WATER SUPPLY

Asset Management Plan

August 2018

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Executive Summary

Purpose of the Plan

Key reasons for writing this asset management plan are to:

- make a strong link between Council's strategic objectives and the Council's delivery of water supply services
- identify the capital and operational expenditure required over the next 10 years, for inclusion in the Long Term Plan 2018–28
- provide information and accountability on how water supply services are being delivered
- provide clear direction for staff on the improvement priorities over the next three years.

Asset Descriptions

Marlborough District Council provides a water supply and distribution service to approximately 82% of residences and businesses in Marlborough through seven reticulated supply schemes. (The remaining 18% of the population access their water through individual supplies or community schemes.)

The Blenheim Water Supply is from the Wairau aquifer, accessed from bores at Middle Renwick Road and Bomford Street. The water is disinfected by ultraviolet light.

The Picton Water Supply is sourced from the Speeds Road bores and from the Essons Valley (Barnes Dam) sources. Treatment is by ultraviolet disinfection as well as chlorine.

The Renwick Supply comes from groundwater, accessed from Boyce Street. It is disinfected with chlorine. The Council proposes to increase the current water supply by accessing more groundwater from bores at Conders Bend Road, and to establish a new treatment plant next to the existing plant.

The Havelock Supply is sourced from two bores adjacent to the Kaituna River, and is treated with chlorine.

The Awatere water supply comes from Black Birch Stream. The MIOX treatment effectively treats bacteria and viruses when turbidity is low, but not protozoa. Filtration is required to reduce turbidity and remove protozoa. Ultraviolet water treatment is provided for Seddon School, where there is also a tap for the public to access treated water.

The Riverlands water supply is primarily for industrial use. It is sourced from a bore at the end of Malthouse Road as well as two bores at Hardings Road. The water is from a confined aquifer and no treatment or disinfection is carried out.

The Wairau Valley water is sourced from a bore on Keith Coleman Road, adjacent to the Wairau River, and is disinfected with chlorine.

Levels of Service

The Council's biggest challenge is the affordability of providing the current levels of service. The Council is committed to:

- supplying water to meet the New Zealand Drinking Water Standards (DWSNZ)
- providing a flow and pressure to meet the needs of firefighting
- avoiding imposing water restrictions except in extreme conditions.

The six levels of service outlined below guide Council's investments in water supply services.

Level of Service 1 — Provide an overall level of service that meets or exceeds residents' expectations.

Performance Indicator: Residents' satisfaction survey.

Results: The water supply activity received the highest customer satisfaction rating of all Council services in the 2017 survey.

Performance Indicator: The total number of complaints received by the local authority about any of the following: drinking water clarity, taste, odour, flow and pressure, and continuity of supply. Also, any complaints about Council's response to any of the issues.

Results: In the two years since the adoption of a performance indicator related to complaints, no complaints regarding the Council's handling of their initial enquiry have been received from customers. The statistics show customer complaints are generally at a low level.

Level of Service 2 — Provide a level of water quality that meets community needs and is appropriate to the degree of public health risk.

Performance Indicator: The extent to which the local authority's drinking water supply complies with (a) Part 4 of the DWSNZ (bacteria compliance criteria) and (b) Part 5 of the DWSNZ (protozoal compliance criteria.)

Results:

Supply Zone	**Date compliant with the DWSNZ**
Blenheim	2011
Picton	2017
Havelock	2019/21
Renwick	2018/20
Riverlands	2020/21
Seddon	2017/18
Awatere	2019/21
Wairau Valley	2019/20

Level of Service 3 — Provide a service that is timely and responsive to customer needs.

Performance Indicator: Where Council attends a call-out in response to a fault or unplanned interruption to its networked reticulation system, the median response times are met:

(a) attendance for urgent call-outs: 30 minutes
(b) resolution of urgent call-outs: 3 hours
(c) attendance for non-urgent call-outs: 8 hours

resolution of non-urgent call-outs: 13 hours.

Results: The current performance on restoration and response times appears to be in line with customer expectations, and there are few complaints regarding response/restoration times.

Level of Service 4 — Provide a reliable water supply service (flow and pressure).

Performance Indicator:

System Capacity — Flow and Pressure. Percentage of properties that receive a minimum water pressure of 300 kPa at the property boundary (except in the Awatere Valley and Wairau Valley Township).

Performance Indicator:

Percentage of system where fire flows are equal to or greater than 25 litres/sec; percentage of system where fire flows are less than 12.5 L/sec. (This is not a mandatory non-financial performance indicator.)

Results: These indicators are generally being met. Parts of the Blenheim system do not meet the upper firefighting flow target. The most affected area is the commercial industrial area to the south-east of the town centre. Pipeline upgrades have been identified to remedy the problem and included in the capital budget at an outline cost of $2.26 million. The work will be carried out over the next 15 years to match the availability of resources.

Level of Service 5 — Maintenance of the reticulation network.

Performance Indicator:

The percentage of real water loss from the local authority's networked reticulation system.

	Target	**2015-16**	**2016-17**
Blenheim	44%	37%	38%
Picton	48%	32%	38%
Havelock	51%	49%	24%
Renwick	50%	35%	35%
Awatere	28%	9%	17%
Wairau Valley	42%	15%	13%

Results:

Both the actual and the target values for losses are relatively high. They reflect water availability, the marginal cost of water supply and the high cost of active leak detection.

The Council has commissioned specialist contractors to undertake annual leakage surveys in Havelock and Renwick since 2014 to help reduce overall consumption. Reducing losses is part of the Council's overall water management strategy and may help to defer investment in accessing additional water sources.

Level of Service 6 — Provide a reliable water supply.

Performance Indicator:

The average consumption of drinking water per day per resident within the territorial authority's district.

Results:

The Council has set a target of 800 litres per person per day. This reflects the customary use of water based on the perception of its relative abundance and low cost.

The Council has had to impose water restrictions more frequently, particularly in Havelock and Renwick, where the sources have the potential to be adversely affected by water takes. In future the targets for water consumption are likely to become more stringent.

Future Demand

Factors influencing future demand for water services include:

- the NZ Drinking Water Standards (DWSNZ) and any future changes as a result of the Drinking-Water Inquiry
- population growth (predicted to slow down in future)
- increased domestic water consumption
- significant demands from primary production and food processing industries
- operators of community/individual water supplies may seek more Council involvement in future as these can be relatively expensive to maintain and operate
- leakage/unaccounted for water
- climate and climate change, as the warm dry summers experienced in Marlborough, particularly in the south of the region are conducive to high water consumption (and drought periods could become longer as the climate changes)
- visitor numbers can increase water demand, particularly tourists in Picton and Havelock and seasonal workers in Renwick and the Seddon township.

The impacts of changing demand on our water supply assets

Blenheim

Substantial works were required to enable the Blenheim water supply to meet the Drinking Water Standards. The Blenheim upgrades also included an increase in water storage capacity. This gives the Council additional capability to balance peak demands and provide security of supply during a power failure affecting the distribution pumps.

Picton

The Speeds Rd Water Treatment Plant was upgraded and commissioned in March 2017, and the supply now meets the Drinking Water Standards.

Recent population projections and demand management techniques delay the need to develop additional sources of water to meet Picton's needs during droughts and to provide for increased demand as a result of future population growth.

Havelock

Plans to meet the DWSNZ by 2015/17 have been delayed whilst affordability issues are worked through with the community.

In periods of low rainfall and high abstraction there is evidence of increased conductivity in the source water, indicating saline intrusion of the aquifer. A condition of the resource consent restricts abstraction rates as conductivity rises. Following extensive public consultation, universal metering has been adopted for Havelock and meters will be installed by 2019 to help manage demand.

Renwick

The three bores at Terrace Road have three major problems:

- the unacceptable turbidity in the source wells when Ruakanakana Creek has very high turbidity
- the elevated concentration of nitrate and other contaminants that occur seasonally

- the inability of the supply to meet predicted summer demand in future. (In the summer of 2014 water restrictions were imposed from 20 February to 2 April due to low levels of water in the abstraction bores.)

A resource consent application to abstract water from the Conders Bend Road bores is proposed, and a pipeline to connect the bores to the treatment plant will cost an estimated $1.6 million.

Riverlands

This water supply's 'secure' status will be abolished following the outcome of the Drinking-Water Inquiry, based on the Stage 2 report recommendations published in December 2017. The Council will consider treatment options for this water supply in 2018.

Wairau Valley

Universal metering was introduced to Wairau Valley in 2007 and successfully reduced demand by around 40%.

This scheme was designed to service a total of 55 properties. At present there are 51 properties connected to the supply but within the supply area there are undeveloped properties with potential to be subdivided.

To extend the supply area would require a new resource consent, a larger pump and upgrades of the current 100 mm diameter reticulation pipes. The treatment system is due to be upgraded to meet the DWSNZ in 2017/18.

Lifecycle Management

Operations and Maintenance

Asset maintenance versus renewal

The Assets & Services (A&S) Department seeks the optimum balance between the cost and disruption of ongoing maintenance and renewal of assets that have reached the end of their useful life. Currently, achieving this balance is based on the judgment of the operational engineers. One of the priority aims of the upgraded asset management information system (AMIS) is to provide good data on maintenance costs and frequency to support the engineers' decisions.

Planned versus unplanned maintenance

Planned maintenance schedules have evolved for the critical components of the water supply infrastructure. More formal documentation and evaluation of the current process is required, as the current reliance on the experience of individual staff may not be sustainable.

In cases where the risks of failure are low it can be cost effective to allow the asset to fail and respond to the breakdown.

Efficient asset utilisation versus risk reduction through redundant capacity

There can be serious consequences from the failure of some critical assets, and a level of redundancy or contingency options can mitigate the risks. However there is an obvious cost to duplicating assets that are not fully utilised in normal operating conditions.

Blenheim and Picton have two independent but inter-connected sources of supply.

Storage reservoirs are designed to provide a continued supply in the event of power failure. In recent years storage capacity has been increased to improve resilience.

Renewal/Replacement

The renewal strategy is designed to maintain the overall condition and performance of the asset infrastructure through a continuous, progressive cycle of replacement. Assets are analysed to determine the intervention point at which it is most cost effective to replace the asset.

The renewal programme is formulated from the following criteria:

- age
- condition
- performance
- maintenance costs
- customer service delivery
- economic obsolescence.

Currently non-critical assets are allowed to fail and are renewed when the cost of maintenance or service interruptions become untenable.

A more detailed renewal programme will be developed once the pipe condition assessment and data analysis has been undertaken.

Creation/Acquisition/Augmentation

Construction process

All capital upgrade projects for the water supply infrastructure follow a process from inception though to construction and commissioning, as follows:

- identification of need
- project prioritisation
- alternatives and options (alternatives including non-infrastructure solutions are considered before examining different design options)
- project approval (usually through the annual plan and LTP processes, with any significant variations discussed with the Assets and Services Committee, and forwarded to the full Council for ratification)
- detailed design
- tender (the Council has a rigorous procurement policy and most construction projects are advertised for competitive tender)
- construction.

Vested Assets

These are normally extensions to the reticulation to serve new subdivisions constructed by private developers, and will only be accepted if they are designed and constructed to rigorous standards.

Purchased Assets

The Council has previously purchased water supply assets or taken them over by agreement from private owners. There are no plans for similar acquisitions in the future. However, the future of small community supplies will come under close scrutiny as a result of the Drinking-Water Inquiry. There is potential that local authorities may be required to take on more responsibility for these private schemes in future.

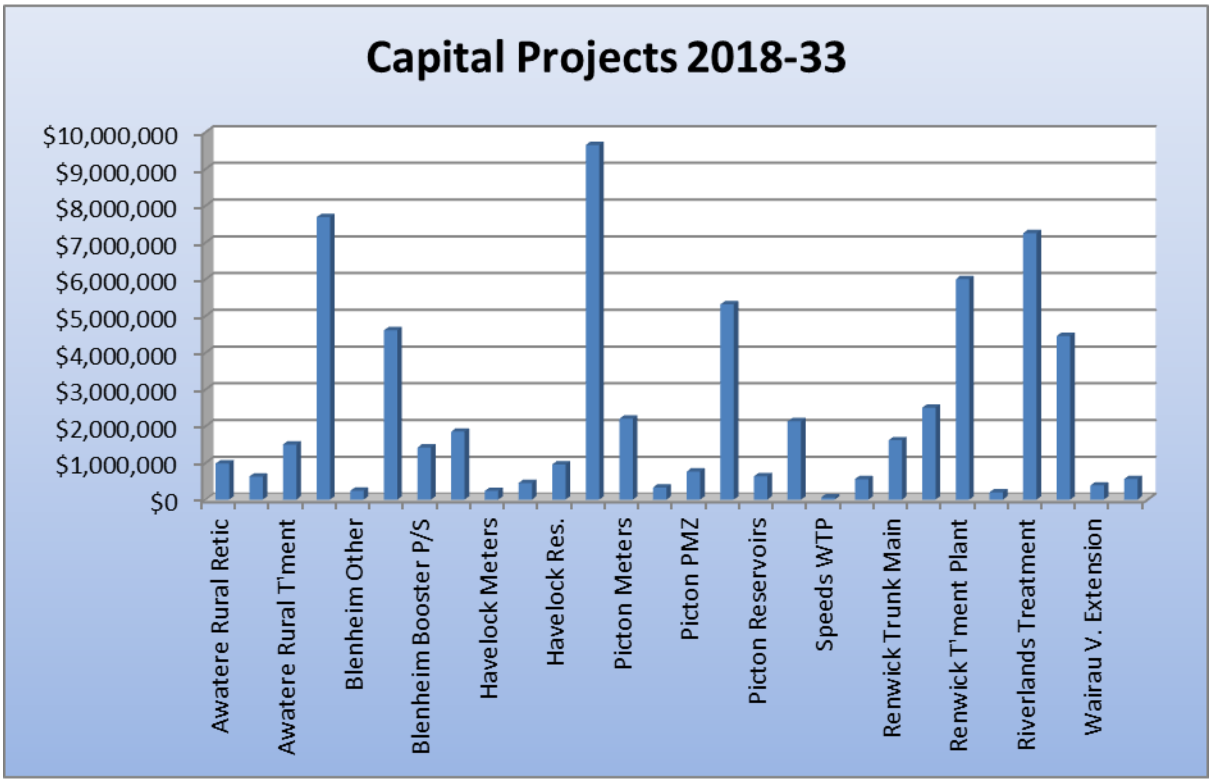
Disposal

Surface features are removed, with parts salvaged and reused wherever practicable.

Underground assets are generally left buried but capped. The position of the pipelines remains on the geographical information system (GIS) and they are archived as ‘expired’ assets in the AMIS.

Financial Summary

Water capital expenditure by scheme for the period 2018–2033 is shown below.



Operational expense funding comes from:

- fees and charges
- general revenues
- grants and subsidies.

The sources of funds for capital expenditure are as follows:

- development contributions
- capital grants and subsidies (where available)
- user charges
- general revenue sources
- Council financial reserves, including Depreciation Reserves
- loans
- targeted rates (directly charged).

Asset Management Practices

Asset Management Information System

The register of assets and their attributes is stored in the Asset Management Information System (AMIS) along with the maintenance history, maintenance schedules and performance data. The system is linked to service requests, the Council's document management system and the financial expenditure database. The quality and completeness of this data is continually improving.

GIS

The AMIS has an automated interface with the GIS, through which all staff across the Council can view water asset information.

Computer modelling

The Council has very high quality in-house network modelling capability which is augmented by specialist consultants. Models are used extensively to predict the behaviour of the reticulation network and as a planning tool for future designs.

Financial forecasting

Our capital expenditure forecasting is good/very good. Estimation of the timing of capital works is more challenging. Project budgets are normally scheduled on a best case scenario to ensure sufficient funds are available for projects to proceed on time.

Customer Service Data

A good mechanism is in place for registering customers' calls and recording response times. Service request data contributes to the performance monitoring of assets.

Asset Data Collection

Asset data is constantly being updated and checked. Assets & Services staff are converting our hard copy asset records to a digital format in the linked GIS and AMIS database.

Improvement Programme 2018–2021

Topic	Issue	Target date
Modelling	Development of dynamic hydraulic models for remaining reticulation systems (Havelock, Renwick, Awatere, Riverlands)	2015 onwards
Asset Management Information System (AMIS)	Prepare and implement business intelligence reports from the new AMIS	2018/19
	Continued improvement of field data capture and the 'back-office' approval system	2018 onwards
Asset Register	Continue 'sweeping' network areas to transfer hard copy plans to electronic data	Ongoing
	Correction of 'best estimate' data in the asset register	Ongoing
Unaccounted for Water	Continue leak detection contracts in Havelock and Renwick and consider extending to other targeted networks	Ongoing
	Evaluate the domestic water metering trial in Havelock and Renwick and consider the consequences for future demand management plans	2018–20
Urban Growth	Continue to develop outline service plans for the new development zones	Ongoing
	Continue to monitor population growth trends and adjust infrastructure plans accordingly	Ongoing
Financial	Ensure operational and financial asset reconciliation is achieved and maintained	June 2018 onwards
Condition Monitoring	Extend pipe condition sampling and surveys to improve life expectancy projections	2018 onwards

Topic	Issue	Target date
	Develop operative skills in identification and recording of asset condition	Ongoing
	Improve the quality and consistency of condition grade recording and reporting systems	2018
	Develop business intelligence reports to assist with renewal decision making	2018
Performance Monitoring	Improved business intelligence reporting on asset performance	2018
Proactive Maintenance Scheduling	Improve data collection recording of scheduled maintenance activities	2019

Monitoring and Review Procedures

The Asset Management Plan is formally reviewed and updated every three years and informs the development of the Long Term Plan. The draft asset management plan is submitted to an external consultant for peer review.

The Council's asset management plans are made available to the auditors of the Office of the Auditor General (OAG) during the audit of the Long Term Plan and the intervening Annual Plans.

Asset valuation is undertaken annually. The valuations and all supporting calculations are submitted to an external valuer for independent verification. The valuation is scrutinised by Audit NZ to ensure asset management is adequately resourced in future plans and budgets.

Levels of service performance indicators are monitored at six monthly intervals and reported to the Council's Executive Management Team, and this information is made publicly available in the Annual Report.

Chapter 1: Introduction

Marlborough District Council provides a water supply and distribution service to approximately 82% of residences and businesses in Marlborough through seven reticulated supply schemes.

The abstraction, treatment and distribution of water provides a source of drinking water for the community. The water supply is also used for cleaning and sanitation, sustenance of livestock, irrigation and as a resource for both commerce and industry.

