit	Quantity	Comments
Pipes	Km	75.8	Diameter from 15 – 375mm
Hydrants	No.	322	Diameter from 100 – 305mm

Valves	No.	351	Diameter from 15 – 375mm
Tobies	No.	2940	Metered water connections
Water Race	Km	311	Managed water races

The 16.5km of the pipe reticulation is of an AC (Asbestos-Cement) material that was reduced by 22% on the previous 2017 total. 24.8km is PVC (polyvinyl chloride), the remainder of the pipe materials are a mixture of materials such as PE (polyethylene pipe), Steel, Copper, & Cast Iron. The most common diameter of pipe used in the network is 100mm diameter at approximately 19km in total length.

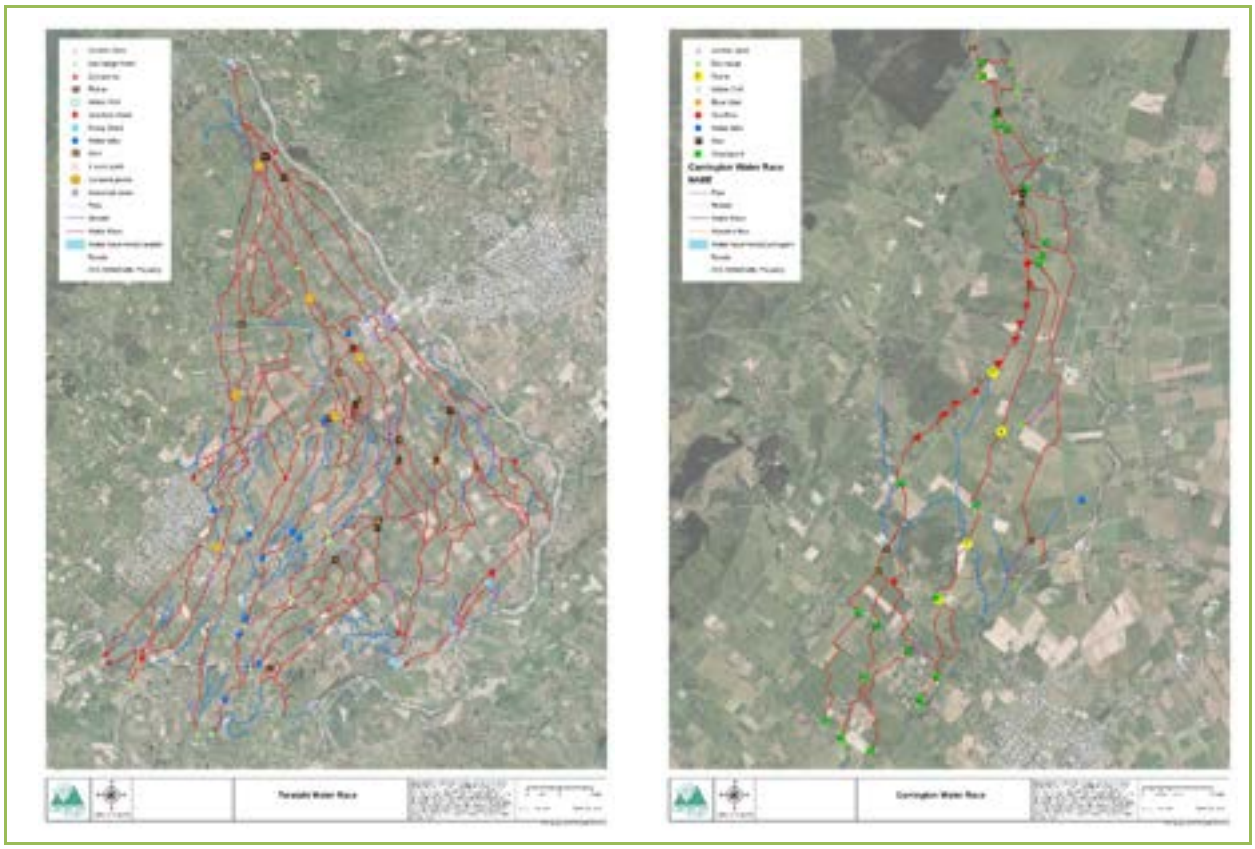
3.3 Water and related Council Assets

There is a rural water supply comprised of the two main networks the 'Taratahi' (271km) and the 'Carrington' (39km) water races. Both water race networks are a combination of natural and manmade channel formations built over 100 years ago for the distribution of water to 510 rural properties across the Carterton District (see Figure 2).

Both water race networks contribute significantly to the economic & environmental health of the rural areas of the District.

There are 70 identified ponds designed for various purposes, ranging in size from a wetland area of 79,500m² at Gladstone down to an ornamental 15m² surface meter pond near Chester Road. There are 119 identified and mapped maintenance points for use as control, extraction, or flow management.

Figure 2: Water race networks



3.4 Why does CDC provide this Activity?

New Zealand's drinking water management structure, which supports the provision of clean and safe drinking water to communities, includes several acts, regulations, and national standards.

The importance to community wellbeing of public water supplies is recognised in the Local Government Act 2002 (Section 130) which requires each local government organisation to:

> *(2) Continue to provide water services and maintain its capacity to meet its obligations under this subpart.*
>
> *(3) In order to fulfil the obligations under this subpart, a local government organisation must—*
>
> *a) Not use assets of its water services as security for any purpose:*
>
> *b) Not divest its ownership or other interest in a water service except to another local Government organisation:*
>
> *c) Not lose control of, sell, or otherwise dispose of, the significant infrastructure necessary for providing water services in its region or district, unless, in doing so, it retains its capacity to meet its obligations.*

The Ministry of Health's Drinking Water Standards for New Zealand set maximum acceptable values for organic, inorganic and bacterial elements in water for public use. The values are at a level that requires the water supplier to act before water quality can cause adverse health effects.

The obligations on suppliers of drinking water to provide safe drinking water was strengthened when the Health (Drinking Water) Amendment Act 2007 was enacted requiring water suppliers to ensure clean drinking water supplies. The amendment meant water suppliers would need to take all practicable steps to comply with the DWSNZ which would be achieved by implementing Water Safety Plans (WSP), which must plan to reduce the likelihood of contaminants entering supplies.

In addition, the Ministry for the Environment introduced a National Environmental Standard for Sources of Human Drinking Water in 2008. The NES for Drinking Water is a regulation made under the Resource Management Act 1991, which requires regional councils to ensure that effects on drinking water sources are considered in decisions on resource consents and regional plans.

3.5 Management of Activity.

This section covers the operation, renewal and improvement of the asset base, and the service delivery mechanisms required to deliver the Water Treatment & Supply service to the stated levels of service

3.5.1 Operations and maintenance

Day to day operations and maintenance are covered by in-house delivery. Operations covers day to day service delivery required to deliver the agreed level of services. Maintenance covers the actions necessary for retaining the assets at as near as practicable to its original condition but excludes rehabilitation or renewal.

3.5.2 Renewals

Renewals cover the progressive replacement of existing assets as they reach the end of their useful life. The rate of asset renewal is intended to maintain the overall condition of the asset system at a standard that ensures the community's investment is maintained. If existing assets are not replaced with assets of similar standard the ability of the service to deliver the required level of service is reduced.

Identification of renewal needs are through staff knowledge of individual assets and associated analysis maintenance records (asset failure and expenditure history), service requests records, and observations.

Through the Councils Asset Management System there is an identified asset renewal program for the next 30-year period.

3.5.3 Service Improvement – Levels of service driven

Service driven improvements provide for infrastructure development to enable Council's drive to achieve its predetermined levels of service (see section 5). The need for these capital works can result from changes in the operating environment, changes to mandatory or council prescribed levels of service, compliance issues and/or changes in existing demand.

3.5.4 Service Improvement – Growth Driven

Growth related projects relate to the development that occurs as a consequence of population, commercial or industrial growth. Growth can result in changes in demand for infrastructure, and changes in the pattern of demand.

Carterton is currently experiencing relatively high population growth (approximately 2%) and will require investment into the stormwater infrastructure to enable further industrial and residential re-zoning to occur. Capital works identified as being driven by growth are funded retrospectively through development contributions.

3.6 Significant negative effects and how they are mitigated.

In general, providing Water services to the community has substantial public health and environmental benefits. There are however possible negative effects in providing this service.

- The cost of providing the service on rate payers, especially our smaller community
- Any future costs of keeping up with increasing national standards that may require significant capital investment
- Long term renewal costs of aging infrastructure

3.6.1 Mitigating Measures

The cost of providing new water infrastructure is mostly funded by new developments, the maintenance requirements is funded by general rates thus the cost is spread across the community. Capital works are funded by loan to make sure that the cost is spread across generations of ratepayers.

3.7 Significant changes to Activity.

During the term of this plan the following may have significant implications on this activity:

- Changes to national water standards.
- Implementation of the natural resources plan.
- Decreasing availability of water takes due to climate changes potentially impacting upon required infrastructure upgrades.
- Changes to legislative requirements
- Three waters reforms
- Fluoridation of Drinking Water

3.8 Goals and Objectives of Asset Ownership

The Carterton water activity aims to provide an effective treated and reticulated water supply with an environmentally sustainable take from the current supplies to provide for its community.

This supports the community wellbeing and health values by providing a water supply network system capable of meeting the required performance targets and consent conditions.

Council has statutory obligations under the Local Government Act 2002 to continue to provide existing Water services and a general authority to construct public drains and undertake land drainage, recognising the requirement to take a sustainable development approach that takes into account:

- the social, economic and cultural wellbeing of people and communities; and
- the need to maintain and enhance the quality to the environment; and
- the reasonably foreseeable needs of future generations

3.9 Community Outcomes

Council's levels of service contribute to achieving community outcomes.

As part of the development of the Consultation Document for the LTP, the Council reviewed its existing vision and community outcomes to confirm whether they were still relevant to the community. They were satisfied that the vision and community outcomes were generally still relevant and refined the vision and outcome priorities as displayed in Table 3.

Table 3: How Council activities relate to the Community Outcomes

Community outcome, Council group of activities	A strong community	A prosperous economy	A healthy natural and built environment	Quality fit-for-purpose infrastructure	A strong and effective Council
Governance	✓				✓
Community services	✓	✓	✓		✓
Regulatory and planning		✓	✓	✓	✓
Roads and footpaths		✓	✓	✓	
Rural water races		✓	✓	✓	
Sewerage and the treatment and disposal of sewage			✓	✓	
Stormwater drainage			✓	✓	
Waste management			✓	✓	
Water supply			✓	✓	

3.10 Local Context

3.10.1 Assessment of water and sanitary services

Under the Local Government Act 2002 councils must from time to time assess the provision of water supply, wastewater services, and sanitary services in its district.

CDC last completed its water and sanitary services assessment in 2016 and another assessment is underway. The assessment informed the development and ongoing review of the related asset management plans and is consequently reflected in CDC's Long Term Plan.

3.10.2 Financial Strategy

Section 101A of the Local Government Act 2002 requires all local authorities to prepare and adopt a financial strategy for each of the 10 consecutive financial years covered by its long-term plan. The purpose of the financial strategy is to:

- facilitate prudent financial management by the local authority by providing a guide for the local authority to consider proposals for funding and expenditure against; and
- provide a context for consultation on the local authority's proposals for funding and expenditure by making transparent the overall effects of those proposals on the local authority's services, rates, debt, and investments

3.11 Regional Context

3.11.1 Greater Wellington Regional Council (GWRC) - Natural Resources Plan (NRP)

GWRC has reviewed the existing regional plans for the Wellington Region. It has identified the effects of human activity on the region's natural and physical resources and has worked closely with communities and individuals to develop rules that "*protect the right things, in the right places*". As a result of this review, the NRP for the Wellington Region was developed. The NRP was approved by GWRC for public notification on 31 July 2015. It combines coastal and regional plans, as well as incorporating regulatory and non-regulatory methods. The Plan identifies five distinct catchment areas (Whaitua) within the region. The Whaitua process provides a decentralised approach to establishing priorities and programmes within each Whaitua through catchment groups called Whaitua committees. These committees work collaboratively and use an integrated approach to resource management. GWRC is currently working through the hearing process on issues that may be resolved or require clarity.

3.11.2 Regional Council Policies and Plans Affecting This Activity

- Regional Policy Statement for the Wellington Region
- Regional Fresh Water Plan
- Natural Resources Plan

4 Level of Service

4.1 Introduction

This plan intends to match the level of service the assets provide with the customers' expectations given financial, technical and legislative constraints. Asset management plans can be readily co-ordinated with strategic financial planning. Allied to which, adoption of formalised asset management systems and practices will provide Council with key benefits which, though acknowledged as understood in broad terms, are repeated here in detail:

- Improved understanding of service level options and requirements.
- Minimum life cycle (long term) costs for an agreed level of service.
- Better understanding and forecasting of asset related management options and costs.
- Managed risk of asset failure.
- Improved decision making based on costs and benefits of alternatives.
- Clear justification for forward works programmes and funding requirements.
- Improved accountability over the use of public resources.
- Improved customer satisfaction and organisation image.

The pursuit of formal asset management planning will enable Council as owner of a comprehensive range of assets to demonstrate to their customers and other stakeholders that services required to be provided are in fact being delivered in the most effective manner.