The water supply activity contributes to the Community Outcomes of **Living** by providing an adequate supply of clean drinking water for communities; **Economy** by supplying cost effective treated water that permits commercial activities to thrive and **Environment** by ensuring responsible stewardship of the source water from aquifers and waterways.

This asset management plan covers the management of infrastructure for water abstraction, treatment, pumping, storage and reticulation owned and operated by the Council.

The plan details the process and costs of operating, maintaining and upgrading the water assets. It describes the services provided by the assets, and how they achieve the desired community outcomes. The plan looks forward to future service requirements: growth in demand from various sources, enhanced customer service in line with increased customer expectations, changing legislation and environmental constraints, and how to achieve greater efficiency of water use.

The plan forecasts the cost implications of providing water supply services and the funding methods proposed and adopted by the Council.

Content of the Introduction

1.1. Purpose — what the asset management plan seeks to achieve, the asset management process and requirements.

1.2. Strategic Context — how water asset management fits into the wider Council vision, the infrastructure strategy and functional environments.

1.3. Asset Management in Relation to the Planning Process — a summary of the Council's planning processes, including other relevant plans.

1.4. Water Assets included in the Plan — a short summary of the water supply assets managed by the Council.

1.5. AM Plan Stakeholders — the main stakeholders and interested parties in water supply activities.

1.6. Organisational Structure — how the water supply function is managed within the Council structure.

1.7. Negative Effects — the consequences of not providing or not delivering a satisfactory water service.

1.8. Plan Framework — a short description of the main elements of the asset management plan.

1.9. AM Planning Maturity — a discussion on the development status of water asset management planning.

1.1 Purpose

The purpose of the asset management plan (AMP) is to document the asset management processes undertaken by the Council regarding its water supply infrastructure and services in order to:

- demonstrate to stakeholders that responsible, sustainable operation and management of water assets is occurring
- describe how service delivery is achieving the defined community outcomes
- define the strategy for asset maintenance and development into the future
- outline the medium-term (10+ years) financial planning profile related to the life cycle of the infrastructural assets
- demonstrate the risk management strategies employed to deliver a reliable service
- support the development of the Council's Long Term Plan and meet the requirements of the Local Government Act 2002.

An asset management plan describes the current standard of service, the future expectations of stakeholders and any assumptions about future changes that could affect the management of the assets. Decisions on operational asset management and investment in infrastructure are explained within the context of cost and the Council's funding constraints.

The Council recognises asset management planning is a valuable tool for delivering effective, efficient and sustainable services to the community. The management of water assets is subject to continual improvement. Issues identified in previous asset management plans are actioned or are being addressed as a part of a continuous process of business improvement. New and outstanding issues, and proposed improvements, are included in Chapter 6 for future action.

The 2018 Water Supply Asset Management Plan updates the asset management plan prepared in 2014 (and adopted in 2015) which was preceded by plans in 2012, 2008, 2006, 2000 and 1997.

The draft plan is presented to the Assets & Services Committee for scrutiny before being forwarded to Council for approval. It then provides the basis for the water supply budgets and proposed actions in the Long Term Plan 2018–2028.

The Council seeks to meet the requirements of a basic asset management plan as defined by the Auditor General.

1. Define the service level.
2. Define the timeframe (life cycle).
3. Describe the asset (physical and financial details).
4. Include financial information (10 years +).
5. Recognise decline in potential ability to deliver services.
6. State assumptions and data confidence levels.
7. Outline an improvement programme.

8. Be prepared by qualified persons.

9. Be a firm commitment of the governing body.

10. Be reviewed regularly.

This Asset Management Plan has been prepared in accordance with the Local Government Act 2002 (including Schedule 10) and subsequent amendments to the Act. Other relevant legislation is summarised in section 2.5 of this plan.

1.2 Strategic Context

1.2.1 Council Vision and Mission

Marlborough District Council has an overarching Council vision and mission.

Our Vision

Marlborough is a globally-connected district of smart, progressive, high-value enterprises, known for our economic efficiency, quality lifestyle and wellbeing, caring community, desirable location and healthy natural environment.

Our Mission

"We invest in Marlborough's future, our people, quality lifestyle and outstanding natural environment."

The Council's vision and mission are implemented through a number of community outcome statements which describe the sort of community Marlborough could become as a result of actions taken now and into the future.

The vision, mission and community outcomes are reviewed and updated from time to time to ensure they are clear and fit for purpose. Amendments are consulted on and published in the Long Term Plan, with the latest amendments made in 2018.

1.2.2 30 Year Infrastructure Strategy

A 2014 amendment to the Local Government Act required local authorities to produce an infrastructure strategy to look at challenges over a 30 year planning horizon, and to ensure the infrastructure strategy aligned with the Council's financial strategy. This asset management plan complements and contributes to the Marlborough Infrastructure Strategy 2018.

The strategy looks at Council-owned infrastructure related to water supply, wastewater, stormwater, roading and river flood management. These key services are critical to the functioning of the region. The strategy considers the major factors influencing the delivery of these service areas over the next 30 years. Community facilities have also been included in the strategy as they have an important role in the functioning of the community. As many of the infrastructural assets have a design life in excess of 80 years it is essential to plan for the medium to long term.

There are five main themes running through the infrastructure strategy which reflect the Council's challenges related to providing infrastructure for the community.

Resilience — building and maintaining assets that are resistant to natural events such as earthquakes and storms, and being adaptable to climate change.

Levels of Service — providing assets that can respond to changes in demand from customers in terms of the quality and quantity of the services, and external influences on local government services such as changes in national and international policy and legislation.

Affordability — considering whether the costs of owning and operating the infrastructure assets will be affordable in future, bearing in mind changes in population demographics, economic prosperity and changing work patterns.

Renewals — recognising that within the 30 years of the strategy many of the built assets will have reached the end of their useful life. It is important to plan for their replacement to avoid a deterioration of service and ensure works are undertaken in a timely and efficient manner.

Growth & Demographics — recognising there is a decline in natural population growth as the age profile throughout the country gets older, which was confirmed in the 2013 Census. Future population growth will be reliant on inward migration, which in turn is heavily dependent on economic prosperity. An increasingly elderly population may have different demands on services and their ability to pay may also be different from the current population. The general trend to rural depopulation is likely to continue and will be apparent in many small settlements and provincial towns.

These key themes provide a context for this asset management plan and are incorporated throughout the plan.

1.2.3 Functional Environments

The Council operates in a number of distinct environments that shape the services provided and the management of the assets required to deliver the services.

Legislative and Regulatory Environment — water supply services are highly regulated in order to ensure people receive a reliable and safe public water supply. Legislation is implemented through agencies such as the District Health Boards, the NZ Fire Service, and by councils' planning and regulatory departments. The Police can also be involved, for Crown offences. Legislation also has an influence through matters such as the health and safety of staff, building standards and financial control regulations.

The National Policy Statement on Urban Development requires councils to identify and zone sufficient land to meet the needs of urban development, and the associated water treatment and reticulation capacity must also be planned and available in a timely way. Policies and strategies must be adopted for the equitable allocation of these servicing costs.

Commercial Environment — funding and spending are important considerations for the delivery of Council services. Local authorities are scrutinised and regulated by central government and have a responsibility to their ratepayers to be financially prudent. Council has a number of funding sources — including general rates, targeted rates, development levies, volumetric charges loans, enterprise income, grants and fees. The allocation of costs must give due consideration to factors such as customer affordability, equity between business and domestic users; inter-generational equity, socio-economic groupings and geographic areas.

Economic Environment — Council must consider its strategic approach to economic development in terms of the number and types of industry sectors it wants to encourage to establish in the region and the subsequent development of commercial services to support those industries. The prosperity of the area will encourage population growth and urban development.

Social Environment — social responsibility requires the Council to fairly balance the benefits of its services across all socio-demographic groups by providing access to a water supply and taking an equitable approach to charges.

Natural Environment — environmental sustainability is becoming increasingly important. Councils are expected to meet high standards of environmental stewardship. The national context is set by central government through the Coastal National Policy Statement and the National Policy Statement for Freshwater Management. Regional policies and strategies must be adopted to protect the environment and provide community leadership.

Cultural Environment — there are significant differences in how European, Maori, Pacific and other cultures perceive the relationship between people and the environment. Disregarding these beliefs and values can cause considerable offence.

1.2.4 Levels of Service

From these environments the levels of service and subsequent performance measures were established to provide:

- an overall level of service that meets or exceeds residents' expectations
- a level of water quality that meets community needs and is appropriate to the degree of public health risk
- a reliable water supply service
- a service that is timely and responsive to customer needs
- a sustainable water service.

The method of developing and establishing the levels of service is described in section 2.4.

1.3 Asset Management in Relation to the Planning Process

The role of the water asset management plan in Council planning is shown in Figure 1-1. The asset management plan provides a link between the Council's strategic objectives and long term plans, and the Council's day to day operational activities related to providing the services.

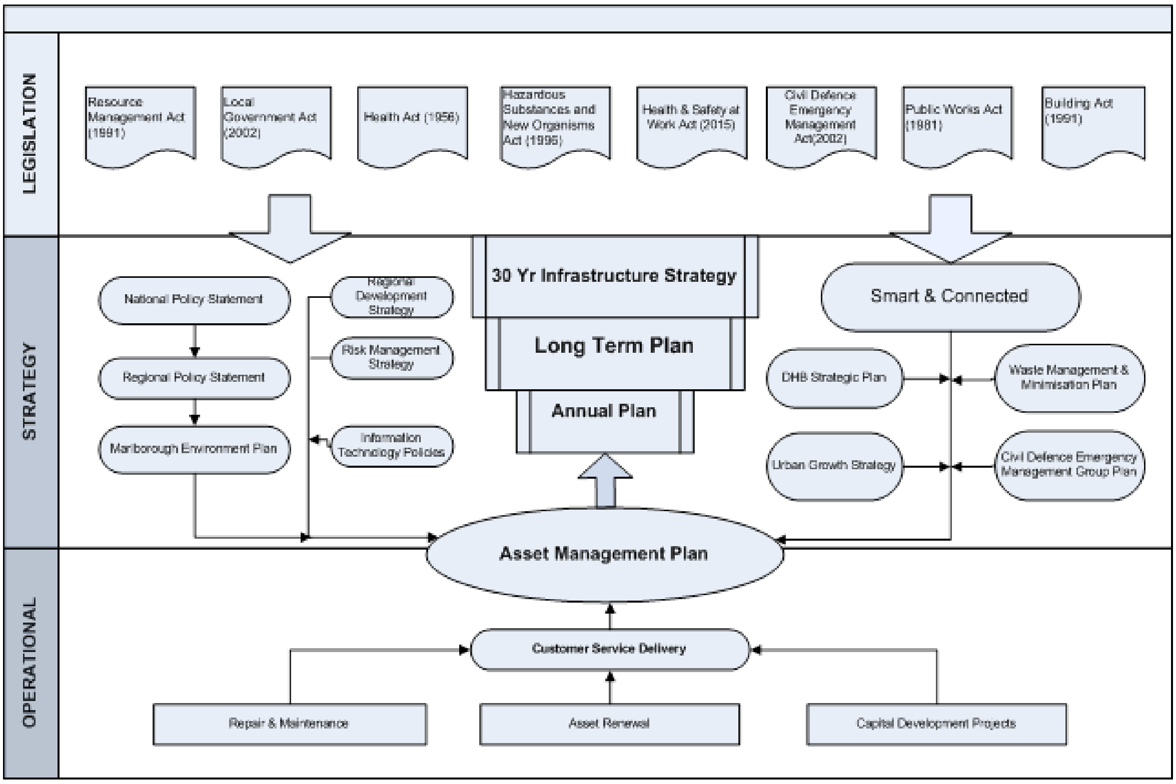


Figure 1-1 Asset management planning process

1.3.1 Other Planning Documents

Smart and Connected Strategy — The Council has adopted a regional 'Smart and Connected' Strategy to promote the economic development of the region and this is now integrated across Council activities. The strategy emphasises an integrated approach that maximises the skills and resources of the region and how they interrelate with the national and international context.

The strategy has been built on a framework of six Community Outcomes — Governance, Environment, People, Economy, Mobility and Learning, as shown in Figure 1-2. The outcomes of most significance to the water supply are: environment (sustainable resource management), economy (productivity), and living (health). The contribution of the water supply activity is discussed in more detail in section 2.2 of this plan (community outcomes).

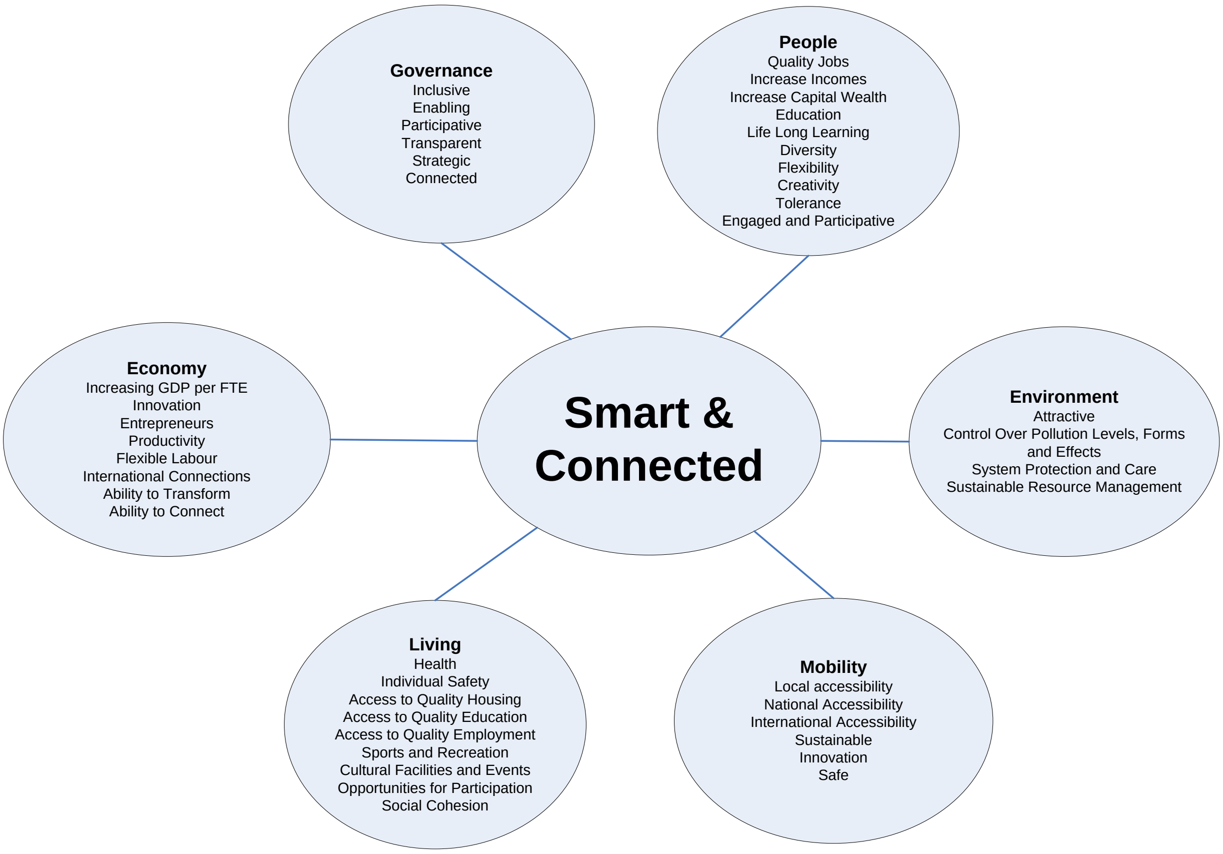


Figure 1-2 The Smart and Connected Strategy framework

The Long Term Plan — The Long Term Plan (LTP) is a requirement of the Local Government Act 2002. The LTP is the primary medium term planning document for local government and contains key information on the activities, assets, levels of service and financial details of all Council services. The plan covers a 10 year period and is updated every three years. It contains detailed information for the first three years and outline information on proposed services and budgets for a further seven years. Asset management plans provide more detailed information on the main Council activities included in the LTP.

Annual Plan —The Long Term Plan (LTP) is reviewed and updated every three years. In the intervening years, any significant changes to the LTP are consulted on through the Annual Plan. Progress on infrastructure projects, performance against levels of service and financial matters are communicated to the public through the **Annual Report**.

Resource Management Plans — The operative Wairau/Awatere and the Marlborough Sounds Resource Management Plans have been updated and superseded by the Proposed Marlborough Environment Plan (MEP). The Proposed MEP is a combined regional and district plan which implements the Resource Management Act. The Proposed MEP provides the framework for assessing resource consent applications. Resource consent conditions apply for a number of water supply activities, including water abstraction and how the discharge of water treatment wastes can occur.

Bylaws — Council has powers to write local enforceable bylaws. The district-wide Water Supply Bylaw is currently being reviewed. It defines local laws and standards in the design and operation of the reticulation system and the customers connecting to the reticulation.

Urban Growth Strategy — The Council has a well-established urban growth strategy which was developed through 2011–2013, following thorough consultation and analysis of future growth patterns. The Assets & Services (A&S) Department was fully involved in the development of the strategy in order to ensure urban growth pockets could be adequately serviced.

The A&S Department works with developers from the beginning of a development proposal to form an agreed service plan. This ensures new infrastructure is designed and installed in a way that matches the long term growth projections. Council coordinates the collection of development levies, and ensures developers are reimbursed for installing additional capacity to meet future demand.

The Backflow Prevention Policy — This policy seeks to avoid contamination of the drinking water supply through back-siphonage or backflow into the reticulation from private plumbing. The policy requires customers who present a risk of contamination to install and maintain a suitable backflow prevention device at the point of delivery.

1.4 Water Assets included in the Plan

Council operates seven water schemes — Blenheim, Picton, Renwick, Havelock Awatere, Riverlands and Wairau Valley. The details of each of the schemes is summarised in Table 1-1 and Table 1-2.

Table 1-1 Summary of water plant

Schemes	Dams	Bores	Treatment Plants	Distribution Pumps	Reservoirs	Booster Pumps
Blenheim	0	9	2	7	23	7
Picton	1	3	2	4	32	6
Renwick	0	6	1	2	10	0
Havelock	0	2	1	0	2	0
Awatere	0	0	1	5	28	5
Riverlands	0	3	0	2	2	0
Wairau Valley	0	1	1	0	0	0

Table 1-2 Summary of water reticulation assets

Schemes	Mains (kms)	Service Lines	Meters
Blenheim	190.1	10,787	662

Schemes	Mains (kms)	Service Lines	Meters
Picton	61.6	2,110	181
Renwick	17.2	858	55
Havelock	9.7	337	33
Awatere	156.7	827	818
Riverlands	10.9	142	137
Wairau Valley	3.5	63	59
Total	449.7	15,124	1,945

Maps and a description of the assets and their recent history are included in Appendix 1 .

The Council also owns and operates two irrigation schemes — the Southern Valleys Irrigation Scheme and the smaller Riverlands Irrigation Scheme. The irrigation schemes are reported in the LTP and annual plans within the Water Supply activity group. However, they are not included in this asset management plan because they do not provide potable water, and are primarily a resource for economic development.

1.5 AM Plan Stakeholders

This plan is an important reference for current and future Councillors and community decision makers. It provides information on the Council's stewardship of the water assets on behalf of the community, including the performance and capacity of the assets, and future demands related to the assets.

The plan is also a primary reference document for managers and engineers within the Assets & Services Department, and operators of the water supply services. It provides a systematic approach to maintaining, upgrading and operating the water assets in order to meet the Council's objectives. It will be a source of information for the Council's corporate planners (particularly during the development of long term plans) as well as for Finance, Building Control and Resource Consents staff.

It is of interest to the District Health Board and the NZ Fire Service, who have a significant interest in the quality and performance of the service. The current status and future resilience of the water supply is also important for civil defence and the engineering lifeline utilities group.

Businesses, particularly the viticulture, agriculture and food processing industries, are stakeholders with an important vested interest in the quantity, quality, reliability and price of water supply services.

Environmental and ecological groups have a significant interest in the abstraction and management of water resources, as do local iwi who have a deep cultural association with the aquatic environment.

1.6 Organisational Structure

The Assets & Services Department is responsible for the Council's water supply services. The capital programme is managed by the Planning and Development Engineer and the day-to-day running of the system by the Operations and Maintenance Engineer. The structure of the department is shown in Figure 1-3. The department has its own Finance and Information Manager to supervise the budget and liaise with the Corporate Finance Department.

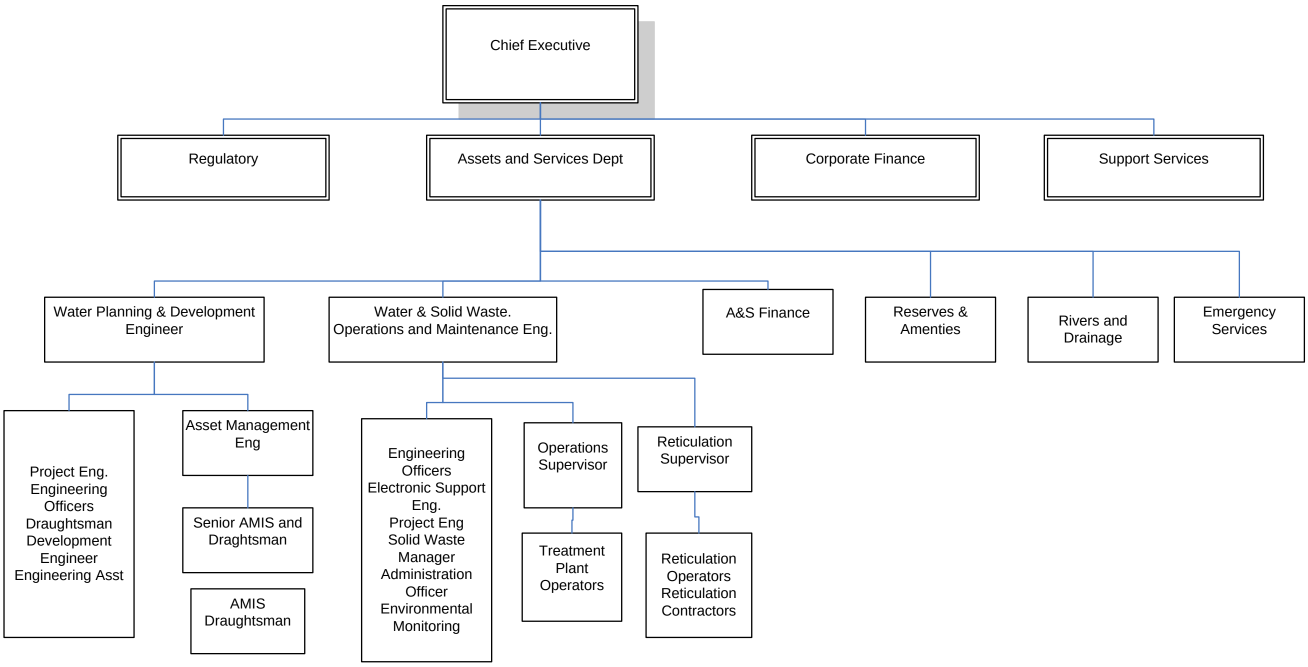


Figure 1-3 Organisational structure of water services at Marlborough District Council

1.7 Negative Effects

The Local Government Act 2002 requires the identification of the possible negative effects associated with the provision or inadequate provision of the service.

Table 1-3 Negative effects of water services

Area of Impact	Potential Negative Effects
The health of communities	Propagation of human and animal disease through lack of adequate, clean drinking water Propagation of disease, poor hygiene and insanitary living conditions from insufficient water for washing.
The safety of communities	Insufficient water for firefighting purposes.
Minimising adverse environmental effects	Damage to the natural environment through overuse of freshwater resources, pollution from treatment processes or chemicals, or damage during infrastructure installation. Insufficient water to maintain public amenities and parks.
Industrial and residential development	Constraints on the location of domestic residential development due to inadequate water supplies or supply infrastructure. Inhibited economic development due to inadequate water supplies or supply infrastructure.
Cultural Sensitivity	Offence to ethnic or cultural groups from the inappropriate or insensitive use of natural water resources.

1.8 Plan Framework

In 2012 the asset management plan was substantially rewritten and updated in accordance with the guidance in the NAMS International Infrastructure Management Manual 2011. The 2018 plan incorporates many of the recommendations of the AECOM peer review of the 2015 plan. Advice and guidance from SOLGM and comments from Audit New Zealand are also reflected in this plan. The six chapters in the plan provide the following information.

- **Chapter 1 — Introduction**: background, strategic context, plan framework, and maturity of asset management planning.
- **Chapter 2 — Levels of Service**: customer research and expectations, strategic and corporate goals, legislative requirements, current levels of service, desired levels of service.
- **Chapter 3 — Future Demand**: demand drivers, demand forecasts, demand impacts on assets, demand management plan, asset programmes to meet demand.
- **Chapter 4 — Lifecycle Management Plan**: background data on water infrastructure, infrastructure risk management plan, routine operations and maintenance plan, renewal/replacement plan, creation/acquisition/augmentation plan, disposal plan.
- **Chapter 5 — Financial Summary**: financial statements and projections, funding strategy, valuation forecasts, key assumptions, data confidence, risks and assumptions.
- **Chapter 6 — Plan Improvement and Monitoring**: status of asset management practices, improvement programme progress, 2018–21 improvement programme, monitoring and review of procedures, performance measures.

1.9 Asset Management Planning Maturity

The Council seeks to achieve a solid core standard of asset management. Intermediate and advanced asset management tools and techniques are deployed in certain areas but only where they add demonstrable value to the decision making process. The maturity of asset management within Marlborough District Council is dependent upon a number factors — skills available, size and criticality of the assets, complexity and value of the infrastructure, experience and culture of staff, and the approach to risk management.

The Council recognises there is an element of diminishing returns between the effort required to collect data and the subsequent improvement in decision making. The water infrastructure is made up of relatively small and comprehensible systems. Whilst there are competing demands for resources between different networks and functions within the networks, they are managed by a single and experienced management team.

Core asset management processes are being developed to provide intelligence to operational managers and to ‘future-proof’ the existing knowledge base. Advanced techniques such as mathematical modelling, option identification and selection, cost-benefit and total benefit analysis, risk management techniques and asset condition grading are all regularly used during the implementation of the current asset management processes.

A team within the Assets & Services Department continues to collect data on asset condition, location and performance to support the asset managers. The quality of the data is systematically and continuously reviewed and improved.

As the treatment processes and the connectivity of the reticulation system become more sophisticated, network modelling and other techniques provide insights into the complex behaviour and performance of the infrastructure. Dynamic mathematical models have been developed for most of the reticulated networks. The models have been verified against existing operational data and can therefore be used to predict the outcomes under a range of different future scenarios.

There is a current reliance on the knowledge and experience of a stable and highly skilled workforce. The depth and breadth of experience across the workforce reduces many of the risks associated with reliance on individual personnel. However, high quality data and empirical analysis can be useful for effective decision making and forward planning. There is an increasing demand for logical and robust processes to support and demonstrate effective management.

The Council's approach to asset management is to select and use advance techniques where they will assist in resolving conflicting demands whilst maximising the skills and practical experience of staff.

Chapter 2: Levels of Service

Components of this section

2.1. Strategic Overview — The role of the water supply services within the context of Council's services.

2.2. Community Outcomes — How water supply services contribute to the Living, Economy and Environment Community Outcomes.

2.3. Who Are Our Customers and Stakeholders — A description of the customers and stakeholders of water services.

2.4. What Our Customers Want — The expectations of our customers and how these were discovered.

2.5. What We Have to Do — Legal Requirements — Our statutory obligations related to providing a water service.

2.6. What We Currently Provide — The current levels of service and the performance indicators of our achievements.

2.7. What Our Customers Would Like — Future challenges from growth and changing expectations.

2.1 Strategic Overview

The supply of drinking water is probably one of the most recognised, and heavily relied upon, services provided by the Council. In 2016/17 the operating costs of the water supply service accounted for around 8.1% of the Council's total activity expenditure. This proportion is likely to increase as water treatment processes become more sophisticated to meet the New Zealand Drinking Water Standards (DWSNZ). The relationship between the water asset management plan and the wider strategic context is outlined in Chapter One of this plan.

There is strong national direction for water supply services. Compliance with the DWSNZ has been mandatory and is almost certain to become more stringent following the Havelock North Inquiry. The fire-fighting code of practice has been established by national expertise to determine flow and pressure of water delivery, and the Department of Internal Affairs has introduced national performance measures. Given the national interests in water supplies throughout New Zealand, there is some uncertainty about whether water supply activities will remain as a local authority function in future. Any changes to New Zealand's approach to managing water supply services are likely to be signalled in 2018.

Separation of water supply from local authority jurisdiction would allow consistent implementation of national objectives and priorities; professional and expert governance, consistent standards and the practices across the activity; the pooling of technical expertise for increasingly demanding engineering and operational standards. cost sharing across an increased user base and opportunities for alternative funding models.

2.2 Community Outcomes

Community Outcomes are a keystone to public service provision in New Zealand. The Council's Long Term Plan (LTP) is the vehicle by which the relationship between the community's well-being, community outcomes and the services provided by the Council are described and published, with feedback invited from the community. The LTP is updated every three years whilst Annual Reports and Plans are published annually in the interim periods.

The water supply activity contributes to three Community Outcomes:

- Living, by providing an adequate supply of healthy drinking water for communities
- Economy, by providing cost-effective treated water that permits commercial activities to thrive
- Environment, by sustainably sourcing water from aquifers and waterways, and avoiding damage during construction and operation of the supply infrastructure.

The Community Outcomes have been established through consultation with the community and their elected representatives. The Council conducts an annual customer satisfaction survey of 600 residents. Plans and strategies are published for public consultation, with submissions considered and all agreed amendments incorporated prior to their adoption. The Council also benefits from the experience and research of a number of national and local agencies such as the Nelson Marlborough District Health Board, Ministry of Social Development, Statistics New Zealand, New Zealand Transport Agency and the Marlborough Research Centre.

2.3 Who Are Our Customers and Stakeholders

The expression 'customers' is a widely understood concept in terms of the free enterprise economy. It has been less readily adopted as a way of describing the relationship between ratepayers and councils. This reluctance is partly due to the monopoly a council has over many services, and the charging mechanism through the general rates. A council has a more complex role to play than simply selling services. Councils also have a statutory duty to provide certain services and to carry out a variety of regulatory functions. This is particularly relevant for the water supply services, and for this reason it is more accurate for this section to consider all of the stakeholders.

Commercial properties and domestic households connected to the reticulation may be considered traditional customers. Approximately 82% of properties in Marlborough receive the Council's reticulated water supply for drinking, cooking, food preparation, the provision of sanitary living conditions and domestic irrigation.

Industries and businesses are also heavily reliant on the water supply. Many businesses use large volumes of water in their processes and to provide domestic facilities for their staff.

Central government is an important stakeholder in the provision of water supply services through its legislative powers. The obligation to supply water and the required standards and quality of supply are outlined in the Public Health Act 1956, the Local Government Act 2002, and other legislation (see section 2.5 of this plan).

The abstraction of water from the environment is controlled through the Resource Management Act 1991. Marlborough District Council is a unitary authority which means the Council's planning and consents departments are also stakeholders and have the same responsibilities as regional councils to establish a water allocation framework in the Proposed Marlborough Environment Plan, to administer this framework when assessing resource consent applications to take water, and to monitor and enforce any breaches in consent conditions related to freshwater abstractions and discharges.

Drinking water standards are a fundamental public health issue and are monitored and regulated by the Nelson Marlborough District Health Board.

The New Zealand Fire Service is an occasional but important stakeholder in the water supply. Providing sufficient flow and pressure in the reticulation to meet the requirements of the SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice is one of the defining standards in the design and operation of the reticulation.

Iwi and environmental groups, including Forest and Bird, Guardians of the Sounds, Kaipupu Point Inland Island and the Grovetown Lagoon Working Group, have an interest in the management of water resources. Iwi have a special cultural relationship with the environment which is an important consideration in the abstraction and distribution of water, and construction of related infrastructure.

2.4 What Our Customers Want

The levels of service and the subsequent performance measures are derived from the fundamental objectives of a water supply, which are to provide:

- a safe and reliable source of drinking water
- a resource for washing, cleaning and sanitary purposes
- a consistent, constant and unlimited supply
- the service at a reasonable and equitable cost.

In practice there is a tension between the provision of the first three objectives and the willingness to pay for the service. Some of the standards are pre-empted by legislation and not open to negotiation; others recognise the realities of delivering the desired goals within financial and environmental constraints.

The proposed levels of service (as listed in section 1.2.4 of this plan) are published in the Long Term Plan consultation document before the LTP is finalised, to enable public consultation on them. Submissions from the public (which can be either in support or opposition to the proposed levels of service) are formally received and carefully considered by the Council.

The Council also collaborates with a number of national and international organisations to help to determine the appropriate levels of service and performance indicators. The National Asset Management Support Group (NAMS Ltd) publishes guidance and hosts training courses on good practice in the development of levels of service. Water New Zealand and the Institute of Public Works Engineering New Zealand (IPWEA) assist in the promotion of best practice through published guidance, research, working groups and discussion papers.

Each year an independent consultant is commissioned by the Council to undertake a customer satisfaction survey. A telephone poll of 600 residents across the region is selected as a statistically representative sample of the population. The survey asks respondents to score each of the Council's activities, and the results are analysed and compared with responses from previous years. This provides a subjective assessment of Council's performance relative to recent history. Verbatim comments are also recorded and these provide a good source of information on the appropriateness of the levels of service and individual concerns.

The outcome of the customer satisfaction survey can be heavily influenced by recent events or media coverage of a particular topic.

In August 2017 a Levels of Service Workshop was held to provide councillors with information on the current levels of service, to discuss the options and seek their feedback. No major amendments were identified as a result of the workshop.

Community involvement and acceptance is sought at the early stages of planning major water upgrade projects through the formation of Consultative Working Groups. Currently groups in Seddon, Renwick and Havelock are regularly consulted to discuss the options for water treatment and demand management.

The most significant recent example has been the Awatere Water Users Group. The Group has been set up with a formal constitution and the election of members from the Awatere community. The group has been heavily engaged in finding a financially acceptable solution to the water quality issues related to their supply. This is a particularly valuable approach when there isn't a single preferred solution and the cost to the community is high. Similar community involvement will be required to resolve the water capacity issues in Renwick and Picton.

Marlborough District Council reviews its business processes from a ‘systems’ perspective. The foundation of the ‘systems thinking’ approach is to consider the performance of the business from the point of view of the customers. Once the customers’ experiences are thoroughly understood the business systems can be analysed to ensure they are aligned with delivering the best outcome. This is an important process because it has been frequently demonstrated that many business processes are adept at delivering internal objectives that are not necessarily aligned with providing the best outcomes for the customers.

In December 2014 a new asset management information system was introduced. This system enables customer service requests to be linked to work orders, making a clear linkage between reported problems and remedial actions. The database is able to provide both asset performance and customer service data.

National Benchmarking

Performance measures for Council activities are reported each year in the Annual Report. These have become a primary method of monitoring and evaluating progress towards the community outcomes and comparing councils throughout New Zealand. In 2013 Non-Financial Performance Measures were issued by the Secretary for Local Government in accordance with section 261B of the Local Government Act 2002. The rules to provide standard performance measures came into force on 30 July 2014 and were incorporated into the Council’s reporting process in 2016. Sub-part 3 of the rules prescribe 14 performance measurements for water supply to be adopted by all local authorities throughout New Zealand.

Many of the new measures have the same intent as the Council’s existing performance indicators for water quality with regard to: bacteriological and protozoa standards, the response and resolution time for urgent and non-urgent customer requests, the number of customer complaints under six categories, and water demand/usage. The benchmark measures are discussed in section 2.6.

The national measures introduced two new indicators — water losses and water usage.

2.5 What We Have To Do — Legal Requirements

Local Government Act 2002

- **Section 11A** — network services are considered a ‘core’ service of local government**.**
- **Section 101B** — Local authorities must prepare an Infrastructure Strategy.
- **Section 130** — confers an obligation on local government organisations to continue to supply water services and maintain capacity.
- **Section 125 & Amendments** — define the requirement to assess water and sanitary services within the Council’s area of jurisdiction.

Building Act 2004

- This Act provides a legislative framework for the building standards in the Building Code. Buildings must be safe and sanitary and must not threaten the water supply through contamination.

Health Act 1956

- **Section 39** — houses must have a sufficient supply of potable water.
- **Part 2A** of the Act was added by the **Health (Drinking Water) Amendment Act 2007** and requires community drinking water supplies to comply with the legislation over a phased period, depending on the size of the community.
- The Act also requires water suppliers to have a comprehensive public health risk management plan for their supplies. It also facilitates charging for backflow protection.