4.2 Service statement

The provision of physical infrastructure provides an important foundation for the role Council performs in achieving community well-being. Council is therefore committed to its role as manager of the range of valuable and essential assets that ensure the wellbeing of our community. These services include the provision of safe and efficient Water supply systems, considered by Council to be strategic assets.

Council delivers Water services because:

- There are legislative mandates requiring the provision of these services
- In-house delivery reduces the risk to Council of failing to meet legislative requirements
- Council has an interest in ensuring the health, well-being and safety of our community, and these functions contribute to this
- Council currently owns the assets relating to this activity

4.3 Customers & Stakeholders

Council's water service customers include:

- Ratepayers
- Residents
- Local industries and businesses
- Health and Educational institutions
- Emergency services

Council's Water service stakeholders include:

- Greater Wellington Regional Council.
- Rangitāne o Wairarapa Inc
- Kahungunu ki Wairarapa
- The Department of Conservation
- Wairarapa Public Health
- Ministry for the Environment
- Ministry of Health
- Ministry of Agriculture and Fisheries.

4.4 Defining levels of service

The adopted levels of service for Water reflect current industry standards and are based on:

- **Customer Research and Expectations**. Information gained from the community on expected quality and services.
- **Legislative Requirements**. Environmental standards, regulations and acts that impact on the way assets are managed (i.e. resource consents, building regulations, health and safety legislation, Local Government Act).

- **Strategic and Corporate Goals**. These provide guidelines for the scope of current and future services offered the manner of service delivery and define specific levels of service that the organisation wishes to achieve.

4.5 Customer Research and Expectations

Council's knowledge of customer expectations is based on:

- Annual Residents Survey conducted by 'Key Research'
- Public meetings on specific projects
- Consultation via Annual Plan/ Long term plan process
- Feedback from the elected members and community boards
- Analysis of customer service requests and complaints

4.5.1 Residents' satisfaction survey

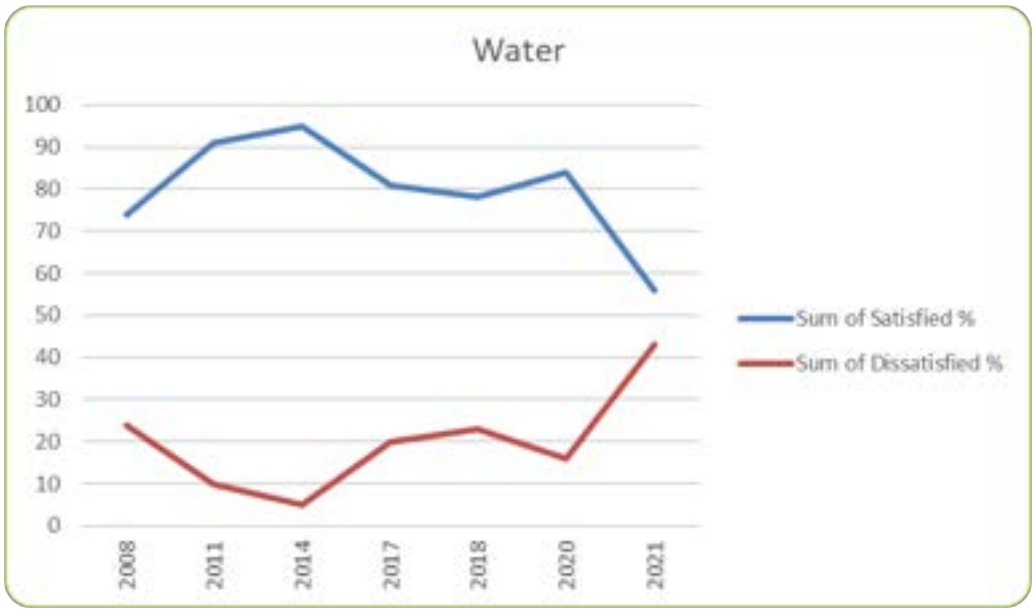
Council undertakes regular resident's satisfaction surveys to gain feedback on the communities' perceptions of Carterton District Council's delivery of services. Market research consultants are engaged to poll and measure the Council's effectiveness at providing services for their residents and customers. The survey results provide comparisons for Council to measure the services performance and to be able to make adjustments to those levels of service when indicated.

Previous survey results are tracked for comparison purposes.

Overall performance for water services from the 2021 survey has shown a significant dip in satisfaction from the previous survey (2020) of 84% to 56%. Respondents to the survey would have been influenced by the 'e-coli' events experienced with the urban water supply at the time of the survey and the resulting boil water notices. Prior to that events satisfaction for the water supply was averaging 83% for the previous surveys.

Figure 3 below shows the proportions of satisfied and unsatisfied respondents for all who took part in the previous Residents Survey.

Figure 3: Results of the 2008 -2021 Residents survey results for town's water supply



4.5.2 Public Meetings on Specific Projects

Council's current policy is to ensure public consultation when undertaking any major projects; however, no major water projects that required public meetings and consultation have occurred in recent years.

4.5.3 Consultation via Annual Plan Process and Long-Term Planning

The draft Annual Plan and Long-Term Plan (3 yearly) are released for public submissions and consultation as a part of the plan reviews. Council then finalises Plans by reviewing and utilising submissions.

4.5.4 Feedback from Elected Members

Feedback from the Councillors is considered in order to provide a better level of service.

4.5.5 Analysis of Customer Service Requests and Complaints

Customer service requests and complaints coming through Councils call centre, letters and direct phone calls are considered and appropriate actions are undertaken for improving the service level.

4.6 Service Levels and Performance Measures

Monitoring of performance standards is an integral part of service management. Regulatory changes to performance standards require an alignment of Councils monitoring and reporting in order to meet regulatory requirements.

Council developed the current water asset levels of service, performance measures and targets from the Long-Term Plan shown in Table 4, to reflect:

- Industry standards
- Customer research and expectations

- Legislative and other requirements
- Strategic and corporate goals

Table 4: Levels of Service, used for performance measures and targets (2021 LTP)

The service broken down into measurable components	Performance measure	Target for year ending June					How it will be measured
		2020 Actual	2022	2023	2024	2025 to 2031	
Safety of drinking water	Compliance with part 4 of DW Standards[1] (bacteriological requirements)	Not met (see Annual Report 2019/2020	Full com-pliance	Full com-pliance	Full com-pliance	Full com-pliance	National Water Information NZ database
	Compliance with part 5 of DW Standards (protozoal requirements)	Not met (see Annual Report 2019/2020	Full com-pliance	Full com-pliance	Full com-pliance	Full com-pliance	National Water Information NZ database
Maintenance of the drinking water reticulation network	Real water loss from networked reticulation system	30%	≤45%[2]	≤45%	≤45%	≤45%	Treatment system and water meter data[3]
Fault response times	Median time to attend[4] urgent[5] call- outs	0.25 hours	≤2 hours	≤2 hours	≤2 hours	≤2 hours	Operational records
	Median time to resolve[6] urgent callouts	1.6 hours	≤4 hours	≤4 hours	≤4 hours	≤4 hours	Operational records
	Median time to attend non-urgent callouts	1.6 hours	≤12 hours	≤12 hours	≤12 hours	≤12 hours	Operational records
	Median time to resolve non-urgent callouts	5 hours	≤24 hours	≤24 hours	≤24 hours	≤24 hours	Operational records
Customer satisfaction	Number of complaints[7] received per 1000 connections	1	≤15	≤15	≤15	≤15	Operational records
Customer satisfaction – water races	Water is continuously supplied through the water races	New measure	≥90%	≥90%	≥90%	≥90%	Service requests

1 New Zealand Drinking Water Standards

2 the target for this measure has been eased; after two years of measurement Council is satisfied that 45% is an appropriate benchmark

3 total water outlet from Kaipatangata and Supplementary reservoirs less sum of water meter usage

4 from the time that the Council receives notification to the time that service personnel reach the site

5 an urgent call-out is one that leads to a complete loss of supply of drinking water

6 from the time that the Council receives notification to the time that service personnel confirm resolution of the fault or interruption

7 complaints received about any of the following: drinking water clarity; drinking water taste; drinking water odour; drinking water pressure or flow; continuity of supply; or the Council's response to any of these issues

The rural water service is under the oversight of the Water Race Committee, which is made up of councillors and community members elected by water race users. The Water Race Committee determines policy, set targets for maintenance, and monitors proactive maintenance programmes.

4.7 Potential changes in Levels of Service

Changes to the Drinking Water Standards for New Zealand may necessitate improvements to water quality, for example, increased treatment requirements.

The Government is reviewing how to improve the regulation and supply arrangements of drinking water, wastewater and stormwater (three waters) to better support New Zealand's prosperity, health, safety and environment.

The Review team, including representatives from the Ministry of Health, the Ministry for the Environment and the Department of Internal Affairs, will be undertaking engagement on those related emerging high-level proposals.

Ongoing increases in the cost of infrastructure materials and labour are likely to be higher than CPI. This is due to a number of factors including:

- a shortage of engineering and trade skills
- the impact of increased environmental considerations when selecting materials and methodologies
- increased requirements around contractor health and safety.

Supporting environmental and public health outcomes (air, water, land, biodiversity) are likely to change levels of service and conflict with affordability. Maintaining debt levels within required tolerances could also become an issue if capital work costs increase and/ or levels or growth slow or decline. This could mean a more aggressive approach to prioritising infrastructure work to stay within limits

4.8 Levels of Service Improvements

To maintain current levels of service, with specific, minor variations by exception, and to formally review levels of service at least every three years. Engagement with the community on their satisfaction with the levels of service provided and improvements desired will be undertaken periodically.

- Consultation on options will be undertaken for specific, significant projects. The level of service review will inform the levels of service adopted by the Council.
- One improvement has been a review of actual performance against reported measures, and a reassessment of the appropriateness of the measures. This has led to an adjustment of the target for one measure: "real water loss from networked

reticulation system", which has moved from ≤15% to ≤45%. The change reflects our ability to measure water loss with the tools currently in place, rather than a change in levels of service.

- More accurate monitoring tools will be investigated, and the target adjusted as appropriate in the future.

Table 5: Improvement table

Improvement Action	Responsible person	Budgeted $	Proposed completion date	Notes
Real water loss from networked reticulation system", moved from ≤15% to ≤45%.	Operations Manager	Within operational budget	Immediate	Water leak detection. Water loss measurements to include volumes of water used for mains flushing for sanitation, the Kaipatangata mains start up flush, and other operational uses not currently accounted for.
Monitoring tools	Operations Manager	Within capital and operational budgets	2021/2022	Bulk flow meter installed on the Kaipatangata mains, and the completion of commercial metering renewals Completion of the telemetry upgrades

5 Demand Management

5.1 Climate change

Water services will very likely be affected by the current patterns of predicted cyclical effects of climate changes, in that the supply of water can be dominated by changing meteorological conditions, and hence are particularly susceptible to the possible more intense cyclical weather patterns associated with climate change.

Climate change projections[1] for Wairarapa are there will be significant impacts to the Wellington Region by 2090 if global emissions are not significantly reduced. They include:

- warmer temperatures (+3^0 C)
- significant increase in the number of hot days (>25^0 C) from 24 days now to 94 days
- frosts in the high elevations of the Tararua Ranges are likely to disappear

1 Greater Wellington Regional Council's Climate Change Report (June 2017)

- spring rainfall will reduce by up to 10% on eastern areas
- the risk of drought will increase in Wairarapa
- more extreme rainfall events.

This will have an effect on the water supply system, as there is a need for a consistent supply for the network to function.

More frequent droughts may affect the security of the Carterton water supply. Currently the supply relies on adequate water flows from the Kaipatangata River and Lincoln Road well-field to maintain a supply throughout the year and has limited storage capacity for a sustained drought.

The Council's overall approach in response to climate change effects is to manage through mitigation of causes and adaptation to effects. Policies and responses will need to be robust to a range of possible futures, rather than relying on a single "forecast".

5.2 Demand for improvement in the Level of Service

This can result from:

- Advances in available technology
- Improving standards of living
- A greater understanding of customers' perceptions and expectations
- Changing legislative requirements, including resource consent conditions
- Change in the strategic management of assets by the Council
- Change in community demographic driving different service levels

The demand for improvement in the service level can be determined by:

- Reviewing the current level of service through public consultation
- Monitoring customer feedback through surveys e.g. Key Research
- Analysing submissions to annual plans

Feedback from customers and consultation processes suggest that, in general, the community is happy with the current level of service provided by Council. However, Council will continue to monitor community feedback and incorporate this into its planning processes.

5.3 Changes to Customer Expectations

Customer expectations may influence service levels. Changes that are likely to impact on services include increasing emphasis on the sustainability of supply and greater demand for the supply of potable water. There is the potential that drinking water standards may be raised or that the community expectations for the quality of the supplied water may increase. In those cases, Council will need to respond accordingly at that time to those changes in service standards.

Opportunities may be identified via the strategic infrastructure and levels of service reviews.

Changes in customer expectations can be determined through community consultation (e.g., Key Research survey) and feedback processes. Customer expectations will be monitored and assessed. Trends will be monitored, and these plans will be updated accordingly.