Rating Powers Act 1988

- This Act gives territorial local authorities the powers to gather revenue in relation to water supplies by rating, to cut off a water supply when water rates are not paid and to install water meters.

Public Works Act 1981

- This Act provides powers to local authorities to procure land for waterworks activities where necessary.

Resource Management Act 1991

- The purpose of this Act is to promote the sustainable management of natural and physical resources.
- The impounding of streams and abstraction of water from various sources are controlled under the Proposed Marlborough Environment Plan (MEP) which will supersede two operative regional resource management plans (the Wairau–Awatere Resource Management Plan and the Marlborough Sounds Resource Management Plan).

Food Act 1981

- **Section 11C (2)** permits the Minister of Health to prepare and publish ‘food standards’ covering a number of issues.
- Whilst drinking water is clearly included in the definition of ‘food’ there is no specific reference to reticulated water and to date the legislation has been used in relation to bottled water only.

Health and Safety at Work Act 2015

- This Act provides for the occupational health and safety of staff, contractors and individuals involved in providing the water supply services.

Civil Defence Emergency Management Act 2002 & Amendment 2016

- **Section 60** requires operators of lifeline utilities (including water supplies) to prepare to function to the greatest possible capability during an emergency.

National Environmental Standards for Sources of Human Drinking Water

- This national environmental standard (NES) provides territorial authorities with powers to control both water abstraction and discharge consents in areas upstream of drinking water abstraction points. (It was enacted in June 2008.)

SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice

- Whilst the Code of Practice does not have statutory powers, it is the basis for the partnership between the Fire Service and local authorities for the provision of water for firefighting purposes in urban fire districts.

2.6 What We Currently Provide

Currently the Council has six levels of services related to water supply.

Achievement against the levels of service standards is judged through seven ‘performance indicators’ which are reported in the LTP/Annual Report.

Level of Service 1 — Provide an overall level of service that meets or exceeds residents' expectations.

Performance Indicator: Residents' satisfaction survey.

The survey scores achieved between 2008 and 2017 are shown below.

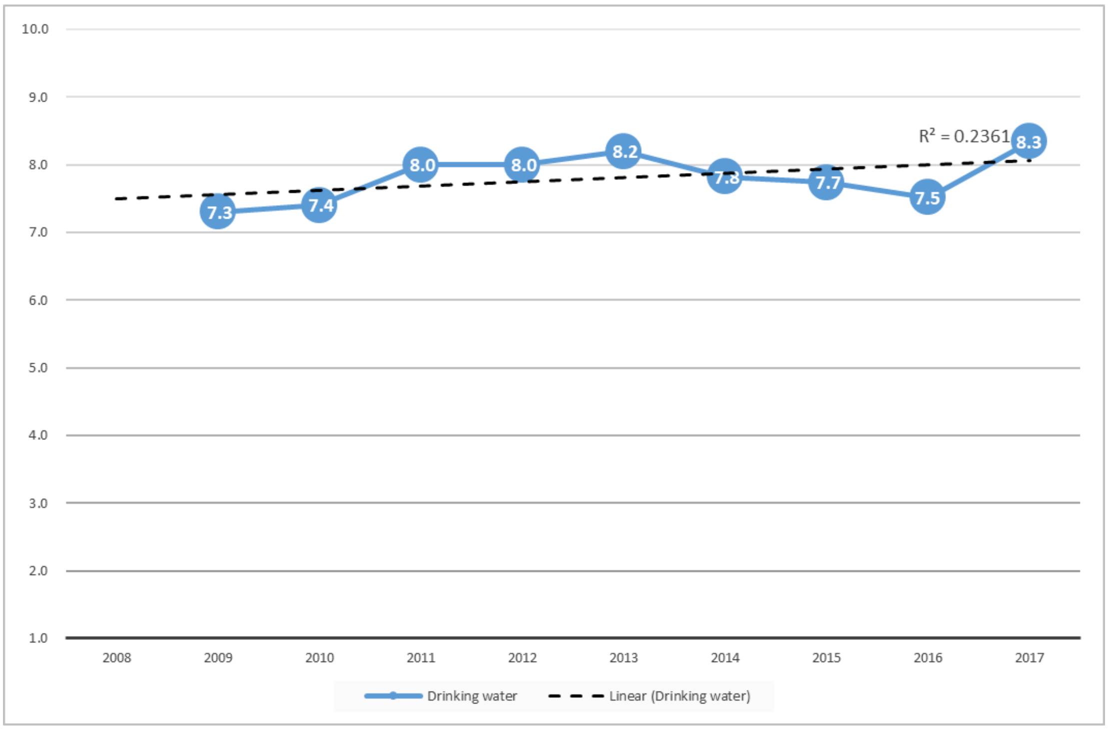


Figure 2-1 Customer Satisfaction Rating with Water Supply

The survey is introduced to the customer as follows — "The Council operates fresh water supply schemes servicing Blenheim, Renwick, Picton, Awatere, Seddon, Wairau Valley, Havelock and Riverlands/Te Koko-o-Kupe/Cloudy Bay business parks". Residents are then asked: "If you receive Council supplied drinking water — on a scale of 1 to 9 where 1 = not at all well, 5 = neutral and 9 = extremely well, how well do you think the Council performs in providing this service?"

Water supply received the highest customer satisfaction rating of all Council services in the 2017 survey. This may have been unexpected as drinking water supply has featured heavily in the media throughout the year. Locally, there has been public consultation with Seddon residents on the design of a water treatment plant; and Renwick and Havelock residents have been considering how to manage their demand for water and the introduction of universal metering. At the same time, on a national level, the mass contamination issue at Havelock North earlier in the year has kept water supply in the headlines.

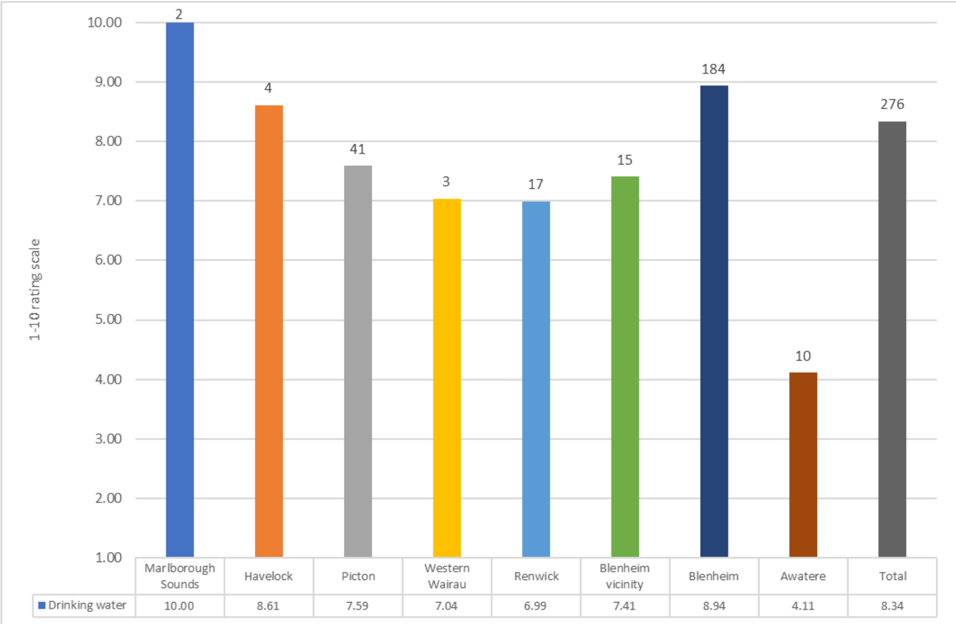


Figure 2-2 Customer responses to the 2017 satisfaction survey

The customers' responses are recorded along with any ad hoc comments. The results of the 2017 survey are shown in Figure 2-2 and Table 2-1.

There was a degree of variation in public opinion. Residents in the Awatere area scored the survey significantly lower than other areas. The results are likely to reflect the continued dissatisfaction with water quality in the Awatere and disruptions as a result of the November 2016 earthquake.

Table 2-1 Verbatim Customer Comments: Customer Satisfaction Survey 2017

	Customer comments	Count		Customer comments	Count
Positive	Good quality	70	**Negative**	Water undrinkable	12
	Good supply	81		Water of low standard	10
	Good taste	67		Costs regarding water	1
	No problems	93		Have own supply	1
	Some of the best water in NZ	22		Water out of town no good	1
	Very good	15		Other	13
	Other	20			

The cause of dissatisfaction in the Western Wairau area is less understandable. The Wairau

Valley scheme is very small with only 51 connections. The area of the scheme was set when it was established and cannot be extended. Some properties outside the boundary of the scheme have problems with the corrosive nature of the natural water quality which may have influenced the outcome of the survey.

Performance Indicator: The total number of complaints received by the local authority about any of the following: drinking water clarity, taste, odour, flow and pressure, and continuity of supply. Also, any complaints about Council's response to any of the issues.

These measures were introduced with the national non-financial performance measures in 2015.

Table 2-2 Complaints received about the water supply

	Customer complaints (per 1000 connections)		
	Target	2015/6	2016/17
Clarity	1.1	0.06	0.06
Taste	1.7	0.12	0.06
Odour	0.6	0.18	0.18
Flow & Pressure	1.9	0.18	0.55
Continuity of Supply	1.3	0.9	0.98
Response to Issues	0.65	0	0

There are around 16,350 water connections to the Council supply. The statistics show customer complaints are generally at a low level, which is supported by feedback from the customer satisfaction survey (Table 2-2 Complaints received about the water supply.) Some complaints received were traced to problems on private pipework and have been excluded from the reported statistics.

Customer perception is subjective and is often relative to an accepted 'normal' operating conditions. Changes in operational practices, whilst still within acceptable range, can be detected by the users and generate an enquiry to the Council. For example the supply to Picton can be either from the underground aquifer at Speeds Road or the impounding dam at Essons Valley. The water from these different sources has inherently different characteristics that can lead to enquiries regarding the taste or odour of the water.

Similarly, air that is dissolved in water under pressure is released as tiny air bubbles when the pressure is released. This can generate customer complaints regarding the clarity of water but is not a water quality issue and it is not the intention of the performance indicator to record this type of enquiry.

Performance indicators are used to identify intrinsic weaknesses in the water supply system to help guide investment decisions. Care must be taken when compiling and interpreting non-empirical data to avoid 'red herrings'.

Level of Service 2 — Provide a level of water quality that meets community needs and is appropriate to the degree of public health risk.

The New Zealand Drinking Water Standards (DWSNZ) are detailed and complex. However, the overall principle is the water supplier must select treatment processes that will combine to progressively remove biological contaminants and make the water safe for public consumption. The number and types of treatment required is dependent on the quality of the original source water. Generally, water drawn from deep, confined underground aquifers requires less treatment than water sourced from rivers or an upland reservoir which is more susceptible to contamination from the immediate environment.

Table 2-3 Current Status of Water Treatment.
**Cost for treatment only pumps, storage, etc not included.*

Supply Zone	Population	Seasonal Population Increase	Water Safety Plan	Bacterial Treatment	Protozoa Treat-ment	Budget Cost*	Date Compliant
Blenheim	24,028		Y	UV	UV	$7.2M	2012
Picton	4,185	5,925	Y	UV & Chlorine	UV	$5.6M	2017
Havelock	618		Y	Chlorine		$4.9M	2019/21
Renwick	1,884		Y	Chlorine		$5.6M	2018/20
Riverlands	740		Y	Secure?		$6.8M	2020/21
Seddon	489	300-400	Y	Chlorine		$4.4M ($1.0 M subsidy)	2017/18
Awatere	844		Y	Chlorine		$1.75M	2019/21
Wairau Valley	160		Draft	Chlorine		$0.5M	2019/20

The Blenheim supply has been compliant since 2012 when the Central Water Treatment Plant was commissioned. The Middle Renwick Road plant was upgraded in 2009.

In March 2017 the Council commissioned the Speeds Road Water Treatment Plant (WTP). In conjunction with the Essons Valley WTP, the two plants ensure the water supply to Picton meets the DWSNZ for bacteria and protozoa.

The Council received a subsidy of around $1M from the Ministry of Health to contribute towards the costs of a treatment plant for Seddon township. A site for a treatment plant has been purchased and construction plans are well advanced through a design and build contract. Commissioning is expected in 2018.

Plans are being developed for treatment plant upgrades at Renwick, Havelock and Wairau Valley township.

The groundwater source for the Riverlands supply has been monitored for many years. The micro-biological testing has produced consistently good quality results. The testing has been undertaken to demonstrate the source water will qualify as a 'secure bore supply' under section 4.5 of the DWSNZ. The secure status is based on slow percolation of surface water through the aquifer to reduce contaminants. It is therefore given a lower priority for additional treatment. However, an outcome of the Havelock North water contamination inquiry[1] is an urgent recommendation that section 4.5 of the DWSNZ (secure bore) is immediately abolished.

The Riverlands groundwater also has relatively high levels of iron and manganese. These are not harmful to health but elevated levels of iron and manganese can cause discoloration and staining which can be a particular issue for some industrial processes. Plans have been accelerated to design a treatment plant to remedy these issues.

[1] Report of the Havelock North Drinking Water Inquiry: Stage 2. Part 23. Dept. Internal Affairs (Dec 2017)

The Awatere Rural supply has a long distribution system with a relatively low population density. The supply was initially installed as a rural water supply and much of the water is still used for agricultural purposes. It is likely that the most cost-effective method of treating this supply is to install individual treatment at the point of use. This would involve fitting a small filter/disinfection unit at the point of entry to each property and only treating the water used within the dwelling. The capital investment for this solution may be favourable but the ongoing maintenance to ensure the several hundred units are serviced and functioning correctly will be considerable.

Performance Indicator: The extent to which the local authority's drinking water supply complies with (a) Part 4 of the DWSNZ (bacteria compliance criteria) and (b) Part 5 of the DWSNZ (protozoal compliance criteria.) These measures became a mandatory national non-financial performance indicator following the amendment to the Local Government Act 2002, effective from 1st July 2015.

The Blenheim supply became compliant for both bacteria and protozoa with the completion of the treatment plant upgrades in 2012.

Picton, Renwick and Havelock have complied with the bacteriological standard for many years by virtue of the chlorine disinfection of the supplies. Chlorination is not effective against protozoa and additional treatment will be required to meet this standard. The upgrades to the Picton supply were completed in March 2017 and works are planned and an outline budget agreed for Renwick and Havelock (see section 4.5.1 of this plan.)

Table 2-4 Compliance with the DWSNZ

	Part 4: Bacteria		**Part 5: Protozoa**	
	2016	2017	2016	2017
Blenheim	Y	Y	Y	Y
Picton	Y	Y	N	Y
Havelock	Y	Y	N	N
Renwick	Y	Y	N	N
Riverlands	Y	Y	N	N
Awatere	N	N	N	N
Wairau Valley	N	N	N	N

To comply with the DWSNZ a comprehensive sampling programme must be implemented and rigorously adhered to at both the treatment plants and at sample sites from around the reticulation system. Failure to implement the sampling programme is recorded as a failure to comply with the requirements of the Drinking Water Standards.

The recognised indicator of the bacteriological quality of drinking water is the absence of E.coli bacteria. The bacteria are derived from the mammalian gut and are very common in the wider environment. It is readily detected and is therefore used as an indicator of possible faecal contamination of the drinking water supply. Detection of the bacteria in a routine sample provokes an immediate investigatory sample survey of the source, treatment works and water distribution area in proximity to the positive sample. Confirmation of the infection will result in emergency disinfection of the water supply and flushing of the watermains. A precautionary 'Boil Water Notice' is issued to households in the affected area.

Regardless of whether or not the initial bacteria contamination can be confirmed by the investigation, the positive result is officially recorded and immediately reported to the Drinking Water Assessor who monitors the progress of the investigation. The result is recorded as a 'failure' for formal reporting purposes.

The investigation must continue until three consecutive days of clear results are obtained. Failure to detect any further contamination after the first sample failure may be due to a transient 'slug' of infected water passing through the system or, alternatively, due to accidental contamination of the water or sample bottle during the sampling process.

The four new water treatment plants are continuously monitored by electronic sensors. Each month around 44,000 sensor readings from each plant are checked and reported to the Drinking Water Assessor to verify the plants are functioning correctly.

Level of Service 3 — Provide a service that is timely and responsive to customer needs.

Performance Indicator: Where Council attends a call-out in response to a fault or unplanned interruption to its networked reticulation system, the median response times set out in Table 2-5 are met.

It is inevitable that structural/mechanical systems will fail from time to time. Proactive monitoring, good maintenance practices, prioritisation of critical assets and built-in redundancy will help to minimise the frequency and impact of failure. However, once failure has occurred the Council can reduce the impact on customers by promptly responding to customer service requests. The target for the performance indicators has been derived through consultation with customers on what is considered to be a reasonable and acceptable service.

Table 2-5 shows the Council's performance against this indicator has been satisfactory. The response to an emergency event is interpreted as the arrival on site of a water officer or repair crew. Whilst the 30 minute target is a proportionate response to an urgent request for service, it is a difficult target to achieve due to the travelling time involved. The Council provides a 24/7 emergency call-out service and the number of urgent events each year is relatively small (less than 30). In the year ending June 2017 the target was not met as there was a preponderance of urgent requests in Seddon/Awatere following the earthquake in November 2016. Service crews were dispatched promptly from Blenheim but the travel time to the Awatere is at least 30 minutes. Consequently the median time for the annual target was adversely affected.

Table 2-5 Response and resolution times for customer service requests

Performance Indicator		Target	2016	2017
(a)	**attendance for urgent call-outs: from the time that the local authority receives notification to the time that service personnel reach the site (in minutes), and**	30 minutes	0:12.5	0:38
(b)	**resolution of urgent call-outs: from the time that the local authority receives notification to the time that service personnel confirm resolution of the fault or interruption (in hours), and**	3 hours	2: 02	0: 50
(c)	**attendance for non-urgent call-outs: from the time that the local authority receives notification to the time that service personnel reach the site (in hours), and**	8 hours	2:07	2:10
(d)	**resolution of non-urgent call-outs: from the time that the local authority receives notification to the time that service personnel confirm resolution of the fault or interruption (in hours).**	13 hours	14: 54	7: 51

Level of Service 4 — Provide a reliable water supply service (flow and pressure).

The provision of an adequate supply in terms of both volume and pressure at the point of delivery is an important characteristic of the supply system. The perception of adequacy can be subjective between different types of consumer — for example, a rural lifestyle block will have different requirements to a suburban apartment.