5.4 Current Consent issues impacting on the Kaipatangata Stream intake

The current resource consent for the water take at the Kaipatangata Stream has expired with current conditions being rolled over while the new consent application is being processed. The current allowance is 5000m^3 per day with a minimum rate of abstraction to be no lower than 60 litres per second measured at any part of the stream flow.

The new consent application, which would be for 35 years, reduces the daily take at the Kaipatangata Stream to 4000m^3 per day with a minimum rate of abstraction to not take more than 50% of mean annual low flow or a minimum of 100 litres per second.

The new consent (if granted as applied for) may place pressure on the supplementary bore fields in Lincoln Road. The lower level of take from the Kaipatangata may switch primary use during dry conditions (December to March inclusive) to the supplementary bore field.

Investigations into further potential supply points needs to be completed alongside a strategic approach to demand management.

5.5 Demand forecast and Response Strategy

Overall demand drivers (for the next ten years) are expected to have a low impact on future demand for Water services. The impact of demand drivers on future Water services are summarised in Table 6.

Table 6: Expected impacts of Demand Changes for Water Services

Demand Driver	Future Impact	Future Demand (for the next 10 years)
Consent limits	Moderate	Outcomes from current re-consenting of Kaipatangata surface take will need to be factored within the next four years future programming
Population	Moderate	Increases in population growth beyond the current growth rate predictions is possible but unknown
Climate changes	Moderate	The impacts will likely require Council to consider the capacity and resilience of Carterton's water supply systems.
Demand for improvement in services	Low/moderate	Outcomes from public consultation and annual plan submissions will be considered
Changes in customer expectations	Low/moderate	Outcomes from public consultation will be considered

5.6 Cost of responding to Growth and Demand changes

As noted, no specific work has been identified at this time. The key actions and issues identified in this section that may require attention and/or intervention, are outlined in Table 7

Table 7: Water Work required meeting Growth & Demand

Action/Work	Driver for Action	Estimated Cost	Scheduled For	How this will be funded
Climate Change	It is possible that climate change impacts will require future work to mitigate and/or adapt. At this stage the extent and impact of climate change is unknown.	Potential project costs are unknown.	On going	Investigative work around network capacity will be covered by existing budgets.
Additional supplementary water supply	Reduction to consented take and over reliance on existing bores.	Investigation project costs are unknown.	2021-22 financial year	Initial investigation is funded by $266,500.00 (Capex).
Water demand supply strategy	Reduction to consented take and over reliance on existing bores.	Investigation project costs are unknown.	2021-22 financial year	Strategy work investigation is funded by $50,000.00 (Capex).
Urban growth strategy	Planning for growth in the eastern area, whether our infrastructure has capacity.	Potential project costs are unknown.	On going	Investigative work will be covered by existing budgets.

5.7 Growth and Demand improvement summary

The existing water supply, at optimal flow, has sufficient capacity to accommodate changes in demand discussed in this section. Trends and potential impacts will continue to be monitored and this Plan will be updated accordingly.

Further research is recommended to assess:

- Council developed strategies for the various possible projections as to the likely outcomes of climate changes.
- Strategies required having the asset capacity to accommodate the projected growth forecast by the Urban Growth Strategy for prediction modelling.
- Effects of the Draft Growth Strategy planning on the eastern supply area.

Table 8: Improvement table

Improvement Action	Responsible person	Budgeted $	Proposed completion date	Notes
Climate change	Asset Engineer	260,750	2021/22	Investigate security and sustainability of water supply
Urban Growth Strategy - Option B	Not assigned	658,745.00 658,745.00 658,745.00	2024/25 2027/28 2030/31	Estimated utility costs are dependent on hydrology modelling for supply capacities within the system
Effects of the Growth Strategy planning on the eastern supply area	Asset Engineer	50,000 20,000	2021/22 2021/22	Water demand/modelling Monitoring equipment

6 Risks and Resilience

6.1 Introduction

Risk management is the term applied to a logical and systematic method of establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating risks associated with any activity, function or process in a way that will enable organisations to minimise losses and maximise opportunities. It is as much about identifying opportunities as avoiding or mitigating losses.

6.2 Risk management procedure

The process followed for this Plan involved a Strategic Level Risk Assessment:

- Initiation of the Waugh Risk Management Project (reviewed on 04/11/2021) to support Council's asset management planning processes and the long-term plan
- Introduction of Council staff to concepts of risk management via training workshops in March 2017
- Production of a report: Carterton District Council Asset Management Processes Risk Management (Waugh Consultants, 2017)

6.3 Summary of trends in the Risk Assessment

6.3.1 Asset information and Staff Opinions

The risk results presented in the Waugh Report (2017) were a combination of opinions of individual staff and the current extent of 'hard' asset data that is held.

Specific asset risk parameters such as systematically assessed failure probabilities and impacts (including risk costs) are not available to justify risk scores. Staff have undertaken

targeted investigations and condition assessments as resources allow, and therefore have more certainty about their assessments where such work has been completed.

The results of the report are reviewed as necessary within the wider corporate context and whenever additional asset information is obtained. Improvement items identify the need to undertake criticality and risk assessments.

6.3.2 GWRC Natural Resources Plan

The Greater Wellington Regional Council is in the process of preparing a Natural Resources Plan (to replace the Regional Plan) that sets targets and rules for all activities in the Wellington Region that have the potential to affect the natural environment, biodiversity and landscape values.

The plan has potentially significant impact on Council's infrastructure requirements, especially on the potable water, rural water (water races), and the wastewater treatment plant. In preparing the asset management plans and infrastructure strategy we have allowed for what we believe to be the most likely requirements when the Natural Resources Plan is in place.

6.3.3 Seismic Risk

Many critical facilities, such as the reservoirs, pump station, and treatment plants, were designed and constructed before the adoption of seismic design standards that reflect the current state of knowledge of regional seismicity. Three of the four reservoirs have been retro fitted with seismic curtains, this option was not available for the fourth reservoir the concrete structure at the Kaipatangata.

Pipeline networks include the use of non-ductile (inflexible) materials, such as A/C and cast-iron pipe, which tend to fail during strong ground motion. Pipelines are especially vulnerable to failure from permanent ground deformation (resulting from liquefaction), because deformation causes pipe to distort and pipe joints to separate.

Work has commenced on the strengthening of risk areas of the Kaipatangata trunk main installing flexible coupling and fusible links to the known quake areas and the vulnerable stream crossing areas.

6.3.4 Critical assets

Council has identified the critical water supply assets as being.

- The Kaipatangata catchment and water treatment plant.
- The Kaipatangata trunk mains to the urban reticulation network.
- The supplementary bore field and treatment plant at Lincoln Road.

6.4 Conclusion

The Waugh Report showed that there were a number of risk themes that were common to many activities. These themes are outlined in the Waugh Report and are identified in Table 9 below.

Table 9: Carterton Risk Improvement Plan – District-Wide Risks

Item	Description
Changes in Demographics not effectively managed by District Plan.	Population and demand changes forecast at least 30 years forward, for individual communities served. District Plan needs to recognise effects of contraction as well as growth, directing infrastructure decisions.
'Physical-Risk-Readiness'	Responsibilities under the CDEM Act: Plans exist for emergency response, recovery, and continuity. Exercises are held regularly to rehearse and check viability.
Incorrect Information	Where information is not 'defensible' or data confidence is low, it is not revealed. Executive support for information gathering and management, including asset information. All information held is locatable.
Council Property (Buildings/Facilities)	Corporate Facilities and Offices are managed as part of infrastructure (Building compliance, internal Levels of service agreements, demand management, maintenance, renewal, additions, disposals etc) and covered by AMP.
Current, changing or new Legislation, National or Regional policy changes Regional Development Strategies and Studies Industry structure and governance arrangements, Shared Services	Monitor developments across NZ and Region: When Strategy developed by GW, assess impacts on Council planning, demand management and asset acquisition/renewal. Shared services model has been implemented already for Roading. Opportunities for any shared services to be explored as and when these become available
Land Use Changes / Rural Technology changes	Monitor and assess effect of changes in crop types (dairy, viniculture, forestry) and lifestyle blocks on asset requirements and usage patterns.
Community Group Viability	Policy is desirable regarding accepting or declining of proposals from community groups, based on risk and mitigation of current/future sustainability by the proposer.
Covid response	COVID 19 outbreak through Council Staff, affecting staff or their families or a pandemic response preventing staff from being at their workplace
Climate Change	CDC proposes to adopt Wellington Regional Council policy and investigates climate change impacts.

The utilities risk assessment covered the water, wastewater and stormwater utilities that are managed by Carterton District Council. It is generally assumed that the risks involved in utilities assets are manageable. However, some of the risks involved in this asset have been identified and assessed on the basis of existing conditions. The utilities risk improvement plan is shown below in Table 10.

Table 10: Carterton Risk Improvement Plan

Item	Description
Succession plan	Ensure systems, data, records are of good quality.
Risk register and asset risk plan	Review regularly the risk control and criticality schedule for Utilities
Corporate Risk Policy	Actively promote Utilities risk assessments, mitigation measures and processes corporately to assist with a Corporate Policy development.
Council policy document	The council has a corporate policy manual that records all policies. Staff know of the manual's existence and it is being actively used. More policies are required in the Utilities / Waters chapter.
Staff Resources	Staffing levels low and considered appropriate due to level of plant automation. Intermittent high project/consent/reporting workload is handled economically with consultants.
Financial assistance (external sources) being taken advantage of.	Council to actively seek Government Assistance
Optimisations- Renewals	Optimisation approach is currently least cost. Complete data attribute update for risk-based optimisation.
Operations Manuals	Maintenance and operation manuals updated when equipment changes and reviewed at 5-year intervals. Risk higher since no succession plans to be made. Licensed operator is essential. Private property access agreements in place where required
Water Safety Plan Requirements met	All Water Safety Plan operational requirements, including monitoring are met, recorded and regularly managed and reviewed. All compliance requirements met. (Water only)
Legislative compliance	All legislative requirements that impact on Utilities Waters services being complied with.
Water Safety Plan	An approved Water Safety Plan is held and updated as required
Climate Change	Investigation into an overall supply that is resilient to climate changes for a consistent the water supply network.
Natural Events (severe storms, seismic activity, bush fires, coastal or river erosion.	[CDC has an approach for managing damage; assessing the risks (Lifelines), and exercises have been held in the past. Earthquake & Emergency Response Plans held, also SARS operator quarantine plan. The Lifelines planning/assessments are now old. Review; prepare additional ERP's.
Damage by others (excavations, vandalism, pests, algae bloom etc)	Consider additional security cameras.

Damage by others (catchment risk)	Water sources open to contamination: low probability. Catchment Management Policy exists. Pest control in catchment. Dilution is a mitigator. CCTV on intake, reservoir entries SCADA-monitored.
Growth	3 yearly projections are provided corporately, and the impacts allowed for in AMPs. 30-year projections are made; impact of declining communities provided for in District Plan and AMP.
Seismic Assessment of Structures	Policy on Assessment Priority and programme urgency. Then AMP/LTP to show budget for works.
Asset vulnerability to natural hazards	Flood, fire, high wind, earthquake, lightning, liquefaction and landslide can all negatively impact infrastructural assets. Whilst relatively low probability, asset failure due to natural hazards is potentially catastrophic, with potential loss of supply.
Consent renewal for Kaipatangata surface water abstraction	Greater Wellington Regional Council has indicated that future consents for abstraction may have reduced allowances in order to maintain base flow levels in the Kaipatangata Stream and Mangatārere River. This poses a risk to the continuity and quantity of water available for municipal water supply.
Consent renewal for Lincoln Road bore water abstraction	Greater Wellington Regional Council is currently engaged in reviewing groundwater allocation arrangements for the Wairarapa valley. This could potentially lead to restrictions on bore abstraction consents.

6.5 Areas for improvement

Review of the Wairarapa Engineering Lifelines Associations publication (2003) is underway.

The 'Carterton Water Safety Plan 2016' outlines improvements that were recommended for preventing, reducing or eliminating the identified public health risks in the Carterton drinking-water supply.

Table 11: Areas for improvement

Improvement Action	Responsible person	Budgeted $	Proposed completion date	Notes
Wairarapa engineering lifelines review	Asset Engineer	30,000	2021/22	Review the engineering lifelines hazards and responses

7 Assets and Lifecycle management

7.1 Introduction

The Carterton water supply assets encompass an urban water supply for the Carterton Township, a reticulation network for the Waingawa Industrial area, and a rural water supply made up of two separate water-race networks.

The urban township asset group contains two water sources with water treatment plants, a network of pipes, valves, hydrants, and service connections that have been established over a period of time to provide a supply of water to the urban water supply area of the Carterton District. The urban water system has traditionally relied on the Kaipatangata Stream, and the Lincoln Road bore field, for the supply of the town's water for potable consumption and firefighting, with a pressurised reticulation network to deliver water to each urban property.

The Carterton drinking-water supply abstracts water primarily from the Kaipatangata Stream at on the western edge of the Tararua Range. Water is treated at the Kaipatangata Treatment plant with filtration, UV disinfection and chlorination before it is stored and delivered under gravity to the Carterton community. Water can also be abstracted from three bores in Frederick Street in the Carterton community. The bores are used when river flows are low, or river turbidity is high.