Performance Indicator: System Capacity — Flow and Pressure. Percentage of properties that receive a minimum water pressure of 300 kPa at the property boundary (except in the Awatere Valley and Wairau Valley Township).

Performance Indicator: Percentage of system where fire flows are equal or greater than 25 litres/sec; percentage of system where fire flows are less than 12.5 litres/sec. (This is not a mandatory non-financial performance indicator.)

The measures adopted by the Council were amended in 2013 to better align with the Firefighting Water Supplies Code of Practice (CoP). Minimum firefighting flows and pressures must be maintained at 60% of peak system water demand. More detail is provided in section 2.7.5 of this plan.

Separate flow and pressure targets have been set for each of the reticulation schemes, based on 60% of peak system water demand. The performance of the reticulation systems is accurately evaluated by the use of mathematical modelling. The peak day demand in each area can be calculated from the flow records of the treatment plants. Based on the water demand around the reticulation, the hydraulic computer model can calculate the maximum water flow in each pipe and the pressure at several thousand node points on the network. The number of nodes that do not meet the minimum pressure requirement during the peak demand period can therefore be determined. The performance reported in Table 2-6 is calculated using the above method. Accurate dynamic models exist for the four reticulation networks and have been checked and calibrated against actual pressure recordings from around the networks.

Table 2-6 Capacity of the water supply systems

	Performance Indicator	Target	2014/15	2015/16	2016/17
Blenheim	300kPa	99%	98%	98%	98%
	25 L/sec	85%	88%	84%	84%
	12.5 L/sec	0.70%	1%	0.50%	0.50%
Picton	300kPa	99%	100%	99%	99%
	25 L/sec	87%	88%	88%	88%
	12.5 L/sec	1.00%	1.00%	1.00%	1.00%
Havelock	300kPa	100%	100%	100%	100%
	25 L/sec	100%	98%	98%	98%
	12.5 L/sec	0%	0.00%	0.00%	0.00%
Renwick	300kPa	69%	89%	89%	89%
	25 L/sec	55%	69%	69%	69%
	12.5 L/sec	2.00%	0.00%	0.00%	0.00%

Hosing restrictions were imposed on Havelock and Renwick in 2015 to help supress water demand as the water sources were becoming over-used.

The availability of adequate flow and pressure to new developments is assessed through the subdivision resource consent process. Approval is only granted if the supply to the area is adequate and the proposed pipework within the subdivision is able to deliver the minimum flow and pressure. The installed infrastructure is monitored to ensure compliance with the conditions.

Modelling is used to identify pipe upgrades required to meet additional demand from growth, and $2.3M has been budgeted for this work related to Blenheim's urban growth. This will be funded through development contributions.

Since 2010 the Council's customer services staff have recorded flow and pressure complaints from customers. All enquiries are investigated by water operations staff. A proportion are due to temporary operational issues such as mains bursts or pump failures. Blockages in supply pipes, meters, filters and internal plumbing fittings can also reduce pressure at the tap. Many of these issues relate to private plumbing systems which the property owner is responsible for fixing. Following investigation, the cause of the fault is recorded to assist with future decision making. Pressure complaints are also recorded under this performance measure.

Level of Service 5 — Maintenance of the reticulation network.

Ensuring the water infrastructure is well maintained and fit for purpose is an important Council role and is one of the main purposes of asset management planning. The Secretary for Local Government has included the following indicator as one of the compulsory non-financial performance measures.

Performance Indicator: The percentage of real water loss from the local authority's networked reticulation system.

The targets set by Council and the performance achieved over the last two years is shown in Table 2-7. The Council uses the minimum night-time flow to estimate losses and leakage in accordance with Water New Zealand's Water Loss Guidelines. The Council's approach to water losses is discussed in section 2.7.6

Table 2-7 Percentage of water losses

	Target	2015-16	2016-17
Blenheim	44%	37%	38%
Picton	48%	32%	38%
Havelock	51%	49%	24%
Renwick	50%	35%	35%
Awatere	28%	9%	17%
Wairau Valley	42%	15%	13%

Level of Service 6 — Provide a reliable water supply.

Performance Indicator: The average consumption of drinking water per day per resident within the territorial authority's district.

The Council has set a target of 800 litres per person per day. This is a high level of consumption by most national and international standards. The average household will receive over one and a half tonnes of water every day. This reflects the customary use of water based on the perception of its relative abundance and low cost. By contrast many Australian cities regard water as a precious resource. For example, Melbourne is striving to reduce per capita consumption from 166 to 155 litres/person/day.

Increasingly, the Council has had to impose water restrictions through the peak demand periods due to the limits of the water sources and infrastructure (see Table 2-9). Water demand management is discussed further in Chapter 3 — Future Demand.

2.7 What our Customers Would Like – Future Challenges

The Council is committed to supplying water to meet the Drinking Water Standards (DWSNZ), to provide a flow and pressure to meet the needs of fire-fighting, and to avoid imposing water restrictions except in extreme conditions. To achieve these levels of service whilst also ensuring the existing infrastructure does not deteriorate to an unacceptable standard will present a challenge to the Council and the community.

The Performance measures proposed in the 2018 Long Term Plan to indicate performance against the levels of service are shown in Appendix 2

2.7.1 Affordability

Perhaps the most important challenge to be faced in the achievement of the levels of service is the question of affordability. As noted in Section 2.4 there is often a conflict between the desired, or compulsory, levels of service and the ability of the community to pay for them. Meeting the requirements of the DWSNZ and the firefighting code of practice requires significant capital investment. Ensuring the infrastructure is resilient to natural hazards and is renewed before becomes inefficient to maintain incurs additional pressure on the budget. The Council is committed to core infrastructure as a priority however.

2.7.2 Future Challenges — Drinking Water Quality

Since the introduction of the Health (Amendment) Act 2007 water suppliers have been required to meet the Drinking Water Standards New Zealand (DWSNZ). The timeframe for compliance is based on size of population. The dates for compliance in section 69C of the Act have not been achieved in Marlborough. The expected compliance dates are shown in Table 2-8.

The Stage 2 report from the Havelock North drinking water inquiry has made strong and urgent recommendations that mandatory measures are implemented to improve and ensure the quality of drinking water throughout New Zealand.

Major upgrades of the two Blenheim water treatment plants and two Picton plants have been completed to meet the standards. These plants are continuously monitored to ensure compliance with the standards at all times.

Table 2-8 Expected dates for compliance with DWSNZ

Supply Zone	Registered Population	DWSNZ Category (Popn)	DWSNZ Target Compliance Date	MDC Target Date
Blenheim	24,028	Large (>10,000)	1 July 2012	Complies 2011
Picton	4,185	Minor (501-5,000)	1 July 2014	Complies 2017
Havelock	618	Minor (501-5,000)	1 July 2014	2021
Renwick	1,884	Minor (501-5,000)	1 July 2014	2020

Riverlands	740	Minor (501-5,000)	1 July 2014	2021
Seddon	489 (plus 400 seasonal)	Minor (501-5,000)	1 July 2014	2018
Awatere/ Dashwood	844	Small (101-500)		2021
Wairau Valley	160	Small (101-500)	1 July 2015	2020

Plans are well advanced for the design and build of a water treatment plant for the Seddon township. Several years of consultation with the community had failed to find an affordable treatment solution for the township, but a successful bid to the Ministry of Health Drinking Water Subsidy Scheme provided a $1M contribution to the cost of the treatment plant. This has been supplemented by $1.5M towards the capital costs from Council reserves and an ongoing contribution of $8/annum from all other Marlborough ratepayers towards the operating costs.

The Seddon funding model can't be readily extended, and affordability remained an issue for the other small townships — Renwick, Havelock, Wairau Valley and rural Awatere. In 2015 the Council consulted with the Marlborough community to seek a method of distributing the costs that would assist the smaller communities. Three alternative funding options and a 'no change' option were presented to the community during preparation of the 2016/17 Annual Plan. Public opinion was generally in favour of spreading both the capital and operational costs more evenly across all water users and the Combined Water Scheme was adopted as Council funding policy as a result.

It is likely that 'secure bore' status in the existing drinking water standards will be abolished as a consequence of the Havelock North Drinking Water Inquiry. As a consequence treatment will be required for the Riverlands supply. The treatment plant is likely to include iron and manganese removal as the elevated levels in the groundwater are problematic to many of the industrial water users supplied from this water source.

Both community and Ministry of Health acceptance is still required for 'point of entry' treatment devices to be fitted to properties on the rural Awatere supply. There are currently no nationally recognised standards for the installation and performance of such devices. It is therefore difficult to progress with an 'acceptable' proposal. A solution to this issue is becoming more pressing in light of the Havelock North incident. The service and maintenance of some 500 separate treatment units will present an ongoing challenge with relatively high operational costs. Further consultation on the best option and the actual cost of the improvements will take place with the affected communities in the coming years.

Gap Analysis — two supply zones currently comply with DWSNZ for bacteria and protozoa. Investment is programmed to complete the treatment plant currently under construction at Seddon, upgrade three treatment plants at Renwick, Havelock and Wairau Valley and install treatment devices to households in rural Awatere by 2021 at a total estimated cost of $23.9M.

2.7.3 Response and Restoration Time to Customer Service Requests

The current performance on restoration and response times appears to be in line with customer expectations, and there are few complaints regarding response/restoration times. It is unlikely that significant improvements could be made without considerable changes to standby rosters, working practices and service contracts. Efforts will be focused on ensuring the current targets continue to be achieved in future.

Gap Analysis — No significant changes to this level of service have been identified

2.7.4 Customer Complaints

Similar to the response and restoration times, the performance of the Council's customer services appear to be satisfactory. In the two years since the adoption of a performance indicator related to complaints, no complaints regarding the Council's handling of initial enquiries have been recorded.

The levels of service workshop held with councillors in August 2017 did not promote any significant changes to the current levels of service for the water supply.

Gap Analysis — No significant changes to this level of service have been identified. The targets will monitored to ensure there is no deterioration as the infrastructure ages.

2.7.5 Flow and Pressure

The measurement of flow and pressure at the point of delivery is not a national non-financial performance indicator. However, the Council has kept the indicator as it is closely aligned with the Firefighting Water Supplies Code of Practice and is linked to both capital and operational expenditure. The measures can be calculated through mathematical hydraulic models for each of the supply areas. The models are programmed to replicate the system conditions for the peak hour of a peak demand day. The model assumes a pressure of 100 kPa at the point of delivery and a residual 100 kPa throughout the reticulation.

The metric has been aligned with the requirements of the Firefighting Water Supplies Code of Practice. A flow of 25 litres/sec at a single node will meet the firefighting demand for domestic properties. The minimum standard of 12.5 litres/sec is not certain to fail the requirements of the Code of Practice (CoP) but is indicative of areas with less hydraulic capacity. The CoP allows the flows from a number of hydrants within a certain radius to be aggregated together and therefore the actual performance against the CoP is likely to be better than the performance indicator suggests. However, it is a useful measure of the performance of the reticulation system.

There is growing evidence to suggest modern firefighting equipment and techniques require less water and the CoP may be adjusted in future to reflect the improved performance. A letter has been sent to the local fire service to request clarification of their position on this issue.

Gap Analysis — The model has demonstrated parts of the Blenheim system could not meet the upper firefighting flow target. The most affected area is the commercial industrial area to the south-east of the town centre. Pipeline upgrades have been identified to remedy the problem and included in the capital budget at an outline cost of $3.83M. The work will be carried out over the next 15 years to match the availability of resources

2.7.6 Water Losses

The new performance measures require suppliers to measure and report water losses as an indication of the maintenance requirements of the reticulation system. Losses are relatively high in Marlborough (Table 2-9 Real Water Loss Performance Targets.)

Leaking water can drain away without appearing on the surface on gravel and sandy soils, so leaks are often undetected. Leak noise correlation and other leak detection methods require expensive specialist skills. In Marlborough the marginal costs of water production are reasonably low, whereas the fixed costs and capital investment is high. Active leakage detection becomes an efficient technique in areas such as Picton, Havelock and Renwick where the existing sources are becoming overused. Substantial savings can be made if the need to develop additional sources can be deferred by effective demand management (discussed in Chapter 3 — Future Demand). In summary, the relatively high target values for water loss chosen by the Council are a reflection of water availability, the marginal cost of water supply and the high cost of active leak detection.

The Council's policy is to repair visible and reported leaks as rapidly as possible. Serious leaks are responded to as a matter of urgency, particularly if a customer's supply has been interrupted. Lesser leaks are classified as 'important' and are usually repaired within 24 hours. This policy helps to reduce water loss through leakage.

Active leak detection uses a number of specialist techniques to find leaks in the reticulation which are not visible. It can be costly and have variable results. However, the Council has commissioned specialist contractors to undertake annual leakage surveys in Havelock and Renwick since 2014 to help reduce overall consumption. Detected leaks on the Council's pipework have been repaired and leaks on customers' pipes have been notified, and rectification notices issued. Reducing losses is part of the Council's overall water management strategy and may help to defer investment in accessing additional water sources.

The more widespread installation of meters on customer service connections will provide valuable information on patterns of consumption and leakage on private property.

Gap analysis — Improved targets the for water loss performance measure are included in the Long Term Plan.

Table 2-9 Real Water Loss Performance Targets

The percentage of real water loss from the local authority's networked reticulation system	Baseline	2018-19	2019-20	2020-21	2021-28
Blenheim	<=44%	37%	37%	37%	37%
Picton	<=48%	32%	32%	30%	28%
Havelock	<=51%	49%	38%	30%	28%
Renwick	<=50%	35%	32%	30%	28%
Awatere	<=28%	15%	15%	15%	15%
Wairau Valley	<=42%	15%	15%	15%	15%

Universal metering is to be adopted in Renwick and Havelock to help identify leakage on customers supply pipes at an estimated cost of $749,000. Extending universal metering to Picton is estimated to cost $2.0M.

Operational costs have been incurred annually for active leak detection. This will continue and is likely to increase as the surveys are extended. The operational cost of metering – meter reading, maintenance, depreciation and volumetric charging will also become more apparent.

2.7.7 Water Consumption

Historically water has been freely available, and water abstraction consent conditions have not imposed onerous restrictions. However, public attention has recently focused on water availability. Abstraction by all users, both for industrial and rural water use and for drinking water supplies, is under scrutiny throughout New Zealand as it is becoming apparent that unrestrained consumption cannot be sustained. The Council has had to impose water restrictions more frequently, particularly in Havelock and Renwick, where the sources have the potential to be adversely affected by water takes. Objective B3 of the National Policy Statement for Freshwater Management (NPSFM) is "to improve and maximise the efficient allocation and efficient use of water." This is to be reflected locally through Chapters 4 and 5 the Proposed Marlborough Environment Plan, and through the rules and conditions applied to subsequent resource consent applications.

In future the targets for water consumption will become more stringent. Discussion of water demand management is included in Chapter 3 of this plan.

Table 2-10 Water Consumption Targets

Performance Measure	Baseline	2018-19	2019-20	2020-21	2021-28
The average consumption of drinking water per day per resident within the territorial authority district	800L	780L	770L	770L	750L

The benefits of deferring or avoiding costly investment in developing new water sources are a key driver for the implementation of demand management. The consumption targets in Table 2-10 are averaged across the region but per capita reductions are likely be significantly more in Renwick, Havelock and Picton where the development of new sources could be deferred.

Table 2-11 shows the number of days that water restrictions have been imposed in recent years. The frequency and duration of restrictions has increased in recent years and is likely to continue, particularly if the Table 2-11 effects of climate change increase the frequency of extreme weather events as predicted.

Table 2-11 Water restrictions in Picton, Havelock and Renwick

Water Restrictions (days)

	2004/05	2006/07	2009/10	2012/13	2013/14	2014/15	2015/16	2016/17
Picton	38	0	0	0	0	78	0	32
Havelock	0	0	35	0	0	78	0	0
Renwick	0	17	0	64	42	82	0	0

The service standards that have historically been used in the management of the water supply system have been based on the premise that water restrictions should not be imposed in the type of drought likely to occur once in 20 years, and a drought with a likelihood of happening once every 50 years should require no more severe restrictions than a hose-pipe ban. These criteria remain important guidelines in terms of planning the capacity of water storage and other water infrastructure, but are supplemental to the conditions of the resource consent.

Gap analysis — Targets for lower per capita water consumption have been set. The universal metering programme and other demand management techniques will contribute to achieving the lower target.

Chapter 3: Future Demand

Components of the Future Demand Section

3.1 Demand Drivers — Factors influencing the demand for water services.

3.2 Demand Forecast — How future demand has been evaluated.

3.3 Demand Impact on Assets — Asset additions, augmentation and utilisation to meet demand.

3.4 Demand Management Plan — Non-asset solutions to meet demand estimates.

3.1 Demand Drivers

Future demand for water services is influenced by a number of factors working in combination.

Population growth — Information from the 2013 Census suggests that population growth in New Zealand will almost certainly slow down and is likely to become negative within the next 40 years. This projection has only recently become apparent and is a significant change to previous forecasts.

Domestic water consumption — Household water consumption has increased over time as dwellings are fitted with more sanitary facilities, automatic washing machines and dishwashers, and from increasing use of domestic irrigation systems. This factor may decline as ownership of domestic appliances stabilises and the average size of households decreases.

Industrial/business consumption — Primary production and food processing industries often have a significant demand for water. Other industries and businesses also require water for processes, firefighting and staff facilities.

Community/Individual supplies — There are many small community water supply schemes. These can be relatively expensive to maintain and operate and are likely to become more so as drinking water standards become more rigorously enforced. A number of suppliers of community water schemes may seek to be taken over by the Council or to join the reticulated areas. Individual households outside the current supply areas may also request an ‘out of district’ connection.

Leakage/Unaccounted for water — All reticulation systems have an element of unfound water —the volume of water that arrives at the customers’ taps does not balance with the amount of water put into supply. Leakage, unknown connections, unauthorised use of hydrants, and the difficulty of accurately assessing legitimately used but unmeasured water, all contribute to the volume of ‘missing’ water.

Climate Change — The evidence for long term climate change is increasing. There is now a reasonable consensus amongst the expert community that climate change in the medium term is inevitable. The implications for the water supply could be particularly significant in Marlborough where demand for water is closely related to the weather and irrigation(see section 3.2.7 of this plan).

3.2 Demand Forecast

3.2.1 Population Growth Trends

Previous analysis of the four Census counts between 1991 and 2006 coincided with a period of rapid economic growth in the Marlborough region. Overall population growth in the region was around 1.5% per annum although there were some significant local variations. For example, the Waikawa area experienced a population increase of 237% whilst the usual resident population of Seddon decreased by 8%.