The industrial area at Waingawa is supplied with potable water via the Masterton Districts urban network to the industrial park and is reticulated by Carterton water assets from a metered supply point at the Waingawa Bridge to customers in this industrial area.

Rural water is supplied via two long established water race networks that were designed predominantly for stock use and are maintained by CDC.

It is Council's role is to ensure that the water supply and reticulation continues to operate in a manner that meets the standards such as those described in the NZ drinking water standards for urban users, and to any other bylaws and codes that are relevant.

This AMP covers the water assets in the Carterton urban area that Council owns and maintains. This includes:

- Surface intake
- Well-field
- Treatment plants
- Pipe network
- Valves
- Hydrants
- Service connections
- Rural water

7.2 Asset Management Systems

Council retains plans and records for the water assets, information from these documents has been summarised into an asset inventory.

Council's in-house operational resources monitors the maintenance of works recording the asset details for installation, renewals, alterations, and removals required for a complete asset management system.

Council uses asset AssetFinda as its chosen management system. AssetFinda is capable of storing asset data in a format that can be consumed by financial, forward planning, and condition performance scaling. The system is linked to the Councils GIS server.

The asset management system inventory contains information such as:

- Asset type
- Age
- Specification
- Condition grading
- Service life
- Valuation
- Associated documentation

Council developed in conjunction with neighbouring Councils an Engineering Lifelines Plan, which identifies vulnerable components of the water supply network and ways of mitigating the degree of disruption likely to be incurred in a civil emergency. A review of this document (WELA) along with current mitigating work identified in the plan is an improvement project

Council utilises the following electronic information systems to store and analyse asset data for these services:

- An asset management system called "AssetFinda" which is a central strategic register and asset management system for all asset classes. It includes in-built reporting, works tracking and life-cycle costing. It will be integrated with prediction model for a complete Strategic Asset Management planning and operational system capable of holding all Water asset information.
- Progress claims from the maintenance Contractor.
- ArcMap 10.8 Geographical Information System (GIS).
- Councils GIS viewer shows the location of the water reticulation, with some information on the assets (e.g., diameters, year of installation, etc.). It is subject to continual development involving digitisation of existing plans plus utilisation of aerial photography to identify services. It is linked to the AssetFinda asset management software package.
- Inventory, including replacement cost, depreciated replacement cost, annual depreciation, and condition assessment based on age (i.e., date installed/built).

The demand for data is expected to increase significantly in the future, especially for resource consent compliance and to contribute to improving decision-making processes.

7.3 Asset descriptions

7.3.1 Kaipatangata Surface Catchment

The catchment for the Kaipatangata Stream upstream of the intake covers approximately 950 hectares. The topographic map below provides an outline of the catchment area that has the potential to contribute water to the point of abstraction for the Carterton drinking-water supply. It includes tributary streams that discharge into the Kaipatangata Stream upstream of the intake.

A dam, weirs, and intakes in the Kaipatangata streambed combine to provide access for the purpose of water extraction and also monitoring points for the stream.

The land use map (Figure 4) identifies the area of the catchment and the land use of that area. All of the catchment is within the Tararua State Forest Park. The area immediately north of the intake is owned by Council, the remainder owned by the Department of Conservation. The catchment is covered with indigenous forest and pine forest. Some of the pine forest on Department of Conservation land was felled and left to regenerate in native trees. All of the catchment is relatively steep with gulley's and ridges typical of the topography in the Tararua Ranges. There is likely to be feral animals in the forested areas of the catchment such as possums, rodents, wild pigs and deer. There are tramping tracks within the catchment and is used by hunters. There are no domestic residences within the catchment

Council held a consent with GWRC "to take water from the Kaipatangata stream; and to dam water in the Kaipatangata stream, and to divert water in the Kaipatangata stream; and to discharge water containing contaminants into the Kaipatangata stream; and to maintain structures in the bed of the Kaipatangata stream; for the purpose of the Carterton public water supply." With the notable condition being, "The total daily net take from the Kaipatangata stream shall not exceed 5000 m^3. The maximum instantaneous rate of net take from the Kaipatangata stream shall reduce according to natural flow in the stream."

Table 12: Carterton public water supply abstraction regime

Natural flow in the Kaipatangata Stream (litres/sec)	Maximum abstraction rate (litres/sec)
<100	60
100-150	70
150-200	75
>200	80

Figure 4: Stream catchment with natural water courses upstream of the intake

7.3.2 Lincoln Road Bore Field

Supplementary water is obtained to complement the main supply from a bore field in the southwest part of Carterton along Lincoln Road. An aquifer field has been identified by GWRC for the consideration of other water takes that may affect the Towns supply. Figure 6

Four bores have been drilled in the Frederick Street area but only three are used to supply water to the Carterton community. The bores draw from two depths, 10-20m and a deeper 20-30m aquifer.

The bores take consent is “to take and use groundwater from the bores for public water supply and some minor industrial use purposes.” With the notable condition being, “Shall not exceed 1,296,000m^3/year, at 6,480m^3/day at a combined maximum pumping rate of 75 litres/second.”

Annual water take is shown graphically below in Figure 5

Figure 5: Annual Carterton water demand

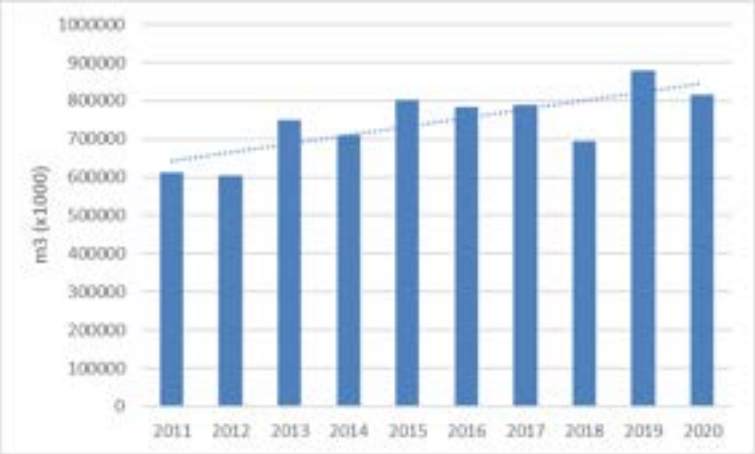
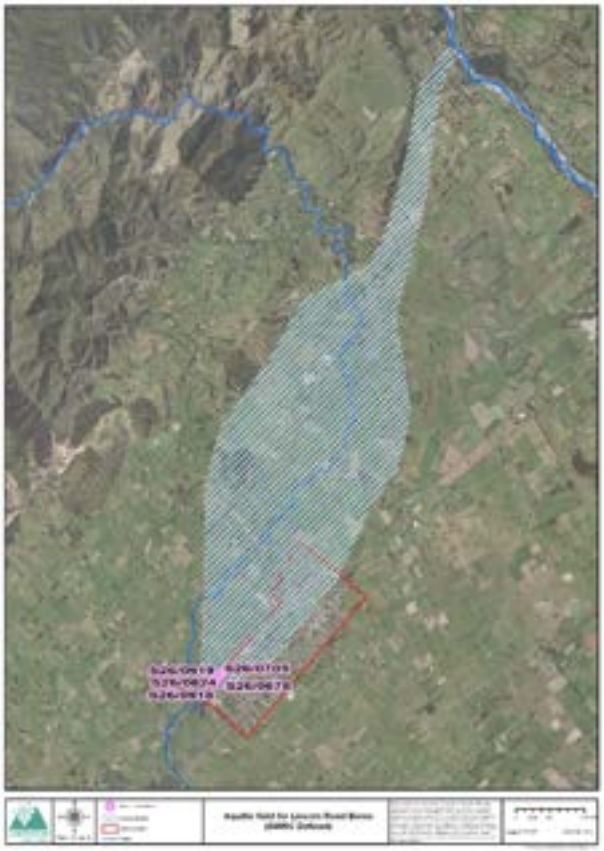


Figure 6: Assumed aquifer for the Frederick / Lincoln Rd Bores



7.3.3 Kaipatangata Filtration plant

The filtration plant and clean water reservoirs are adjacent to the bank of the Kaipatangata Stream, approximately 1.6 kilometres downstream of the dam crest. The Kaipatangata filtration equipment and plant is housed in a structure built to current building standards. Bulk chlorine is stored in a one tonne cylinder, within the treatment plant structure as a separate cell designed to house dangerous materials. Council's water treatment plant staff have assessed the condition of the various components of the treatment plant. The treatment plant equipment dates in age from 1980 to the present day.

The plant is powered from the mains power network but is soon to supplemented by a mobile power generator in case of any main supply outage that may be experienced.

It would permit the plant to function allowing the ability to backwash the main filters and continue chlorination without the main power source.

Kaipatangata's treated water reservoirs are comprised of a 1000m^3 timber staved tank and a 500m^3 reinforced concrete reservoir.

7.3.4 Supplementary filtration plant

The Lincoln Road filtration plant has minimal treatment processes on site beside pH balancing and ultraviolet (UV) treatment. There are three sequential electric boost pumps that respond to the monitored town mains pressures, balancing the town's mains pressure to that of the Kaipatangata's headwork's pressure.

The Supplementary Plant stores treated water in two timber staved reservoirs 200m^3 and a 300m^3 reservoir, with rubber liners.

There is an independent power supply generator (100kva) is located on site at the supplementary plant, and in the event of a major outage the generator would be required to power the bores and treatment processes.

A planned upgrade of the Lincoln Road treatment facilities has been started with electrical and controls systems the focus of capital investment. The purpose is to minimise or eliminate the risks surrounding the treatment of water to required standards at the site.

Table 13: Upgrade task list for Frederick Street Treatment Plant

Stage	Location	Task	Purpose	
1a	Lincoln Road	Preliminary works	Create a new area approximately 9m2 with 6m of wall space where new equipment can be installed without effecting the current operation of the plant.	18,000.00
1b	Brooklyn Road	Valve	Manages the gravity supply from the Kaipatangata reservoir into town.	32,633.00
2	Lincoln Road	New bore	Adjacent to existing bore number two CDC will drill a new bore utilising the existing pipework and power of Bore 2	20,000.00
2 3	Lincoln Road	Mains, Switchboard and Booster Pump Control System	Create a pump control systems with redundancy and resilience. Update the generator control system to enable auto restart of the plant in an emerging situation. Upgrade the power mains and main distribution board to meet the required safety standards for isolation.	105,990.00
5 4	Lincoln Road	Bores 3 & 4 Power supplies	Currently bores 3 and 4 are supplied from a separate mains connection on the supply network to be connected to the main plant room.	19,078.00
3 4	Lincoln Road	Frederick Street Dosing Room Upgrade	Provide an online and redundant spare for each dosing pump. Create a control system with traceable performance KPI to facilitate Public Health reporting.	61,516.00

4 5	Lincoln Road	Bore 1 & 2:	To enable each bore to be flushed automatically on start-up based on turbidity.	65,318.00
6a	Lincoln Road	Bore 3 and 4 Upgrades	To enable each to be flushed automatically on start-up based on turbidity. To enable individual bore control (variable flow) which can be automatically controlled to help mitigate turbidity issues.	121,953.00
6b	Lincoln Road	Bore 4 renewal	The existing bore has presented turbidity problems from its inception and attempts to rectify this to date have not been successful. Drilling a new bore with a specialist drilling rig that is able to monitor narrow bands of water bearing gravels.	48,000.00
7	Lincoln Road	Removal of the old equipment	The existing bore has presented turbidity problems from its inception and attempts to rectify this to date have not been successful.	2,940.00
8	Lincoln Road	Installation of a Mains Harmonic filter	To provide the required Harmonic mitigation to meet the power supply authority's requirements. To protect the new equipment installed in the upgraded installation.	23,902.00
9	Lincoln Road	Documentation/Site Liaison/Project Management:	Supply documentation for plant operation.	14,500.00
10	Lincoln Road	Linages to Dalefield Road	Water trunk mains connections and telemetry to connect Dalefield Road water reservoirs to the Frederick Road Water Treatment Plant	Awaiting costing

7.3.5 Supply main to town - Trunk Mains

The supply trunk mains comprises of a single 8km 380mm trunk main built in the 1960s from the source of supply the Kaipatangata Treatment Plant in to the Carterton urban water reticulation. The supply is metered when leaving the Kaipatangata Treatment Plant, but is not currently monitored at the Lincoln Road junction where it enters the urban water supply reticulation.

Flooding and earthquake zones pose significant hazard areas to the resilience of the trunk main from the Kaipatangata Road Treatment plant to Carterton Township especially where it passes over the two identified potential fault lines.

It is suggested that these two sections of trunk main where it passes through the identified fault lines could be renewed with resilient materials and fused so that any possible movement damages are contained within the immediate vicinity. This work was planned for 2019/20 but has been deferred due to delays with the supply of specialist couplers from overseas. It is planned to undertake this work in 2022.

That containment of possible damages to the two identified areas would also mitigate the transmission of damage laterally along the trunk mains to other areas of the trunk mains.