In 2014 a reassessment of population projections was undertaken and presented to the Council's Assets & Services Committee. The report recognised several trends in global population demographics that are contrary to historical growth patterns. These trends are likely to have significant implications for national and regional planning assumptions.

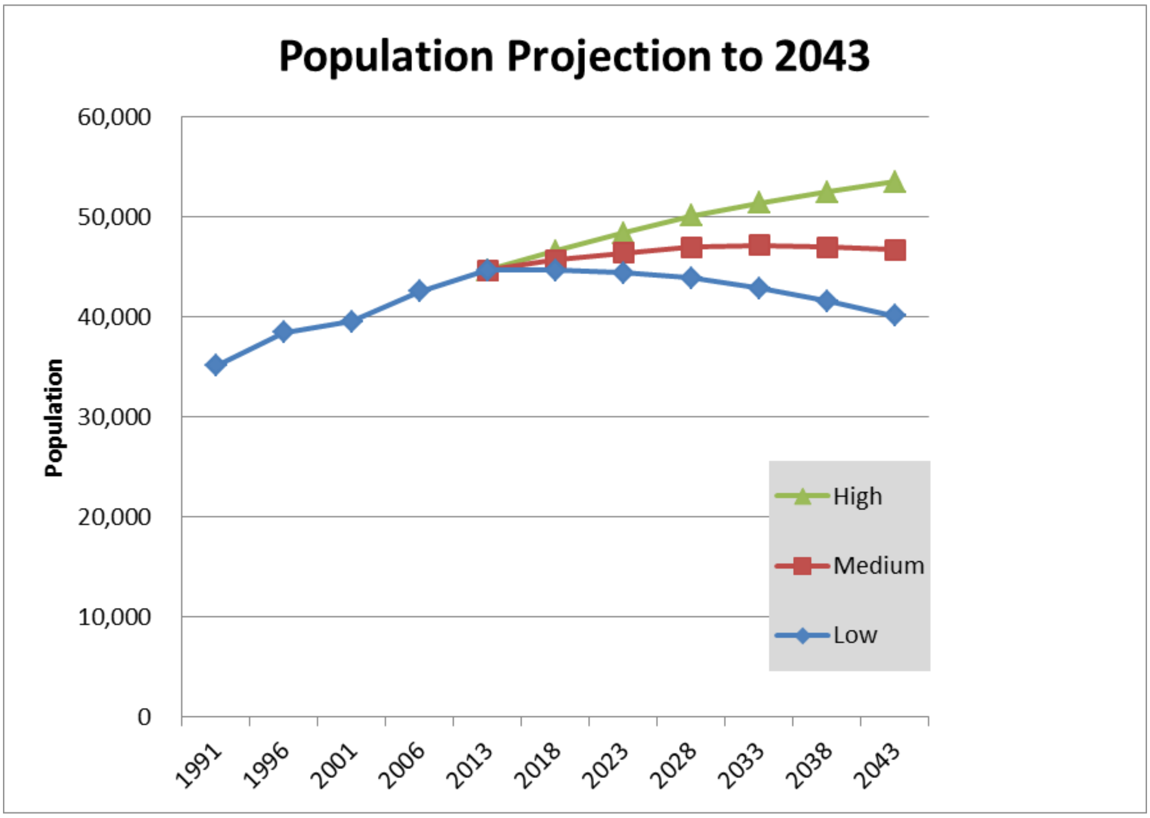


Figure 3-1 Population projections to 2043

3.2.2 Marlborough Population Growth

There are two major trends in the demographics of developed countries that are unprecedented — a slowdown in population growth and an increase in the age of the population.

Within a generation most developed countries (including New Zealand) as well as many developing countries will be experiencing negative population growth. Figure 3-1 shows the population projection for Marlborough based on the data collected in the 2013 census by Statistics NZ. In addition the Council commissioned two reports from the National Institute of Demographic and Economic Analysis (University of Waikato). The Institute's report provided further detailed analysis and population projections for the region. This 2012 report used local economic data supplied by Infometrics to inform their conclusions.

Population predictions — Both Statistics NZ and the Institute of Demographic and Economic Analysis report provided projections on high, medium and low growth scenarios. The trends are broadly similar. The Institute generally projected lower growth over a narrower time period than the Statistic NZ projections but this is within the overall range of the Census projections. The Institute's report looked at the whole of Marlborough rather than the individual settlements, and projected further into the future. The conclusion for all three projection scenarios (low, medium and high) was that the population will continue to grow for some time, then slow down and eventually decline. The timing of the population peak varied from as early as 2017 for the low projection to as late as 2061 for the high projection.

The release of the 2013 usual resident population statistics show the actual population for Blenheim to be very similar to the medium projection previously published by Statistics NZ. The Census showed some of the smaller settlements to have grown at a slower rate than was previously projected. These statistics fit with the national pattern of slowing growth in rural areas and more people moving to the more urban areas. However, local economic opportunities can strongly influence regions or individual townships, bucking the national trends.

Over the next 35 years there will be a slowing down of population growth, followed by a period of no growth and eventual negative growth.

Regional variation — The changes in population are not occurring uniformly through the region or uniformly across all settlements. Generally the smaller rural settlements are experiencing a more rapid slow-down in growth than the urban populations. However, there is also a shift in the “centre of gravity” of the Blenheim–Renwick and the Picton–Waikawa urban areas. Renwick and Waikawa have experienced considerable increases in population whilst central Blenheim and Picton have seen less growth or a decline in population.

The main urban growth areas are the greenfield sites on the periphery of existing urban areas. Urban growth pockets have been identified to the north and west of Blenheim’s existing town centre and these areas have been zoned for urban residential development.

Household sizes — The number of inhabitants per dwelling is also falling. This means the demand for housing will decline at a slower rate than the fall in population. With Marlborough’s age distribution this could indicate there will be fewer wage earners per household, which has consequences for the future affordability of water services.

3.2.3 Planning for Growth

The methodology for infrastructure planning most commonly adopted by the Assets & Services engineers is to use the medium growth scenario for population projections. The census data is analysed at mesh-block level and population estimates assigned to the water distribution zone boundaries. Adjustments can be made depending on the growth characteristics of individual mesh-blocks and local knowledge.

When planning services with a long lead time, the anticipated increase in demand needs to factor in a margin of error. A ‘just in time’ approach is prudent both from the point of view of capital expenditure and the uncertainty of projections and assumptions. In contrast, from a financial planning perspective, it is prudent to anticipate a slower growth in the rateable property base and income from development contributions, with a subsequent delay in cash flow returning to the Council.

A further consideration is that many infrastructure assets have a planned life in excess of 80 years. As a large proportion of the total assets costs occurs in the initial construction phase, it would be expensive to underestimate the long term demand and be forced to upsize assets. Thus the tactic employed is to err on the high side for such long life components, use the medium scenario for the design of shorter life components, and for all assets build ‘just in time’ to meet demand.

3.2.4 Ageing Population

The proportion of the total population over 65 years old will increase significantly (Figure 3-2.) The baby boom that followed the conclusion of World War Two continued into the 1960s. However subsequent generations had unprecedented access to effective birth control and a different attitude to family size. Other social factors such as opportunities for women in the workplace and greater financial security in old age have also been influential. As a result the average size of families has been dropping steadily.

Improving life expectancy for the baby boomers and continued trends of smaller family sizes by the following generations will ensure the proportion of older people in the population will increase significantly over the next 30 years. Currently the proportion of the Marlborough population over 65 is around 23%, which is marginally above the national average. By 2043 this is projected to increase to 34%. The proportion of the population of working age will decrease from 64% to 50%. Taking into account a considerable number of people of working age may not be working, significantly less than half of the total population will be wage earners.

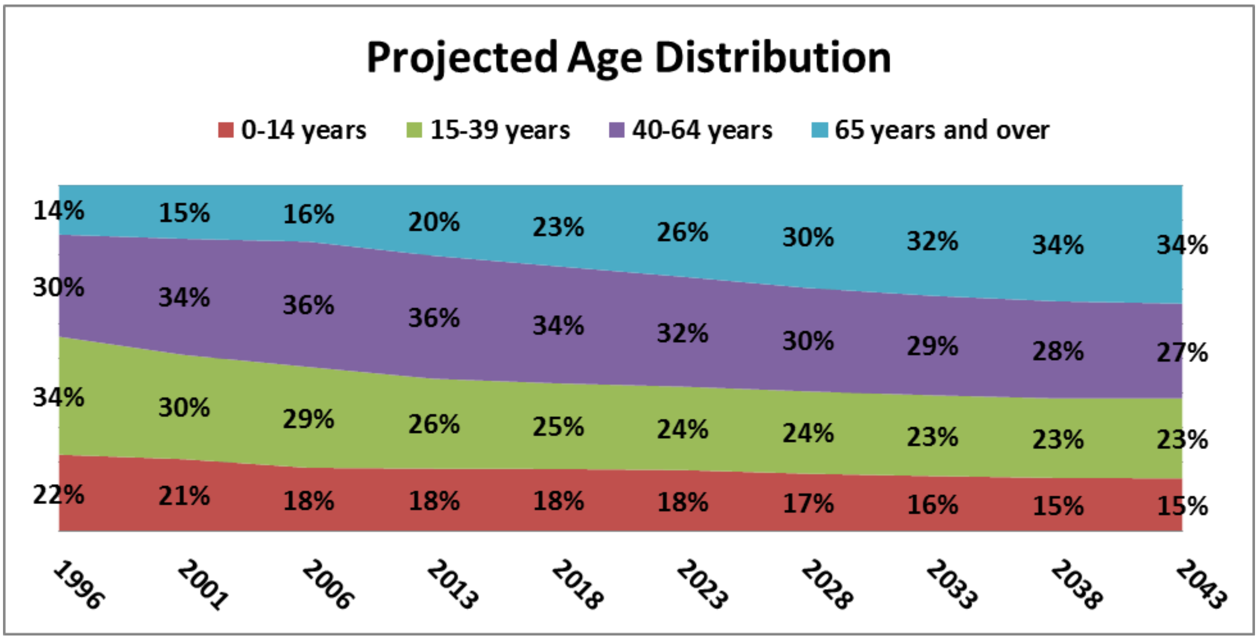


Figure 3-2 Marlborough population projected age distribution

At a high level there are two consequences for Council infrastructure that need to be highlighted.

1. Councils can no longer simply design infrastructure for significant growth secure in the knowledge that at some time in the future the capacity will be required.

2. A greater portion of the population will be on fixed incomes so people will have a limited capacity to handle increased costs.

3.2.5 Other Factors Influencing Water Demand

Population growth is an important factor for the projection of demand for future services. However, population growth alone is a poor indicator of changes in demand for infrastructural services.

Changes due to other factors such as climate change, environmental standards, national legislation, significant natural hazards, levels of service and other social aspects also have a significant impact on the demand for the service. It can be difficult to assess and quantify these factors as there is a less empirical relationship between the causes and the effects on the demand. However it is important that these factors are included in assessments of future designs and included in planning and design of infrastructure.

Climate — By both national and international standards water consumption in Marlborough appears to be very high. The warm dry summers experienced in Marlborough, particularly in the south of the region are conducive to high water consumption. The relationship between the weather and water consumption is illustrated in Figure 3-5.
Household Factors — The Census information is also analysed for other data that may influence water consumption patterns such as the total number of properties, household occupancy rates, age distribution pattern and an estimation of temporary resident numbers.

Visitors — Tourists to the area can be a significant factor, particularly in Picton and Havelock. Current estimates are that the usual resident populations in Picton and Havelock can temporarily increase by up to 40% due to summer visitors.

Itinerant and seasonal worker populations can also be considerable, particularly in Renwick and Seddon. These people are not included in the 'usual resident' data, but estimates of temporary visitors are included when projecting peak demand for future water services.

Economic — The Council uses a number of sources of information on economic activity and future projections. The economy has a very significant influence on migration, both within the region and nationwide. The Council has a proactive economic development strategy that helps to encourage development of new opportunities, and assists and coordinates the growth of established business sectors.

The Council subscribes to BERL's (Business and Economic Review Ltd) information for relevant economic indicators.

3.2.6 Marlborough Urban Growth Strategy

In 2009 the Council embarked on a major project to develop a comprehensive urban growth strategy for the Marlborough region. Population projections were based on the previous Census which estimated growth over the next 25 years of approximately 9,300 additional residents across the region. The opportunity for infill housing and urban densification within the existing settlements was taken into consideration. Household and section sizes were also analysed and trends were projected into the future.

The data was used to inform a major consultative process with the public, other expert stakeholders and Council staff. The quantity of land required was estimated and areas with potential to be developed into urban growth pockets identified. Wholly new settlement hubs were considered unlikely and future growth was assumed to occur on the periphery of existing settlement nodes. All areas of the region were considered for their growth potential and capacity to provide for future growth.

Earthquake risk — The final strategy was accepted by Council and published in March 2013[2]. The Canterbury earthquakes occurred during the development of the strategy and early drafts had to be revised after land around Blenheim, particularly to the east, was assessed as susceptible to liquefaction and lateral spread. The strategy forms a valuable platform for planning future capacity upgrades of all services.

Residential and employment land uses — In Blenheim, seven land parcels to the west and north of the town were identified as suitable for zoning for Urban-Residential development outlined in red in the following aerial photo (Figure 3-3). A total area of around 240 hectares of urban-residential and a further 53 hectares of employment land is earmarked for development. In addition, a private development north of the Omaka Airfield and south of New Renwick Road was approved by the Environment Court following an appeal. The area known as Omaka Landings has provided a further 21 hectares of land. Plans are being developed to install a new water supply pipeline from the Wither Road Pump Station, along Wither Rd (West) and under the Taylor River to provide additional supply to the airfield area.

Utility services —The provision of utility services was considered from the outset of the project. The supply of water was not a significant restriction for the Blenheim growth pockets. However pipeline upgrades will be required to deliver water to the new growth areas. Estimated costs of $2.53M have been included in future budgets for the upgrades. These costs will be recovered from development contributions.

[2] Growing Marlborough — A Strategy for the Future. District-wide Overview and Decision Summary (March 2013)

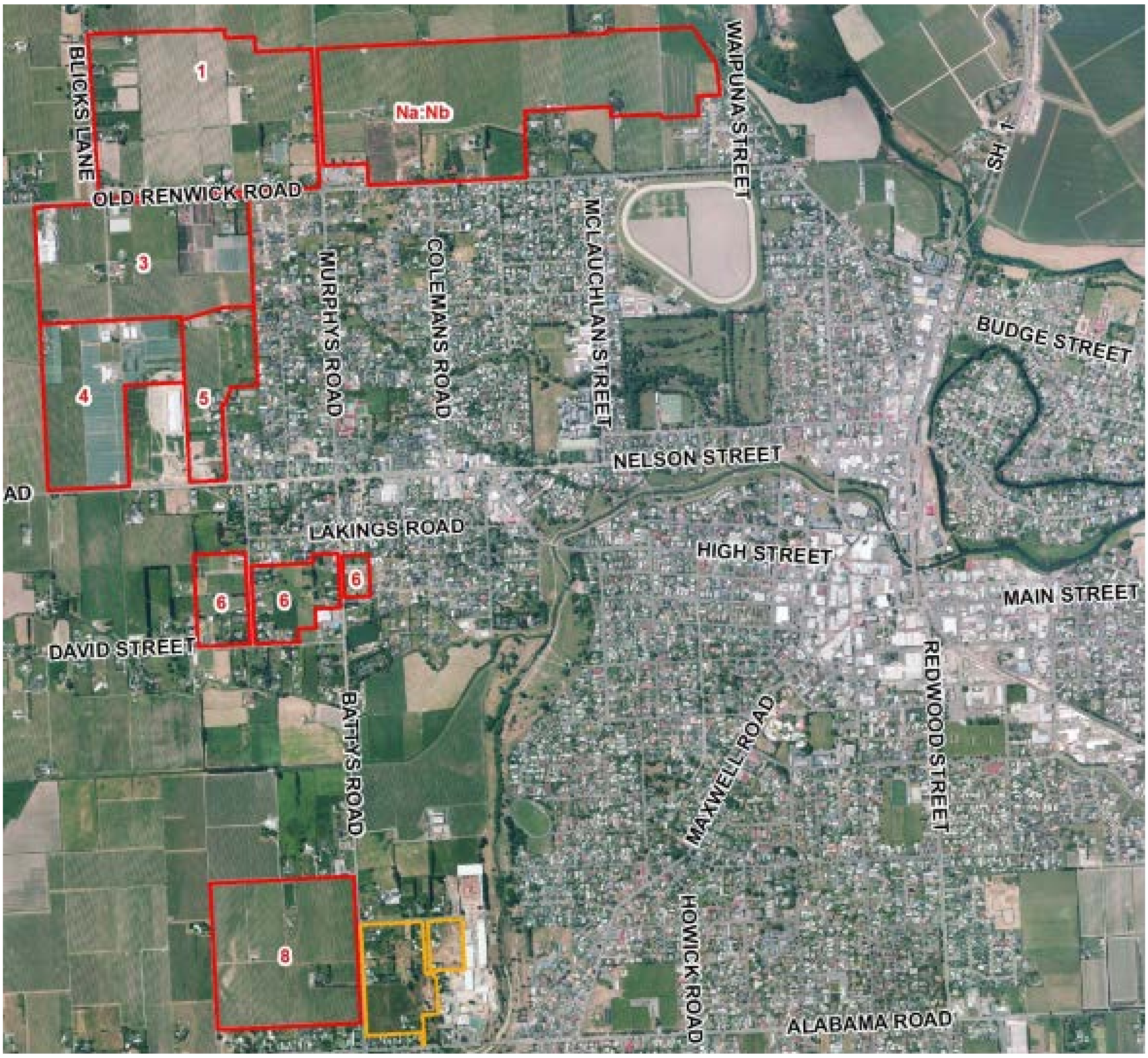


Figure 3-3 Urban growth pockets in Blenheim

Simultaneous development of all sites identified for development would result in a significant capital investment. The recent population projections cast some doubt as to when that investment would be recouped from development contributions and the increased rating base. The Council has not specified a preferred sequence for development, but the full costs of developing in a non-logical progression will be borne by the developer.

Renwick, Picton and Havelock — Providing a sufficient water supply for Renwick, Picton and Havelock may be more problematic. The water sources for these settlements are currently under stress during periods of peak demand. The most recent Census estimates suggest population growth in Havelock and Picton will level off. If the other factors affecting demand for water can be effectively managed, investment in accessing new water sources can be deferred or avoided.

3.2.7 Blenheim Demand

The Blenheim water supply is predominantly used for domestic purposes. The major industrial users are around the Riverlands industrial area, outside of the boundary of the Blenheim water supply area. Some larger consumers within the Blenheim area continue to use their own private bores. There is very little agricultural/horticultural usage from the reticulated supply.

Water consumption patterns in Blenheim are very heavily influenced by domestic usage. In the second half of the 20th century there was a significant increase in household water consumption through increased ownership of domestic appliances — laundry and dishwashers, as well as multiple bathrooms and toilets. However, in the early years of the 21st century per capita water usage has levelled off with little or no growth (see Figure 3-4).

The base level water consumption is around 500 l/person/day but with a very high seasonal variation

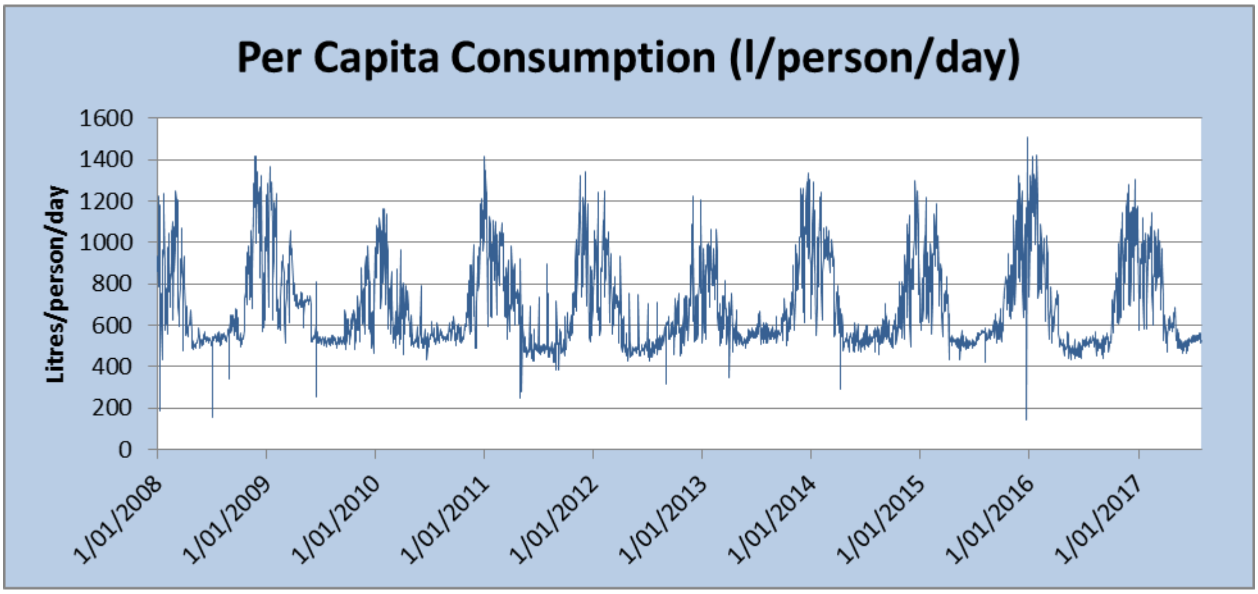


Figure 3-4 Per capita water consumption in Blenheim

Summer peaks — The peaks in demand for water occur during the summer months. Reference to Figure 3-5 shows the consumption of water in Blenheim is closely related to the evapotranspiration rates. The same pattern is repeated throughout the Marlborough region. The peaks of water consumption almost exactly match the days of high evapotranspiration when warm dry days cause a spike in watering the garden, and topping-up paddling pools and swimming pools.

The per capita figures are based on total water supplied into the system and therefore include the water used by visitors to the area and industry/commerce, as well as leakage and system losses. Most industrial/commercial properties are metered. The meter records show that around 9.5% of the total water supplied to Blenheim is used for business purposes.

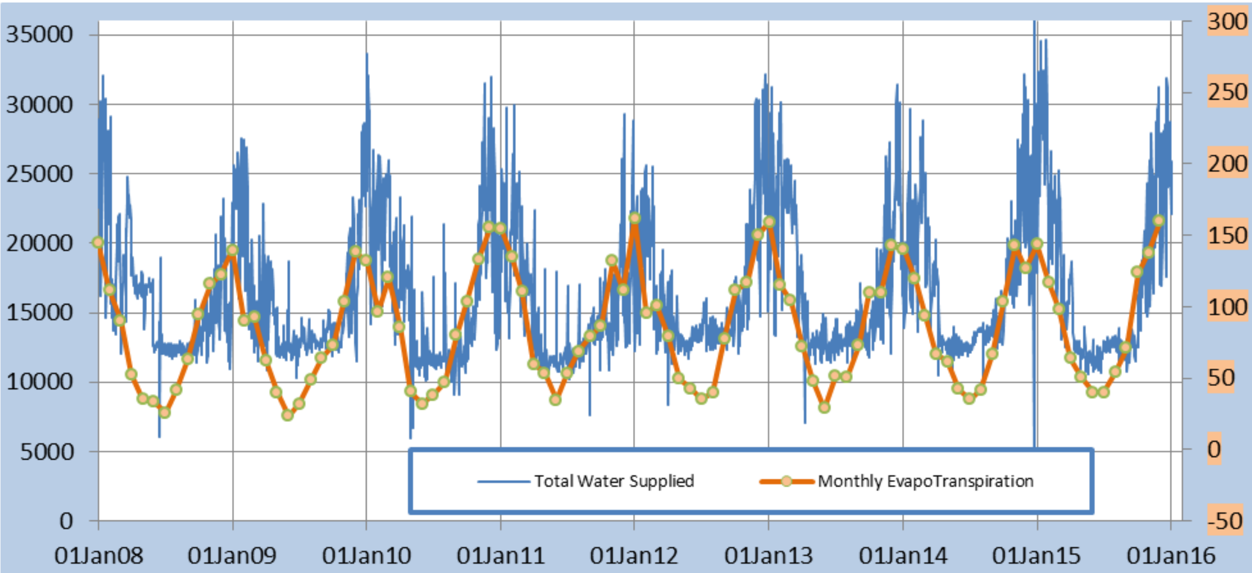


Figure 3-5 The relationship of water consumption and dry weather in Blenheim

The data in Figure 3-5 shows maximum daily demand peaks are approximately 1,300 litres/person/day, which is around one and half times the base usage. This has important consequences for the rate of abstraction and for meeting resource consent conditions. The service level targets must be met during the periods of peak demand, so infrastructure is designed and sized to meet this requirement. Flattening peak demand through demand management measures would have long term benefits for asset investment.

3.2.8 Picton Demand

The pattern of water consumption in Picton is similar to Blenheim. Population growth has levelled off in recent years and there is some evidence of a decline in overall consumption. This equates to a decline in per capita consumption (see Figure 3-7). The average of 800 litres/person/day is higher than Blenheim but may be partially explained by the difference in business usage as the gross figures include industrial and commercial water usage. Based on a sample of four years of meter records, business consumption in Picton is around 20% of the total supply.

Peak demand days are similar to Blenheim at around 1,400 litres/person/day. This estimate is based on usual resident population and does not account for the influx of summer visitors. It is likely the corrected figure would be below the Blenheim consumption rate.

Analysis of the data has revealed that peak demand days are relatively rare. Over the period between 1998–2011 there were 57 occurrences when consumption was greater than 70% of the average (and only 18 days between 2003–2011.) The same relationship between consumption and evapotranspiration exists in Picton as Blenheim, suggesting large volumes of water are used for garden irrigation.

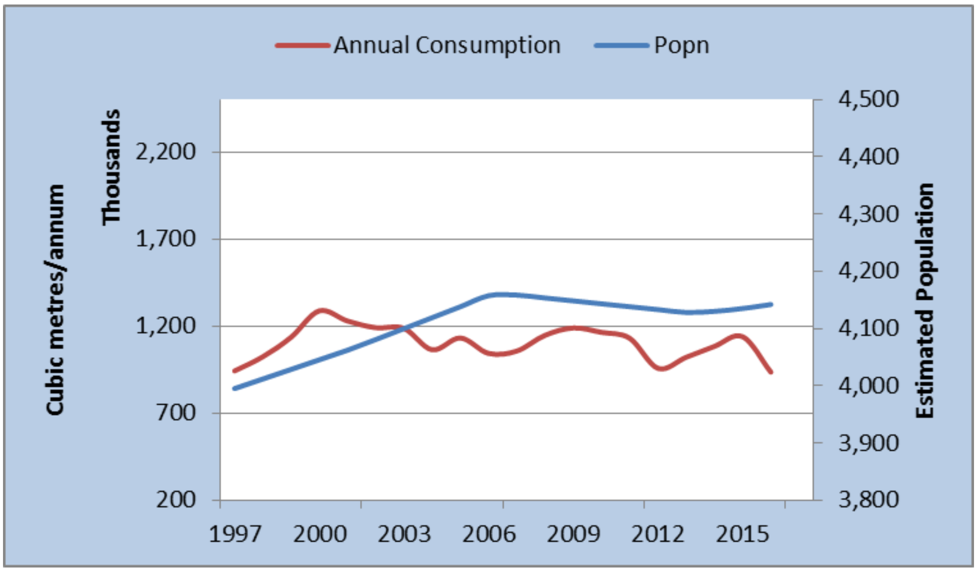


Figure 3-6 Water consumption in Picton

A detailed study of water consumption patterns and usage in Picton was undertaken in 2009[3]. The report estimated leakage at between 1,281 m^3/day and 1,400 m^3/day which is equivalent to around 40% of the total volume supplied. By most standards this is a high proportion of unaccounted for water. Leakage is likely to be a particular problem in Picton where water pressures are high. The report also considered seasonal usage, summer visitors, industrial/commercial consumption and irrigation of parks and reserves.

[3] Picton Water Supply Strategy: Background, CH2M Beca (2009)

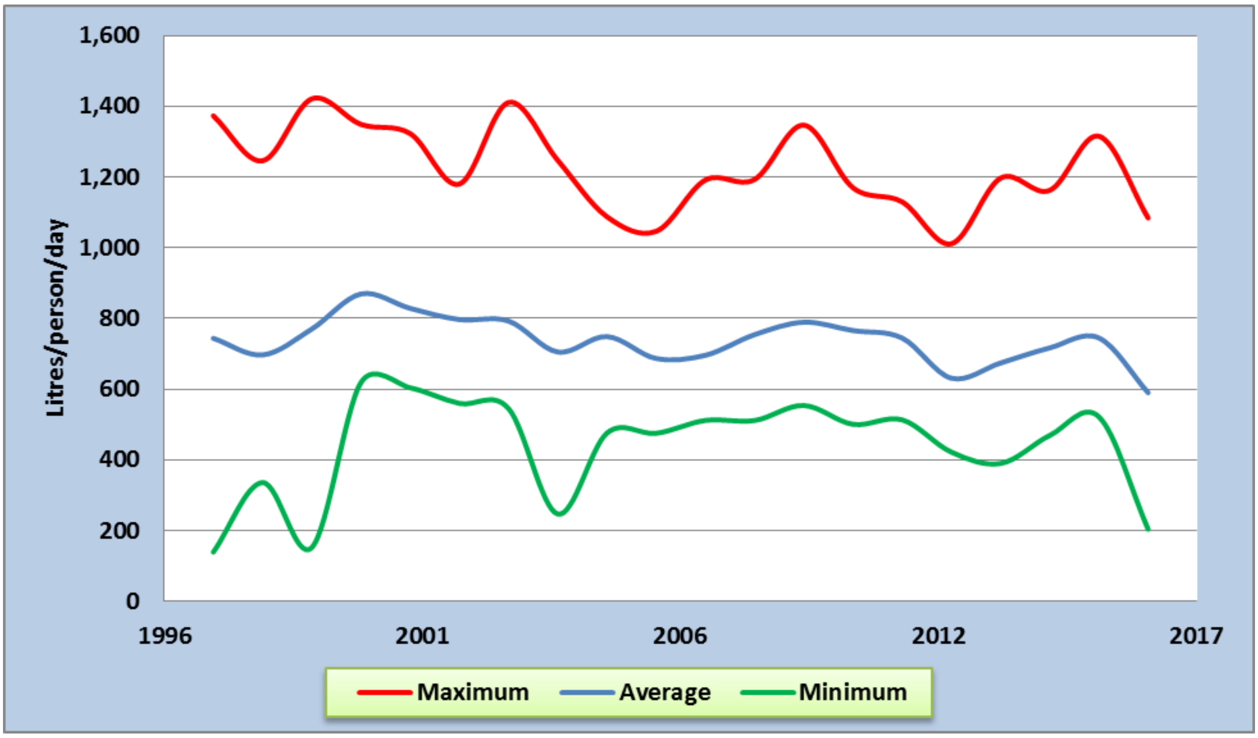


Figure 3-7 Water Consumption per capita/day in Picton

3.2.9 Havelock Demand

Future growth in Havelock is included in the Marlborough Urban Growth & Development Strategy — Picton, Havelock & Inner Sounds. The medium growth projection from Statistics New Zealand recognises positive but slow population growth over the next 30 years.

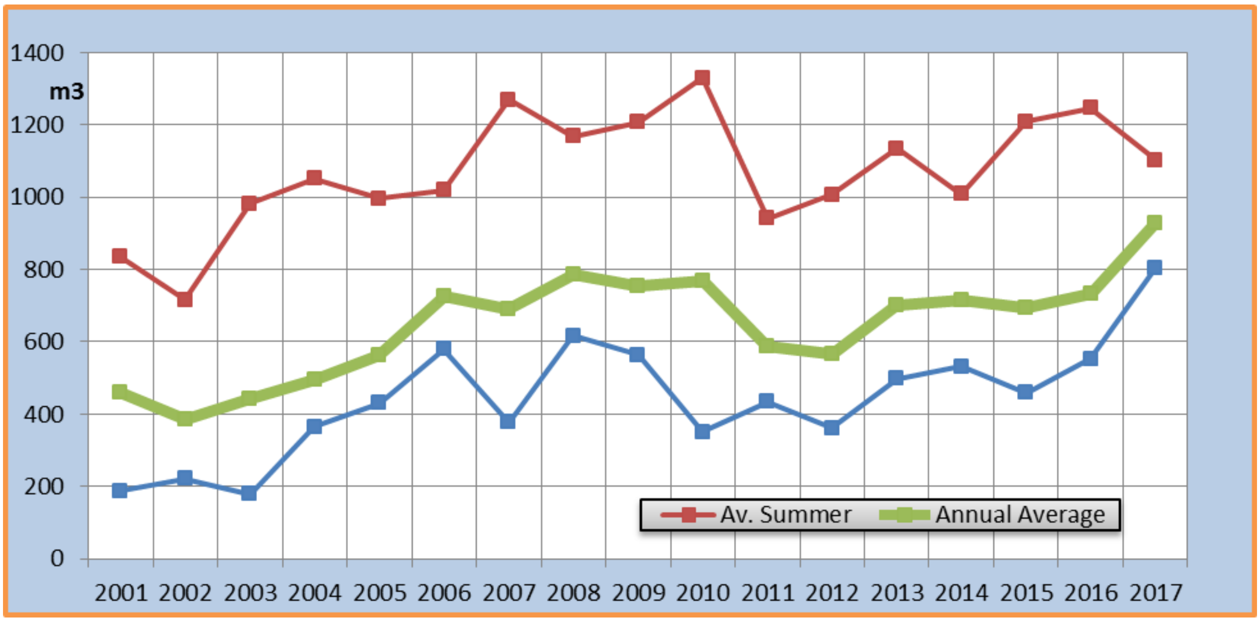


Figure 3-8 Water consumption patterns in Havelock

Havelock has many characteristics in common with Picton. Metered consumption by businesses is around 20% of total water delivery and is heavily influenced by the port activities. There was clear growth in demand up to 2010. Summer water restrictions and increased leakage control helped to suppress demand between 2010–2015 but there is evidence of increasing consumption since then.

Water leakage within the port area is a recurring problem. The Havelock port has an underground pipe reticulation beneath concrete or bitumen seal, making leaks difficult to detect and locate.

In the spring of 2017, 20 households in Havelock agreed to join a water metering trial. Advanced water meters fitted with radio transmitters were installed at the boundaries of the properties and will be read each week with ‘drive-by’ technology. The results of the trial will be invaluable in helping to target future water management efforts.

3.2.10 Renwick Demand

Demographic projections suggest that the expected slow-down in population growth will be most apparent in rural areas and settlements. Currently Renwick is resisting this trend. Renwick has experienced significant recent population growth as it would appear to benefit as a satellite settlement to Blenheim. Demand is largely for domestic usage and leakage is estimated to be very high.

Water restrictions occurred in Renwick in 2013, 2014 and 2015 and residents were asked to exercise voluntary restraint in 2016. Active leakage detection projects have also been deployed in the settlement over this time period. The impact of these measures can be seen in Figure 3-9 which also shows the relatively low usage during winter and a surge in demand during spring and summer.