The trunk mains (in blue) from the Kaipatangata Road Treatment plant to Carterton Township passes through two identified fault lines.

A mains water meter with telemetry will be installed at the threshold of the urban water supply areas reticulation (Lincoln/Brooklyn Road). This will assist with the gauging of any possible losses that may be occurring over the 8km of trunk main from the Kaipatangata Treatment Plant into the Township.

7.3.6 Pipework

The water reticulation pipework varies in size from 15mm diameter laterals up to the 375mm diameter supply main (see Table 6). The network is reticulated using of pipes made of earthenware, concrete, steel, aluminium, PE (polyethylene), and PVC (polyvinyl chloride). Overall length of pipework is approximately 75,811m including laterals. The oldest pipes excluding Chester Road were laid early in the 1930s and the most recent in 2021. Reticulation is shown in map figures 7 & 8.

Figure 7: Water Supply – Reticulation (Carterton)

Figure 8: Water Supply – Reticulation (Waingawa)

Table 14: Length of pipework by size and material (amended Nov2019)

Diameter (mm)	A/C	Cast iron	Concrete lined steel	Copper	PE	PVC	Steel	Total
15				4,250.45				4,250.45
20				999.97	468.50			1,468.47
25					2,792.13			2,792.13
32				50.54	1,234.42	605.32		1,890.28
50	272.69				3,506.00	495.95		4,274.64
63	127.43				3,965.32			4,092.75
75		748.26						748.26
100	11,925.81					8,878.20	944.88	21,748.89
125							3,097.60	3,097.60
150	356.73				105.58	8,607.24		9,072.55
200	2,451.56					7,131.78	305.52	9,888.86
250	1,349.12					1,896.20		3,245.32
300	940.03					99.94		1,039.97
375	1275.66		6,925.80					8,201.46
Total	**18,699.03**	**748.26**	**6,925.80**	**5,300.96**	**12,074.95**	**27,714.63**	**4,348.00**	**75,811.63**

7.3.7 Hydrants valves and supply connections

The water reticulation fittings are listed below in table 15, and figures 9 & 10.

Table 15: Summary of water reticulation pipe fittings

Diameter (mm)	Valves	Fire Hydrants	Water tobies
20			2939
25	4		
50	11	1	
63	14		1
100	279	205	
150	18	50	
200	4	45	
250	1	16	
300	1		
305		5	
375	19		
Total	**351**	**322**	**2940**

Figure 9: Water Supply - points (Carterton)

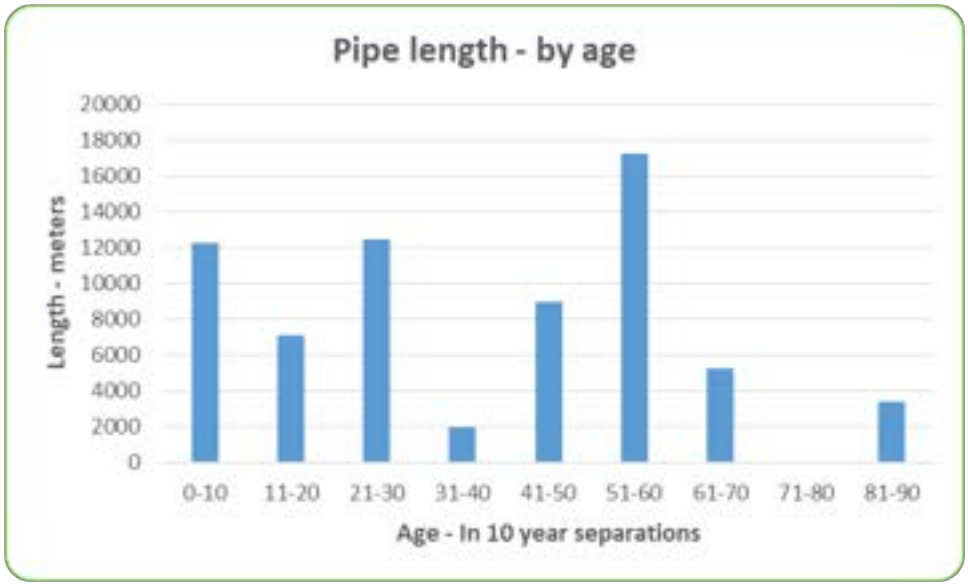
Figure 10: Northern – Extraordinary connections

7.4 Pipe work asset condition

In Figure 11 below it can be seen that when grouped by total pipe lengths, a majority of 59.9km of the pipes are 10-60 years old and 8.6km are 60-90 years old. There is a proportion of pipes in the reticulation network that are older than the generally expected lifespan of 60 to 70 years. The older pipes are capable of performing satisfactorily and renewal will depend upon any loss in levels of service.

Renewal that is based solely on the age would not be a viable use of funding when the performance of these pipes has not shown signs of diminished capacity or performance. Continued condition assessments and monitoring by Council of these pipelines in the network will assist decision making for future renewal / replacement programs.

Figure 11: Total merged pipe lengths by average age



Also noteworthy from the above data is a proportion of pipes that are older than the general lifespan of 60 years. These pipes can still perform satisfactorily within the network. It would prove uneconomic to base the renewal or replacement decisions for these pipelines based solely on an expiry date when the performance of these pipes has not diminished. Continued assessments and monitoring by Council Staff of these pipelines will assist with the renewal replacement programme considerations.

7.4.1 Pipes condition assessment

In Figure 12 the condition grading of water pipes in the network has been recorded, from excellent to poor. The assessment was made using age and material type to accrue an initial grading.

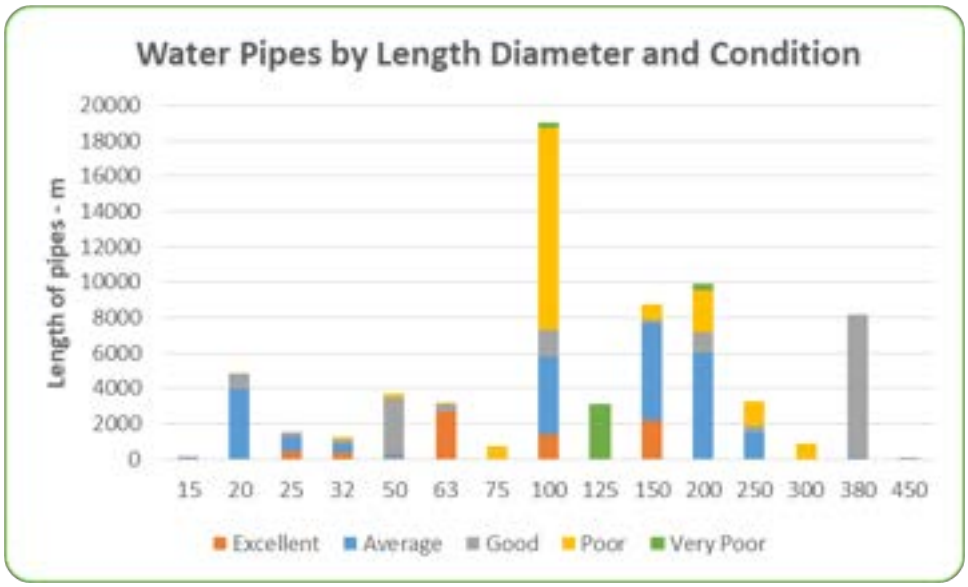
These grades are based on the NZ Pipe Inspection Manual (2006).

The water asset class indicates a spread of condition ratings in the 1-5 categories (very poor to excellent). An assessment was completed, and all assets were graded according to age and material types based on the NZ Pipe Inspection Manual (2006). Ongoing condition

surveys are undertaken to gauge whether the initial assessment is a true reflection of the asset stock.

It is normal practice to grade any pipework while being maintained or altered by Operational Staff and this information is incorporated into the asset management system.

Figure 12: Water pipe condition by length diameter (includes laterals)



7.4.2 Pipe leak detection

Findings from the commissioned Water Leak Detection surveys that commenced in 2011 are being used to build a better understanding of the condition of Council's water supply network and to inform Council's repair and maintenance programme. In the 2011 survey, 91% of the faults identified were attributable to a Council owned asset of hydrants and valves. In the following 2015 survey this reduced to 60% of the identified faults being Council assets.

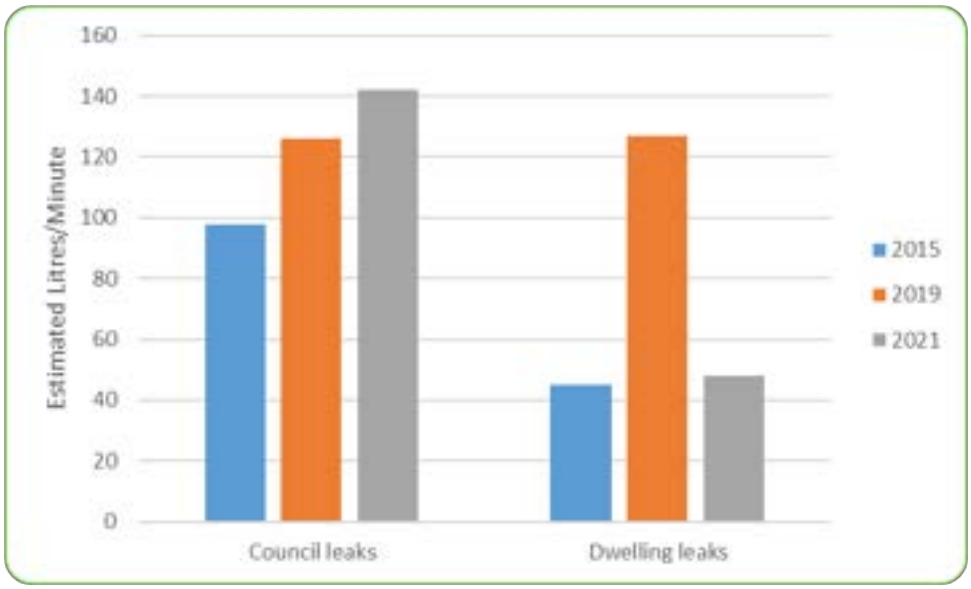
Leak detection of the reticulation has been planned for a 4 year cycle gauging water loss using high resolution acoustic sounding, in the Carterton Urban and Waingawa water supply areas and also on the Kaipatangata trunk main. The plan and budget is proposed to reduce this survey cycle to a 3 year interval. A leak detection survey was conducted in November 2019 and the cost is funded through maintenance budgets.

The identified leakage reduced from the 2011 estimate of 5.3 litres per/min to 4.3 litres per/min and in the recent 2019 survey an estimated 39 leaks were detected in the survey with a range of severity from 1 to 35 litres lost per min. 25 of those leaks identified in the report were within Council reserves or roads and 14 were identified as being within private property. Council leaks are being repaired by Operations Staff and effected Property owners have been notified of possible leakages in their properties.

The upgrade of the universal meters to smart metering will allow constant flows (leakage) on private properties to be recorded and flagged as a fault condition when meters are read.

Figure 13 below shows the severity of leaks/faults identified in the previous three leak detection surveys.

Figure 13: Leak detection results (2015, 2019 & 2021)



7.4.3 Monitoring reticulated water usage

Universal smart water meters were installed in 2020. Industrial and trade water meters are also being converted in 2021 to smart electronic data loggers which are able to be polled and read from the Sensus READ software (mobile reader) as the universal meters.

As mentioned earlier a digital flow meter will be installed on the Kaipatangata trunk main at the threshold to the urban area to constantly measure and monitor pipe losses (if any) in the 8km water trunk main from the supply to town.

There is an opportunity to bulk meter the distribution areas within the Carterton urban reticulation network as well to record of water usage and to support distribution modelling programs.

Metering of those mains that extend out beyond the water supply area in to rural extraordinary customers will be undertaken. These rural mains have been installed over time to service extraordinary customers that are outside of the water supply area and these rider mains are sometimes not a reasonable standard. Metering the point of supply and measuring the usage at each user will determine possible loss and direct future works.

All ‘extraordinary or restricted’ water supply connections (usually rural properties connected to the water supply) are to be moved from the current ‘on demand’ connection to comply with the conditions of the Wairarapa Consolidated Bylaw 2019 part 5 Water Supply.

When the Kaipatangata supply is offline for a period of time there are significant operational costs to supply water to a small number of users (approximately 6 users) that are on the Kaipatangata main. Water users connected to the trunk mains from the Kaipatangata supply will be encouraged to supplement their water connection from the trunk main with an ‘own’ supply on their property.

7.5 Rural Water

For the rural water supplies (water races) Council has an accurate assessment of the surveyed dimensions such as length & width but attributes such as condition grading for Carterton's rural water race network is anecdotal and largely unrecorded.

Remapping of the two networks was undertaken in 2018 primarily for rating purposes, and GIS records were edited for the GIS viewers. Maintenance of the water race rating and minor mapping amendments are undertaken regularly.

7.6 Water Assets Maintenance

Maintenance of the water supply in Carterton is carried out by an 'in-house' Operations Unit and includes the following items:

- Collection and treatment of the water supplies.
- Water pipe maintenance, hydrant & valve maintenance.
- Water meter monitoring, water conservation.
- Water quality testing.
- Water consent and standards compliance
- Water race maintenance and consent compliance.

Council's Operations Unit carries out maintenance on an 'as required' basis, for the catchment, treatment and reticulation including water asset inspections and assessments.

It is recommended however that more documented condition grading is to be carried out on the water network assets whenever maintenance is undertaken.

7.7 Renewals / Capital Expenditure Plan

Renewal expenditure is work that does not increase an asset's design capacity but restores, rehabilitates, or renews an existing asset to its original capacity.

A contingency fund operates for the water races to provide funds for replacing or repairing the river intakes when they are damaged from time to time by river floods.

Table 16: Improvements planned - LTP 2021 (Year 1)

Capex type	Action	Estimate
CFWD	Kaipatangata trunk main - resilience and flex joints	480,000.00
Renewals	Nobel Street - renew services	47,175.00
Renewals	Memorial Square - renew services	112,000.00
Renewals	Costley St - renew services (last section0	108,500.00
Renewals	Chester Rd - water mains (extraordinary water users)	590,000.00
Renewals	Hornsby - renew services (AC water mains)	270,000.00

New	Lincoln Road - Install water trunk mains connection from reservoirs to WTP at Frederick Street	395,000.00
CFWD	Rhodes St – renew services (completed)	345,500.00
New	Kaipatangata treatment telemetry (turbidity control)	30,000.00
New	Trunk mains pressure solutions (remove domestic connections on trunk line)	120,000.00
New	Increase water storage capacity (underway with stimulus funding – total $1.5m)	500,000.00
New	Frederick bore supply (protozoa micro filtration)	164,000.00
New	Water supply (modelling)	50,000.00
New	Water supply (portable monitoring equip)	20,000.00
New	Water supply (reticulation leak detection)	18,000.00
New	Kaipatangata treatment facilities (generator)	40,000.00
Renewals	Kaipatangata treatment telemetry	16,000.00
Renewals	Kaipatangata treatment facilities	30,000.00
Renewals	Kaipatangata storage (tank liners)	25,000.00
Renewals	Frederick treatment (pumps for chemicals)	10,000.00
Renewals	Holiday Park - water mains renewal	163,000.00
Renewals	Water supply (reticulation segment for modelling)	35,000.00

7.7.1 Decision making

All project work priorities regarding timing of renewal or replacements are based on the optimised renewal decision-making (ORDM) framework.

The ORDM process is a risk based methodology which assesses the probability of each failure mode (i.e. structural, hydraulic capacity, operational and performance) and the consequence or damages of the failures.

A scoring system of 0 to 5 is employed to quantitatively assess the risk components. This is derived from a system that is scaled to the International Infrastructure Management Manual (IIMM) 2015.

For example, structurally failed sections will attract a failure mode probability of 5. The risks of failure (for each failure mode) of each section are assessed and calculated by quantifying the product of their probability and consequence of failure.

Sections with a high risk of failure are then ranked and the top group is included in the priority list.

However, it must be noted that the on-going programme of collecting further asset information and the variation of market prices for renewal/replacement, as well new

technology advances in the industry, mean that the priority list is provisional and will be subject to change with new information.

Currently the ORDM for Water reticulation failure probability assessment include the following factors:

- Structural failure; Age profiles, material profiles, and soil type profiles.
- Hydraulic/capacity failure: Distribution (current/future) flow monitoring and low flow/pressure records.
- Performance failure: System performance, dirty water/low flow/low pressure incidents.
- Operations and maintenance failure: Repair records, maintenance records and maintenance costs.

The probability rating is then multiplied by the consequence of failure rating to obtain the overall risk score.

The utility service department maintains and updates a database on the reticulation network.

7.7.2 Data confidence

The data confidence levels for this asset are shown in Table 7 where.

- A = Highly Reliable
- B = Reliable
- C = Uncertain
- D = Very uncertain

Note that some assets have variable confidence levels spread across the asset description and therefore appear across the attribute range.

Table 17: Water data confidence levels

Attribute	Very uncertain	Uncertain	Reliable	Highly reliable
Physical Parameters			**X**	
Asset Capacity		**X**		
Asset Condition			**X**	
Valuations			**X**	
Historical Expenditures				**X**
Design Standards			**X**	

7.7.3 Asset modelling

AssetFinda has two different modelling options for the Council's Water network, there is an optimized budget model using the long-term plan renewal amounts and there is an asset driven model.

The ‘optimized budget renewal’ can predict the renewal schedule based on a combination of factors such as budgeted annual expenditure, condition, age, risk, and performance. These scenario options show assets due for renewal over the next 30-year period and will assist Council Staff in accurately identifying assets likely to require attention in the Council’s Works Program.

The ‘calculate predictive model’ is not constrained by budget and uses the assets end of life to determine the renewal scenario.

An assumption has been made that the associated ancillary point asset items such as the pipeline fittings and terminations can be included within the long-term budgets for assets. The Councils long term plan identifies ten years of predicted budget for the upgrade of existing assets, but to aid with a utility forecast out to thirty years, these figures have been entered into the Infrastructure Strategy.

Optimize Budget Renewal - The first option the model provides a replacement program, firstly taking budget into account then the replacement requirements. The model will identify if there is enough budget to maintain a desired level of service (condition). This model provides a before condition graph and after program condition graph. Figure 14 & 15

Predictive Model - This model displays a basic budget for assets that are due for replacement over the next 30-year time-frame. It is based on the estimated replacement date of the asset.

Water hydrology and distribution predictive modelling is being undertaken as a necessary tool to enhance the process of optimised decision making in the future.

7.8 Design Standards

All water supply infrastructure installed in areas of new development must meet the requirements outlined in NZS4404 Land Development and Subdivision Engineering.

The policy for reticulation network design endeavours to provide a grid network – and where “dead end” streets are unavoidable, rider mains are installed to minimise circulation problems.

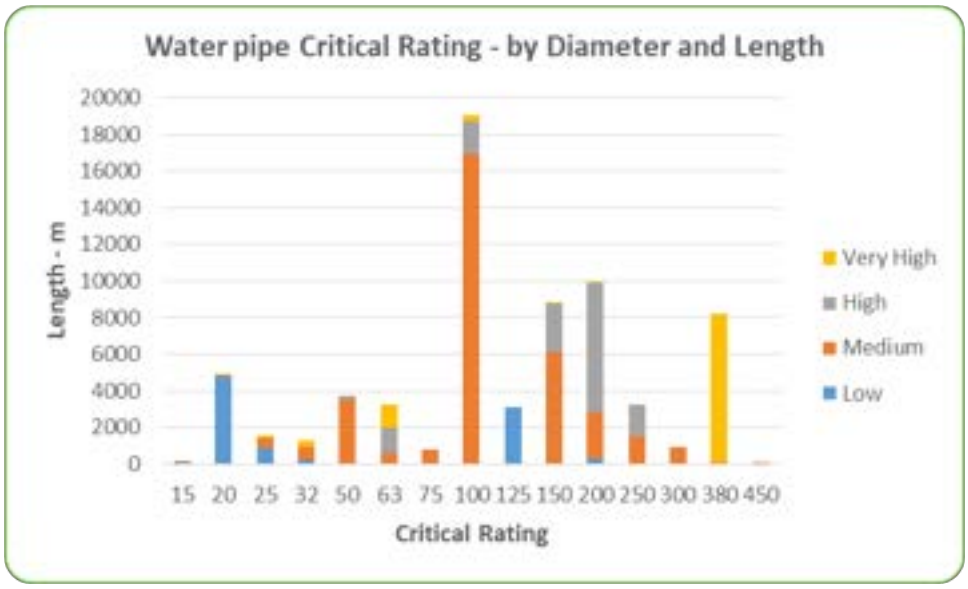
The current policy is for backflow prevention to be installed using backflow devices that comply with AS/NZS 2845.1:2010 on all service connections.

Documentation for the backflow prevention policy was a recommended implementation measure in the Public Health Risk Management Plan (PHRMP Opus, 2016). This will be addressed as part of the current PHRMP.

7.9 Critical Assets

Within the asset management system Council has identified criticality for all Water assets. A very high rating was applied to 10.2km of pipe that includes the 8km of trunk main from the Kaipatangata and other mains that are either key delivery mains or have higher service delivery requirements. Figure 14.

Figure 14: Criticality rating for water pipes



Possible significant effects and how Council could mitigate these are show in Table 18 below.

Table 18: Possible significant negative effects

	Significant Negative Effects	How We Do/Will Mitigate This
Social	Consequences of a contaminated water supply could be severe.	Council has adopted practices in order to minimise this risk, for example regular water quality testing and sampling.
Cultural	Water use and ownership has on-going political and cultural impacts which are as yet unknown	Monitor and respond accordingly.
Environmental	Normally, there would not be any significant negative effects from an environmental perspective. However, over-extraction from the water source would have significant environmental effects, not to mention the effects on any downstream users.	Council has adopted practices in order to minimise this risk, including operating within its resource consent, enforcing water restriction during peak demand, promoting water conservation etc.
	There are potential conflicts between the use of water and community expectations. Many believe they have a right to water, and that water should be free of charge. The cost of supplying treated water needs may cause conflict without adequate understanding and knowledge	Consistent and on-going messaging to the people of Carterton
	The easy availability of and access to clean water that is safe to drink for members of the community connected to the public water supply can lead to wasteful use.	Manage public expectations and encourage respect for this resource

	The public water supply draws water from the river's aquifers within the District. This reduces the flow in the streams and is perceived to have negative environmental effects on this finite resource.	Consent requirements maintain minimum flow requirements Council has identified the catchment area for the Lincoln Road bore field and is advised by GWRC of any new consent requests within this catchment.
Economic	As water infrastructure is expected to have a life of between 50-150 years, the costs of supplying water to communities can span more than one generation of ratepayers. If not responsibly managed and apportioned, one generation could benefit at the expense of another.	Fiscally responsible long term planning
	The cost of compliance with Central Government imposed New Zealand Drinking Water Standards can result in increased costs to water users as the Council upgrades its water treatment plants.	Monitor and respond accordingly.

7.10 Disposal plan

Council does not have a disposal plan for its water assets, and it is not currently considered necessary given the nature and usage of the assets involved.

7.11 Improvement Plan

Below is a list of actions for CDC to take to improve knowledge of the water assets

- Continued condition sampling of assets.
- Water hydrology and distribution predictive modelling.

Table 19: Improvement plan

Improvement Action	Responsible person	Budgeted $	Proposed completion date	Notes
Condition assessments of assets	Operations Manger	Within operational budgets	Immediate	As maintenance is undertaken condition assessments will be recorded with 'as built' data and stored in the AssetFinda system against the asset assessed.
Effects of the Growth Strategy planning on the eastern supply area	Asset Engineer	50,000	2021/22	Water demand/modelling
		20,000	2021/22	Monitoring equipment

8 Financial Projections

This section sets out financial statements, funding strategy, depreciation forecast and charges for the Water asset activity for Carterton District Council.

All forecasts are presented as the amounts for inclusion in the Long Term Plan, which include forecast inflation as required by the Local Government Act 2002

8.1 Financial Strategy

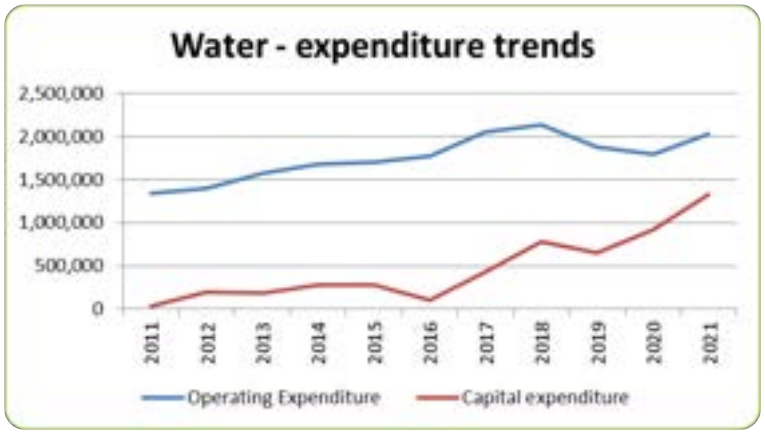
This plan provides the substantiation for budget forecasts put forward in the LTP (2021-2031) for Water Supply assets. CDC will:

- Implement an improvement approach to asset management planning. An improvement plan will be developed and included in each asset management plan. Improvement projects will be monitored as a part of Council's performance reporting system
- Prepare, maintain and periodically review an AMP outlining sustainable long-term asset management strategies. Annual amendments or updates may be undertaken if significant asset management changes occur
- Report variations in the adopted annual plan budgets against the original asset management plan forecasts and explain the level of service implications of budget variations

8.2 Past Expenditure

Council's Annual Reports provide the following summarised information on the historical operating and capital costs of the Water network Figure 15 below demonstrates the previous 11 years operating and capital expenditure.

Figure 15: Historical expenditure (sourced from Council's Annual Reports)



8.2.1 Water Assets Valuation

Councils water assets were last valued as of 30 June 2019 by Opus International Consultants Ltd. The components valued are shown in Table 17 below shows a summary of the 2019 valuation results for Carterton District Council's water assets. Of the three asset types valued

in the Opus (2019) report, water comprises 45.1% of the total overall optimised replacement cost for the three waters at the time of valuation ($54,146,564.00).

The 2019 valuation was a 21% increase (optimized replacement cost) on the 2016 valuation and that is partially attributable to increased data confidence and the contributions over three years of urban developments. Opus assessed the valuation to have an overall confidence rating of B (i.e. ±10% - 15%) for the 2019 values.

Next valuation is due in 2022.

Table 20: 2019 Water Assets Valuation Summary (exclusive of GST)

Asset Type	Optimized replacement cost	Optimized depreciated replacement cost	Annual depreciation
Pipe reticulation	$14,937,097	$6,186,396	$200,513
Reticulation fittings	$4,585,174	$1,733,821	$179,960
Supplementary Supply	$1,138,529	$382,013	$37,998
Kaip. Head-works	$650,814	$150,013	$8,014
Kaip. Treatment Plant	$3,126,860	$1,413,635	$87,022
Total	**$24,438,474**	**$9,865,879**	**$513,506**

8.3 Depreciation

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.

Depreciated replacement cost is determined using a number of significant assumptions. Significant assumptions include:

- The replacement asset is based on the replacement cost of the specific assets as at the date of valuation less an allowance for any physical and economic obsolescence to date and for any over-design
- The replacement cost is derived from recent construction contracts of similar assets, recent costing obtained from construction details and Property Institute of New Zealand cost information
- The remaining useful life of assets is an estimated figure using the expected life of an asset, asset maintenance frequencies, and known condition rating.
- Straight-line depreciation has been applied to most assets when determining the depreciated replacement cost value of assets.

Water infrastructural assets are valued using the depreciated replacement cost method. There are a number of estimates and assumptions exercised when valuing infrastructural assets using the depreciated replacement cost method. These include:

- Estimating any obsolescence or surplus capacity of the asset
- Estimating the replacement cost of the asset.
- Estimates of the remaining useful life over which the asset will be depreciated. These estimates can be affected by the local conditions. For example, weather patterns and traffic growth. If useful lives do not reflect the actual consumption of the benefits of the asset, then the Council could be over-or under-estimating the annual depreciation charge recognised as an expense in the statement of comprehensive revenue and expense. To minimise this risk, infrastructural asset useful lives have been determined with reference to the NZ Infrastructural Asset Valuation and Depreciation Guidelines published by the National Asset Management Steering Group and have been adjusted for local conditions based on past experience. Asset inspections, deterioration, and condition-modelling are also carried out regularly as part of asset management planning activities, which provides further assurance over useful life estimates.

8.4 Insurance coverage

The Council is a member of the Local Authority Protection Programme (LAPP). LAPP is a mutual insurance fund which provides for disaster insurance cover over Council's underground and generally uninsurable assets, to the extent of 40% of their value. The Government's Disaster Recovery Fund is expected to cover 60% of the replacement cost of assets in the event of a declared civil defence emergency arising from an adverse weather or seismic event.

2021 LAPP replacement costs are on average 30% greater than those of 2019.

Table 21: Infrastructure assets covered by the LAPP fund (2021)

Description	Covered by LAPP	2021 Value (ORC)	2021 Value (ODRC)
Water reticulation	LAPP	$25,416,326	$10,311,444
Supplementary supply	No	$1,482,267	$497,348
Kaip. Headworks	No	$847,304	$195,304
Kaip. Treatment Plant	No	$4,070,904	$1,840,080

8.5 Forecast Finances

The Council has an Infrastructure Strategy to help the Council to make informed decisions to deal with the major decisions and investment opportunities that will occur over the next 30 years and to comply with section 101B of the Local Government Act 2002

8.5.1 Forecast loan repayment and loan interest costs

The LTP financial model includes interest costs and provision to make loan repayments. The level of debt related to the urban water supply infrastructure is relatively low. All capital renewals are expected to be funded from depreciation funds.

The Council has set limits on the level of borrowing. These are set out in its liability management policy. All three of the following conditions must be met:

- Total debt as a percentage of total assets will not exceed 15 percent
- In any financial year, gross interest paid on term debt will not exceed 12 percent of gross operating revenue
- In any financial year, gross interest expense will not exceed 50 percent net cash inflow from operating activities.

New capital expenditure and the renewal of existing capital items for the water activity will be funded by way of the annual depreciation provision and/or loans.

8.5.2 Forecast operational revenue

Operational revenue forecasts are incorporated into the LTP. Assumptions include low growth in the number of properties, so rates increases will be absorbed by the existing ratepayer base. Metered properties outside the urban water supply area account for a very small proportion of the revenue generated. The majority of revenue for the urban water supply comes from property rates.

8.5.3 Forecast expenditure required

Below shows the forecasted capital expenditure for the urban and rural water supply services over the next thirty years. The key items are;

- Water mains and trunk mains renewals & water connection replacements
- Eastern growth area infrastructure
- WTP component and infrastructure renewals
- WTP take consents
- Water race consent renewals

8.5.4 Water asset renewals forecast

Renewal expenditure is work that does not increase an asset's design capacity but restores, rehabilitates, or renews an existing asset to its original capacity. A contingency fund operates for the water races to provide funds for replacing or repairing the river intakes when they are damaged from time to time by river floods. These estimates are based on incorporated asset condition assessment work to be done for the AMS and the asset management plan.

Council has made a strategic decision to maintain the current levels of service for this activity. Maintenance and renewal work identified in this section to enable maintenance of current Levels of Service is outlined in table 5 of section 4 of this plan

8.5.5 Capital Expenditure plan

Renewal expenditure is work that does not increase an asset's design capacity but restores, rehabilitates or renews an existing asset to its original capacity. Capital works are those that create new assets, or works that upgrade or improve an existing capacity. They may result from growth, social, or environmental needs.

Capital expenditure in this group of activities in the next ten years are shown in table 20 below.

8.6 Changes in service potential

Council maintains the assets so as to retain their condition and overall value at nationally accepted levels. A programme of routine maintenance and the renewal of identified underperforming components where and when required is used to achieve this.

8.7 Assumptions & confidence levels

8.7.1 Basis of preparation

The financial information in this plan has been prepared following the provisions of Public Benefit Entity (PBE) Standard - Financial Reporting Standard 42 'Prospective Financial Statements' (PBE FRS 42).

8.7.2 Basis of assumptions

Prospective information is based on a number of assumptions. Risks and uncertainties surround these assumptions. The basis of the assumptions surrounding the information is found in Planning Assumptions in the LTP. The information should therefore be used carefully, with this best endeavours purpose in mind. The Local Government Act 2002 Schedule 10 (1)(e) requires that information relating to levels of service, estimated expenses and revenue be provided in detail for three financial years, and indicative for the subsequent seven financial years. Over time, information becomes increasingly indicative from the time it was first prepared.

The approach taken to budget development has been that of preparing 'forecasts' on a best estimate basis. In this case, a forecast refers to financial information based on assumptions on future events the Council expects to occur and on the basis of Council's expected response to these events.

The Council has not taken an approach where hypothetical "what-if" projections are used.

The major limitation of the forecasting approach, as with any approach, is that events may change over time and undermine the accuracy of assumptions made. The actual financial results achieved for the period are likely to vary from the information presented and the variations may be material.

The review of assumptions underlying the financial information was undertaken in preparation of the Long term plan (LTP). However, the assumptions themselves were adopted by Council resolution to approve the Draft LTP for public consultation in 2021.

8.7.3 Assumptions and Risk Assessments

A number of assumptions were made in preparing the Long term plan (LTP). These assumptions are necessary as the planning term is for ten years and the stating of assumptions ensures that all estimates and forecasts are made on the same basis. There are four categories of planning assumptions in this document:

- Demand Assumptions
    - Resident population
    - District growth
- Political Environment
    - Policies
    - Governance
- Operating Environment
    - Resource consents
    - Natural disasters
    - External factors
- Financial Assumptions

(Please see the full LTP document for the assumptions detail.)

8.8 Finance summary (including rates requirements)

Operating costs are to be funded by rates and user charges as per the Council's Revenue & Financing Policy. User pays charges include water-by-meter charges collected from those metered properties. The Council has deemed that provision of the water activity provides a degree of public benefit to the whole district, 10 percent of the cost of delivering the service is charged by way of general rate across all property owners in the district. The balance of the funds required will come from targeted rates.

Urban water

All properties connected to the urban water supply are metered. Each property connection is charged a fixed amount in rates for an allowance of up to 225 cubic metres per year. Water usage above 225 cubic metres is charged at $1.70 per cubic metre. This charge is invoiced separately from land rates.

Waingawa

A targeted rate of a fixed amount on every separately used or inhabited part of a rating unit that has been fitted with a water meter or meters and is connected to the Waingawa Water Supply service. A targeted rate per cubic metre of water supplied, as measured by meter, for all water consumed. This rate will be invoiced separately from land rates.

Rural water races

A targeted rate on a differential basis, calculated on land area, on rating units within the Carrington and Taratahi water race system classified areas as follows:

- Class A Land area 200 metres either side of the centreline of the water race.
- Class B Land area from 200 to 500 metres either side of the centreline of the water race.
- Class C Land area able to be irrigated from water drawn from natural watercourses fed from a water race system, calculated from conditions of the applicable resource consent.

After taking into account income received the balance of funding required for each activity—urban water, Waingawa water, and rural water races—is funded as follows:

- 10 percent General Rates
- 90 percent Targeted Rates

Operating costs are to be funded by rates and user charges as per the Council's Revenue & Financing Policy. Capital renewals should be funded from depreciation reserves (to the extent that the reserve funds can sustain the renewals programme). Upgrade projects should be loan funded to ensure intergenerational equity i.e. those receiving the benefits should pay.

Table 22: Forecast revenue and expenditure included in LTP

	Annual Plan 30 June 2021 $	LTP 30 June 2022 $	LTP 30 June 2023 $	LTP 30 June 2024 $	LTP 30 June 2025 $	LTP 30 June 2026 $	LTP 30 June 2027 $	LTP 30 June 2028 $	LTP 30 June 2029 $	LTP 30 June 2030 $	LTP 30 June 2031 $
Sources of Operating Funding											
General rates, UAGC, rates penalties	763,398	811,739	838,331	862,526	877,137	401,890	415,642	441,950	496,404	494,332	500,723
Targeted rates	1,979,889	3,076,647	3,321,395	3,546,892	3,685,864	3,915,843	4,047,077	4,291,327	4,789,416	4,779,302	4,845,893
Subsidies and grants for operational purposes	-	-	-	-	-	-	-	-	-	-	-
Fees and charges	25,200	36,000	36,720	37,748	38,740	39,697	40,690	41,682	42,745	43,880	45,085
Internal charges and overheads recovered	-	-	-	-	-	-	-	-	-	-	-
Local authorities fuel tax, fines, infringement fees and other	-	5,599	5,822	6,145	6,783	7,439	8,114	8,779	9,473	10,143	10,804
Total operating funding	2,768,487	3,429,984	3,702,268	3,953,311	4,108,524	4,364,869	4,511,522	4,783,739	5,338,038	5,327,656	5,402,505
Applications of Operating Funding											
Payments to staff and suppliers	1,481,953	1,543,476	1,574,346	1,722,114	1,764,399	1,805,871	1,849,223	1,893,377	1,941,026	1,991,906	2,046,016
Finance costs	52,312	9,536	15,747	15,445	20,473	25,634	25,465	96,528	167,824	167,755	173,715
Internal charges and overheads applied	642,308	1,098,372	1,149,614	1,199,839	1,224,000	1,260,298	1,311,752	1,322,856	1,354,449	1,400,562	1,415,791
Other operating funding applications	-	-	-	-	-	-	-	-	-	-	-
Total applications of operating funding	2,176,573	2,651,384	2,739,707	2,937,398	3,008,873	3,091,802	3,186,440	3,312,760	3,463,299	3,560,223	3,635,522
Surplus/(deficit) of operating funding	591,914	778,600	962,561	1,015,913	1,099,651	1,273,067	1,325,082	1,470,978	1,874,739	1,767,433	1,766,983
Sources of Capital Funding											
Subsidies and grants for capital expenditure	-	-	-	-	-	-	-	-	-	-	-
Development and financial contributions	66,026	95,600	96,900	98,200	246,092	254,510	262,683	270,710	278,983	287,255	296,019
Increase/(decrease) in debt	805,448	804,930	(63,570)	(63,570)	611,615	(82,289)	(99,991)	8,939,584	(546,176)	(577,316)	215,828
Gross proceeds from sale of assets	-	-	-	-	-	-	-	-	-	-	-
Lump sum contributions	-	648,750	-	-	-	-	-	-	-	-	-
Other dedicated capital funding	-	-	-	-	-	-	-	-	-	-	-
Total sources of capital funding	871,474	1,549,280	33,330	34,630	857,707	172,221	162,691	9,210,294	(267,193)	(290,060)	511,847
Applications of Capital Funding											
Capital expenditure - meet additional demand	266,500	2,123,000	35,700	-	1,017,130	305,364	-	9,536,335	-	36,962	857,701
Capital expenditure - improve level of service	852,800	166,000	-	-	-	17,702	-	-	31,140	-	-
Capital expenditure - replace existing assets	469,573	1,610,800	1,747,546	574,196	107,890	143,831	263,515	547,818	143,723	172,487	976,740
Increase/(decrease) in reserves	(125,485)	(1,571,920)	(787,355)	476,347	832,338	978,391	1,224,257	597,118	1,432,683	1,267,924	444,389
Increase/(decrease) of investments	-	-	-	-	-	-	-	-	-	-	-
Total application of capital funding	1,463,388	2,327,880	995,890	1,050,543	1,957,358	1,445,287	1,487,773	10,681,272	1,607,546	1,477,373	2,278,830
Surplus/(deficit) of capital funding	(591,914)	(778,600)	(962,561)	(1,015,913)	(1,099,651)	(1,273,067)	(1,325,082)	(1,470,978)	(1,874,739)	(1,767,433)	(1,766,983)
Funding balance	-	-	-	-	-	-	-	-	-	-	-

Table 23: Capital expenditure included in LTP

Item	Carry Forward 30 June 2021 $	LTP 30 June 2022 $	LTP 30 June 2023 $	LTP 30 June 2024 $	LTP 30 June 2025 $	LTP 30 June 2026 $	LTP 30 June 2027 $	LTP 30 June 2028 $	LTP 30 June 2029 $	LTP 30 June 2030 $	LTP 30 June 2031 $
Reticulation network	633,000	243,000	78,540	-	19,420	44,256	-	90,969	-	86,244	22,813
Urban Growth Strategy		-	-	-	710,722	-	-	768,278	-	-	834,888
Treatment plants	297,500	290,000	1,449,706	574,196	107,890	128,341	240,799	186,273	174,863	123,205	900,697
Increase storage capacity at existing treatment plants	1,500,000	525,000	-	-	-	-	-	-	-	-	-
Investigate new water supply		-	-	-	286,988	294,300	-	-	-	-	-
Establish new water supply		-	-	-	-	-	-	8,747,064	-	-	-
Resource Consents for rural water supply	71,500	-	255,000	-	-	-	-	291,569	-	-	-
Improvements to rural water supply	319,800	20,000	-	-	-	-	22,717	-	-	-	76,044

Carry Forward reflects the potential underspend on approved projects that will be transferred to 2021/22 for completion

9 Improvement plan and monitoring

9.1 Improvement plan

In preparing this Plan there remain a number of areas where improvement to the level of detail is needed. This improvement will be phased reflecting a process of continuous enhancement of the management confidence provided by the Plan. This further work will have the effect of:

- Enhancing analysis for planning purposes.
- Improving operational efficiency.

Table 24 below provides a list of recommendations for refining Asset Management Plan data and budget forecasting:

Table 24: AMP refinement

Action	AMP Section	Responsibility	Completion Date
Develop a critical asset register and investigations undertaken to report on the condition, possible risk mitigation measures, and alternative service/redundancy strategies in case of damage from significant natural events.	6	Asset manager / Corporate services manager	2023
Further work on identification of climate change risks specific to the area should be undertaken using data sourced through existing government research and applied to the Carterton District. Could also involve a secondary flow path strategy for the town to mitigate flood damage in extreme rainfall events.	6	Project team	2023
Water take consent limits and supplementary investigations	6	Senior management	2021
The draft urban growth strategy may require an increase in capital expenditure for new wastewater pipe work on the eastern side of Carterton. Costings for this need to be completed	6	Project team	2022

9.2 Monitoring and review

The above 'Improvement Plan' should be monitored and reviewed at least once in every 12 months. Appropriate actions then can be taken for further improvement. This Plan will be reviewed every three years.

10 References

Table 25: Carterton Water Safety Plan 2016 V1.1 – summary table

Supply Details		
Supply Name	Carterton	
WINZ Community Code	CAR001	
Supply Owner	Carterton District Council	
Population Served by Supply	4200 (WINZ register 2016)	
Source Details		
Source Name	Kaipatangata Stream	
Source WINZ Code	S00591	
Type of Source	Surface	
Consent Expires	2013. New consent under negotiation	
Maximum Consented water take:	5000m3/day, 80L/s but must retain 100 L/sec flow in stream	
Grid Reference of Source (NZTM)	Easting: 2715250	Northing: 6021287
Treatment		
Location	Kaipatangata Road, adjacent to Kaipatangata Stream	
Treatment Processes	Sand filtration, bag filtration, UV disinfection, pH adjustment, chlorination	
Average Daily Volume	1000m^3/day	
Peak Daily Volume	30000m^3/day	
Source Details		
Source Name	Fredrick Street bore	
Source WINZ Code	G00870	
Type of Source	Groundwater	
Consent Expires	2034	
Maximum Consented water take:	6480m^3/day during normal operation,	
Grid Reference of Source (NZTM)	Easting: 2720485	Northing: 6016008
Treatment		
Location	Fredrick St, Carterton	
Treatment Processes	pH adjustment, UV disinfection, chlorination	
Average Daily Volume	2000m^3/day	
Peak Daily Volume	3000m^3/day	
Distribution		
Distribution Zone Name	Carterton	
Distribution Zone WINZ Code	CAR001CA	
Distribution Zone Population	4200 (WINZ register 2016)	

Figure 16: Photos of the Carterton water supply.

Kaipatangata Stream intake.

Kaipatangata Stream weir intake.

Screen chamber

Pressure media filters

Bag filters.

Lime slurry batch mixer

Kaipatangata gas chlorine.

Kaipatangata treated water

Frederick St sodium hypo storage.

Frederick St UV unit

Frederick St treated water storage

Frederick St bore number 2

Figure 17: Flow Chart/Schematic of the Supply

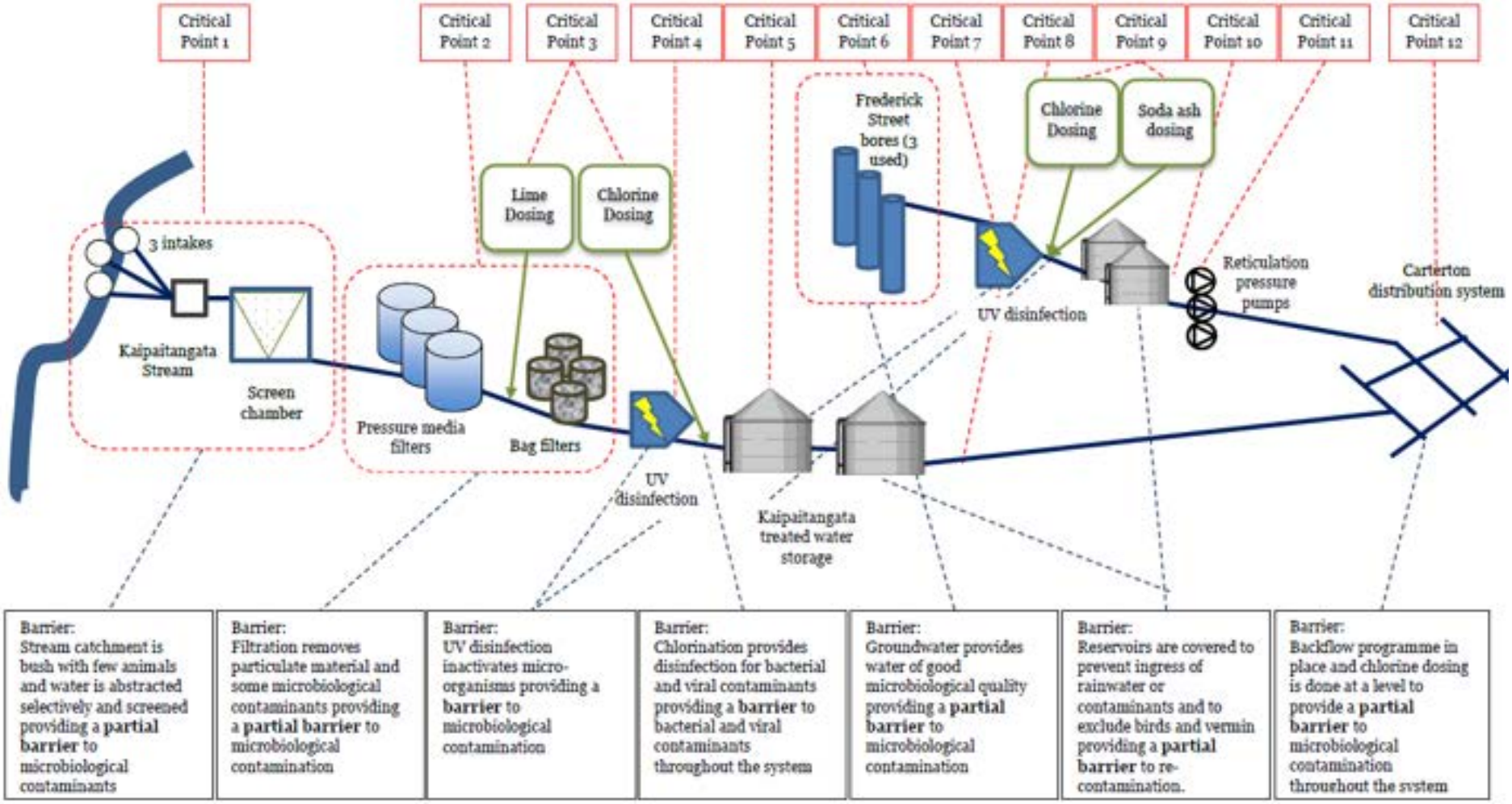


Table 26: Carterton Water Safety Plan V1.1 2016 - Critical points where hazards can be eliminated, minimised or isolated

	Critical Point	**Description**
1.	Intakes and screen chamber	*Intake or screen chamber damage or blockage may result in eventual loss of supply*
2	Pressure media and bag filtration	*Failure of filtration processes affects downstream disinfection processes and may result in micro– organisms contaminating the supply*
3.	Chlorine dosing and pH adjustment (Kaipatangata WTP)	*Failure will result in a lack of bacterial and viral control Overdosing may exceed chemical MAV*
4.	UV disinfection (Kaipatangata WTP)	*Failure will result in reduced bacterial, viral and protozoa inactivation*
5.	Kaipatangata treated water storage	*Possible point for microbiological contamination*
6.	Ground water bores	*Possible point for microbiological contamination. Failure of bores may result in loss of supply*
7.	UV disinfection (Frederick Street bores)	*Failure will result in reduced bacterial, viral and protozoa inactivation*
8.	Bulk main from Kaipatangata WTP	*Pipe failure means eventual loss of supply*
9.	Chlorine dosing and pH adjustment (Kaipatangata WTP)	*Failure will result in a lack of bacterial and viral control Overdosing may exceed chemical MAV*
10.	Frederick St treated water storage	*Possible point for microbiological contamination*
11.	Frederick Street reticulation pressure pumps	*Pump failure may result in loss of supply*
12.	Distribution system connections	*Possible access point for contamination due to backflow or insanitary procedures*

Table 27: Carterton Water Safety Plan V1.1 2016 - Recommended Improvements

Priority	Risk level	Water Supply area	Proposed works	Person responsible	Expected cost	Intended completion date
1	Moderate	UV Disinfection (Frederick St WTP)	Either install run to waste facility at Frederick St plant so that water is run to waste when bores start to allow UV reactors to reach optimal operating conditions before water is directed to the reservoirs or reconfigure controls so that UV reactors turn on and reach optimal operating conditions before the bores begin pumping	OM RTL	$5000	Mid 2017
2	Moderate	Chlorination (Kaipatangata WTP)	Investigate modifying chlorine dose control so that the dose rate is controlled by the downstream continuous FAC monitor	OM RTL TPO	Staff time	Mid 2017
3	Moderate	Pressure Media Filters (Kaipatangata WTP)	Investigate condition of pressure filter media to identify whether small red particles accumulating on bag filters is evidence of media breakdown	OM RTL TPO	Staff time	Mid 2017
4	Moderate	Chlorination (Frederick St WTP)	Change sodium hypo concentration from 30% to 50%	RTL TPO	Staff time	Mid 2017
5	Moderate	Other	Install turbidity meter immediately upstream of UV reactor at Kaipatangata Plant to demonstrate turbidity of water entering the UV reactor	OM RTL	$5000	Mid 2017
6	Moderate	Chlorination (Kaipatangata WTP)	Investigate the levels of DBP formation when there is high levels of organics in the source water and if a problem is identified, investigate options to reduce DBPs in treated water	OM RTL	Staff time	Mid 2018
7	Low	Other	Resolve data collection problems with the UV reactors at both plants so that DWSNZ protozoa compliance can be demonstrated	OM RTL EHO	Staff time	Mid 2018
8	Low	Other	Consider changing DWSNZ treatment plant bacterial compliance at both plants from E. coli monitoring to continuous chlorine monitoring or demonstrate bacterial compliance with the UV reactor	OM RTL EHO	Staff time	Mid 2018
9	Low	Other	Consider upgrading staff qualifications so that one person has the Diploma in Water Treatment	OM	$10,000	2020

OM –Operations Manager, RTL – Reticulation Team Leader, TPO – Treatment Plant Operator, EHO – Environmental Health Officer

Figure 18: Planned 30year Water Mains Renewals