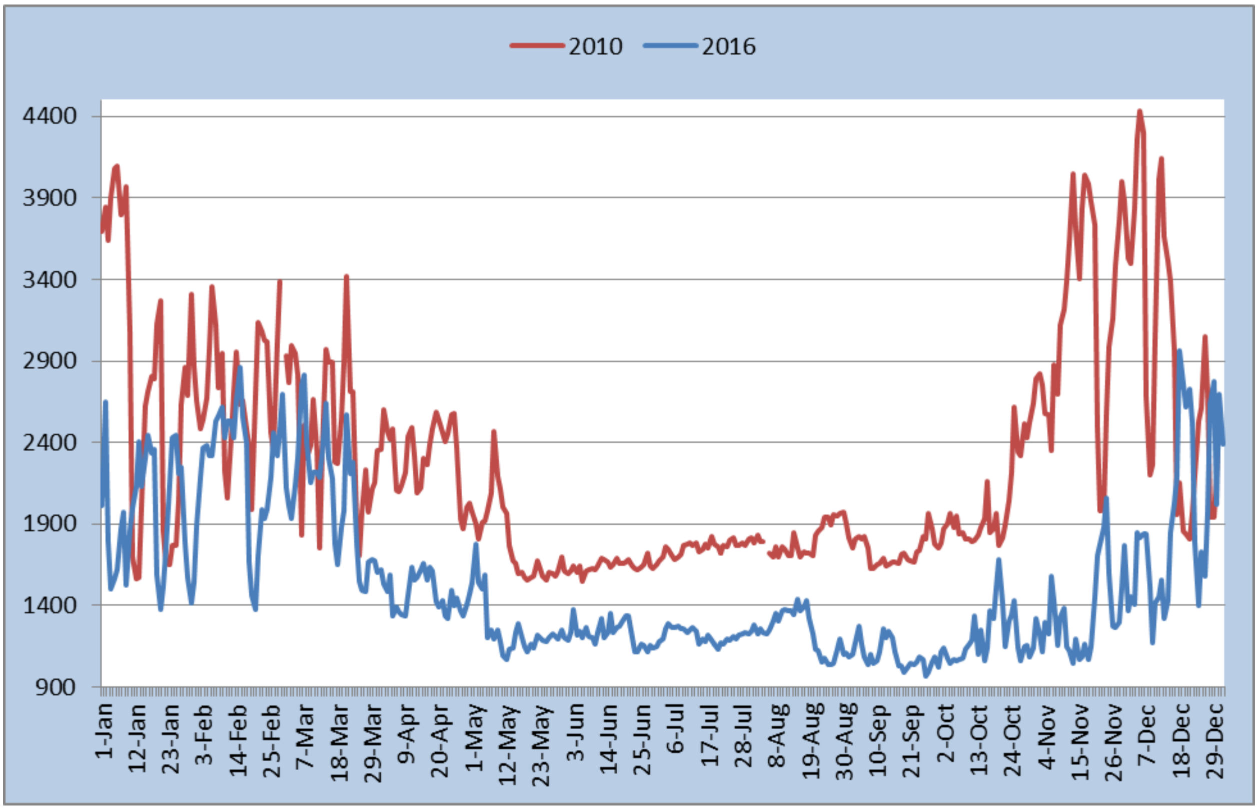


Figure 3-9 Comparison of water usage in Renwick in 2010 and 2016

Similar to Havelock, ‘drive-by’ water meters were fitted to the supply pipes of 44 households in Renwick who had agreed to join a metering trial in advance of universal water metering. The meters have been read weekly throughout the summer of 2017/18. The results of the trial will be used to inform future water management programmes.

3.2.11 Industrial Consumption in Marlborough

The world-wide success of Marlborough wine is creating demand of increased production. In 2016 the region produced 323,290 tonnes of grapes. The industry is predicting a 25% increase in production over the next 5 years. A large proportion of all winery capacity is based at the Riverlands Industrial Estate and Cloudy Bay Business Park.

A detailed study of industrial and commercial land use requirements was carried out during the development of the Urban Growth Strategy. The amount of land required, and the types of business that can be accommodated, are discussed in detail in the study alongside analysis of potential sites. The water demand of the businesses cannot be known. One of the recommended approaches in the Urban Growth Strategy is to:

"..cluster less visually attractive activities and activities with potential off-site impacts at large, well, buffered locations where they can be more visually and physically separated from existing and possible future sensitive uses."

The adoption of this principle is likely to result in new, high consumption industries gravitating to the existing sites in Riverlands, the port areas at Picton and Havelock or to out-of-town industrial parks.

Use of the resource consents process to manage demand — Increases in industrial and commercial water usage can also be managed through the resource consent process. Major changes to land use or site activity normally requires a resource consent. Applications are vetted by Asset & Services staff in terms of their water requirements and the capacity of the water supply source and network to provide the anticipated demand. It is likely that industries with significant water demand from the reticulation network could not be accommodated in Picton, Havelock or Renwick.

Many of the major 'wet' industries have developed their own private source of water using bores into the shallow aquifers, abstraction from surface water or on-site capture and storage. The allocation of resource consents for water abstraction is managed by the Council's Regulatory Department, and independent commissioners make decisions on the Council's own resource consent applications.

Review of the water allocation method — Permitted abstractions from the Wairau Aquifer have led to over-allocation of the resource when compared to the ability of the groundwater in the aquifer to recharge. However, recent improvements in the metering of water abstractions indicate that only a proportion of the permitted total allocation is used each year. A more effective method of allocating and controlling the resource is required. Consultation with stakeholders is underway as part of a formal review which is being led by the Council's Planning department for inclusion in the Marlborough Environment Plan.

Firefighting capacity — Modelling of the Blenheim reticulation has demonstrated that pipework to the industrial zone to the east of the CBD will need upgrading to meet firefighting demand. Mains upgrades costing around $3.8M have been identified and programmed over the next 10 years to resolve this issue. This information is considered when assessing resource consent applications for industrial development in the area.

Industrial water use —

The industrial zones at Cloudy Bay Business Park (CBBP) and Riverlands Industrial Estate (RIE) are fed from bores at Malthouse Lane (P28w/1678 — Resource Consent U090179) and Hardings Road (P28w/1147 & 1148 — Resource Consent U130670). In 2002 the Council purchased the Hardings Road bores and much of the infrastructure on the CBBP from the Primary Producers Cooperative Society (who had previously operated a large meat processing facility.)

The primary source of water for the business parks is the Malthouse Lane bore. This has a daily capacity limit of 3,900m^3 as a condition of the resource consent. During peak processing in March, April & May demand from the wineries exceeds the daily limit and the supply is augmented from the two Hardings Rd bores. Two reservoirs on the estates are able to balance the water demand from the estates.

The recent renewal of the resource consent for the Council water supply from the Hardings Road bores will help to secure the future supplies to the Riverlands Industrial Estate and the Cloudy Bay Business Park.

Industrial Demand in Picton and Havelock — A large volume of water is used in the ports and by related industries. Records show there are a small number of high use consumers in Havelock which account for between 10–20% of total usage. Consumers who have a significant amount of underground pipework are encouraged to undertake on-site water balance audits to check for leaks within their property. This is good practice for all metered supplies.

3.2.12 Community Demand

Around 17% of Marlborough's population is not supplied by a Council water supply. Their water comes from individual on-site wells, rainfall catchment or private community schemes. These schemes were assessed in the Water Sanitary Services Assessment (WASSA) 2005, which considered 22 small community schemes.

Section 69J of the Health Act requires the Director General of Health to maintain a register of drinking water suppliers and supplies. The register records the size of the supply — whether it is Neighbourhood (serving 25-100 people), Small (serving 101-500 people), Minor (serving 501-5,000 people), Medium (serving 5,001- 10,000 people) or a Large supply (serving >10,000 people). The small community supplies currently recognised by the Ministry of Health are shown in Table 3-1 Community schemes in Marlborough (*D = Draft Plan Submitted). It shows the community schemes and their compliance with the Drinking Water Standards as of mid- 2017.

*Table 3-1 Community schemes in Marlborough (*D = Draft Plan Submitted)*

Supply name	Popn Size	Seasonal popn	Capital Assistance?	Water Safety Plan ?	Protozoa Treatment?	Bacterial treatment?
Anakiwa Bay	60	350		D		Chlorine
Bellview Bay	35	102	Y	D		
Delta Lake	50					
Duncan Bay	30	228		Y		
Edgewater (Rarangi)	60					
Fairbourne Drive	50					
French Pass Camp	12	60				
Goldmine Point (Moetapu Bay)	9	66				
Haka Haka Bay	5	54		D		
Moenui Bay	56	159	Y	Y	UV	UV
Moetapu Bay	7	49				
Momorangi Bay	50	700			UV	UV + chlorine
Morven Lane	47					
Ngakuta Bay - Brough Place	14	36				
Ngakuta Bay - Manuka Drive	20	65				
Okiwa Park	86	180	Y	Y	UV	UV
Okiwa Park - Thompson	16					
Okiwi Bay	160	1800	Y	Y	UV	UV
Pelorus Bridge	30	150			UV (camp only)	UV
Penzance/Tuna Bay	25	200		D		
Rarangi	160	240		D	UV	UV
Terrace Water (Renwick)	20					
Tuamarina West	100					
Waihopai Terraces	53					
Ward	250					
Willow Bay	10	150	Y	D	UV	UV
Woodbourne RNZAF Base	1500			Y	UV	UV + chlorine
Worlds End (Tuna Bay)	4	50				
Wrekin, Fairhall	20					
Total population	**2939**	**4639**		**5 of 29 comply**	**8 of 29 comply**	**9 of 29 comply**
		(Peak Christmas)		**(2938 popn at risk)**	**(1926 popn at risk)**	**(1576 popn at risk)**

It is likely that the small community schemes will be under increasing scrutiny and pressure to comply with the Drinking Water Standards following the recommendations of the Havelock North Inquiry. The costs of compliance will be considerable for some schemes. The role of central and local government in assisting small communities has not been addressed, but this may change if there are continued non-compliance issues.

A number of residents on individual properties and in communities on the periphery of the current supply areas have either actively sought to connect to the reticulation or would benefit from doing so. The Council considers applications from small communities to develop a municipal supply on the basis of the needs of the community, the availability of a water source, the costs, and the willingness of the community to pay for the infrastructure. Applications for an 'out of district' connection from individual property owners are considered on their merits and may be granted depending on the available capacity of the system.

3.2.13 Leakage

All reticulation systems have some unaccounted for water, of which leakage is normally the largest component. In areas where all customers are metered it is possible to get an indication of pipeline losses by deducting the amount of water delivered from the volume leaving the treatment plants. In the absence of universal metering it is more common to estimate losses by analysing flows in the reticulation system during periods of minimum consumption. Midnight to 04.00 hours is a time of minimum domestic flows. Industrial/commercial usage can be measured or estimated during this time period. The Council has also used this minimum night flow technique to estimate water losses. These are reported annually as a non-financial performance measure.

Based on the International Leakage Index, four reticulation systems (Renwick, Blenheim, Picton and Dashwood) are classified as either 'very inefficient' or 'poor' in terms of leakage management. Two networks (Awatere and Wairau Valley) are classified as 'B' (further improvement.) Riverlands has been excluded from the calculations as the minimum night flow is difficult to estimate due to high industrial usage.

As noted in Chapter 2 of this plan, the marginal costs of supplying additional water in all areas is relatively low, whilst the costs of finding and fixing leaks is relatively high. In most cases active leak detection and prevention of losses only becomes efficient when it enables deferment of capital investment.

Active leak detection and repair projects have been undertaken annually in Havelock and Renwick since the spring of 2014. Figure 3-9 shows that these efforts have contributed to consumption management in Renwick. The effects are less obvious in Havelock.

Water metering — In 2017 the Renwick and Havelock communities agreed to universal metering of all water supplies, which will provide the Council with more reliable data on the difference between the volumes of water supplied and water actually used. This is an important step in identifying the source of water losses. Leak detection initiatives can be better targeted once this data is available.

Also in December 2017 a trial of 'drive-by' meters were fitted to a sample group of properties in Renwick and Havelock. The meters revealed a huge range of consumption across the properties. A data logging facility within the meters is able to record hourly usage patterns. This data will help Council to understand current usage to assist with future demand management strategies.

3.2.14 Climate Change

The Ministry for the Environment has published advice on their website (updated December 2017) on the likely impacts of climate change in Marlborough. The information is included in Appendix 3.

The demand for water throughout Marlborough is heavily influenced by the weather. The expectation that summer rainfall is likely to increase in Blenheim will help to suppress the demand for irrigation water. However, the effects may be countered by the increases in temperature and an increase in the frequency of extreme weather events that is also predicted.

The overall average annual rainfall is not expected to change, however there will be significant seasonal variation from the current pattern. A shift in the peak demand for water to the spring may eventuate as this season becomes drier and coincides with germination of many plants in the early growing season.

The rise in sea level may also have important implications for the bore sources at Havelock and Riverlands. There is some evidence of salt-water intrusion into the Havelock bores with raised chloride levels. The Hardings Road bores at Riverlands are being closely monitored. As sea-level is predicted to rise the pressure on the underlying aquifer is likely to increase. Outline plans are being prepared for alternative sources should this risk eventuate.

Climate change is change is a long term influence that has been incorporated into the planning and design of long-life infrastructure.

3.2.15 Water Abstraction Permitted by Resource Consent

The Resource Management Act seeks to protect natural freshwater environments through the control of abstraction from all water sources. The Proposed Marlborough Environment Plan implements the Resource Management Act in this region.

Public water supply utilities are 'permitted activities' under the rules of the plan, and the following consent conditions apply to the Council's abstractions for water supply purposes.

Table 3-2 Resource consent conditions for water abstractions

Area	Consent No	Site	Renewal Date	m^3/Day
Blenheim	U960523 2011-15	All Blenheim abstraction bores.	1/12/2030	38,300
	2016-20			40,200
	2021-25			42,000
	2026-30			43,500
Picton	U041741	Speeds Road	31/5/2020	5,000
	U071405	Essons Valley	30/09/2032	34 litres/sec
Havelock	U080226	Kaituna Well	01/07/2037	2,000
Renwick	U031385	Terrace Road Well	2/6/2024	5,000
Awatere	U940669	Black Birch	15/12/2029	8,000
Riverlands	U031249	Malthouse Road	01/09/2019	3,900
	U130670	Hardings Rod	01/01/2024	4,600 m^3 max. Strict conditions
Wairau Valley	U080117	Keith Coleman Lane	01/07/2018	480

In 2008 a request for a Certificate of Compliance was granted which enabled the Council to upgrade the bores supplying the Central Water Treatment Plant during the treatment plant upgrade.

In 2013 an application was made to renew the resource consent for the Hardings Road bores. The Independent Hearing Commissioner considering the application was initially reluctant to renew the consent and adjourned the hearing in order to receive further evidence. The bores are used to support the Malthouse Lane supply at times of peak demand and provide irrigation water to nearby vineyards. The bores are not heavily used currently, but are regarded as important for the future, as demand for industrial process water in the Riverlands Industrial Estate and the Cloudy Bay Business Park is anticipated to grow considerably.

The new consent was granted in 2014 but the maximum rate and volume of abstraction was restricted, and strict consent conditions were imposed to protect the aquifer from saltwater intrusion, to protect the rights of other users, and to ensure the sustainability of the natural environment as required by the Resource Management Act and the National Policy Statement for Freshwater Management.

3.3 Demand Impact on Assets

3.3.1 Blenheim – Sources and Treatment

The old Bomford Street Water Treatment Plant and the five bores associated with it had a consented capacity of 330 litres per second (l/sec) prior to the upgrade of the Blenheim water supply. The abstraction volume was increased to 530 l/sec by drilling three new bores and redeveloping one of the existing bores at Grove Road. One of the existing bores at Bomford Street and one at Auckland Street were abandoned.

The increased output from Bomford Street (renamed Central Water Treatment Plant) allowed the Andrew Street bore and treatment facility to be decommissioned. The site and building has been retained but all of the plant has been removed.

Table 3-3 Upgrades to the Blenheim water supply

	Pre-Upgrade			Post-Upgrade			
Plant	**Bores**	**Capacity**	**Treatment**	**Bores**	**Capacity**	**Treatment**	**Year**
Bomford Street/Central WTP	5	330 l/sec	Lime pH Correction	6	530 l/sec	Lime pH Correction UV Disinfection	2011
Middle Renwick Road	3	180 l/sec	Caustic Soda pH Correction	3	180 l/sec	Caustic soda pH Correction UV Disinfection	2009
Andrew Street	1	75 l/sec	Caustic Soda pH Correction	De-commissioned			2012

3.3.2 Blenheim Storage

The Blenheim upgrades also included an increase in water storage capacity. This gives the Council additional capability to balance peak demands and provide security of supply during a power failure affecting the distribution pumps. A total storage capacity greater than 20,000 m^3 equates to the average daily demand, and two thirds of demand on a peak demand day.

Table 3-4 Capacity of Blenheim reservoirs

Blenheim Reservoirs	Capacity (m^3)	Year Installed
Weld Street	5,700	1971
Redwood Street	90	1996
Forest Park	175	2005
Blenheim Low Level	10,000	2010
Middle Renwick Road WTP	950	2009
Central WTP	2,900	2011
Blenheim High Level	2,000	2016

3.3.3 Blenheim Reticulation

As outlined in section 3.2.6 of this plan, the Urban Growth Strategy has provided a coherent plan of growth pockets for the anticipated population growth to around 2030, and this strategy will be vital to the design of future upgrades to the reticulation network.

A new reinforcing main has been identified to link With Booster Station to the south-western growth pockets around Omaka Aerodrome.

The Blenheim reticulation upgrades required to meet the firefighting code of practice are partially driven by growth and partially to meet the flow & pressure level of service. The works will be undertaken over the course of the plan as resources become available

Table 3-5 Blenheim Demand Related Project

Area	Project	Budgeted Year	Budget Cost
Blenheim	Wither Booster/Aerodrome Main	2018-19	$283,000
Blenheim	Watermains Upgrades	2017-28	$3,546,000
Blenheim	Universal Metering	2029	$7,275,000

3.3.4 Picton Sources

Resource Consent 41741 permits the Council to abstract up to 5,000 cubic metres of water per day from the three bores at Speeds Road. In 2014 Bore 3 was replaced with a new 450mm diameter bore of approximately 11m deep.

The Essons Valley Resource Consent (No. 071405) permits a maximum water take of 34 l/sec. In theory this would offer a maximum supply volume of 7937 m^3 per day. However, in drought years there is less available water than this in the Barnes Dam and in the aquifer below Speeds Road, restricting the total deliverable volumes.

The two watermains leading from Barnes Dam to the Essons Valley WTP were installed when the dam was built in 1958. Both pipes are exposed in places and access for maintenance is very difficult. The 225mm cast iron main is showing signs of deterioration and modelling has been conducted to assess if the treatment plant can function to capacity from one main only.

Both desktop studies and site investigations have been undertaken to find a further reliable, high quality water source to meet Picton's needs during droughts and increased demand as a result of future growth. Exploratory bores have been drilled at Grahams Valley, Speeds Road and Linkwater but the yields are unsatisfactory. The nearest reliable source is the Wairau Aquifer between Spring Creek and Tuamarina. To connect this potential source to the main Elevation Reservoir would require a trunk main of around 19 km in length, at a cost of $13M. There are no plans to use this source at this time. Recent population projections and demand management techniques will be used to delay the need for additional source development.

3.3.5 Picton Treatment

The Speeds Road Water Treatment Plant was upgraded and commissioned in March 2017. The plant is designed to produce a peak flow of 58 l/sec and an average flow of 25.5 l/sec of water. This is supported by water supplied from the Essons Valley WTP.

3.3.6 Picton Reticulation

A dynamic mathematical model has been created for the Picton water supply system. Future growth has been simulated within the model and a number of upgrades have been identified[4] to increase supply to low pressure areas.

The model has been used to identify areas where pressure reduction can be implemented to help reduce leakage and therefore help to manage demand. The first pressure management zone (PMZ) in central Picton was established in 2013/14. Further PMZs have been identified at Waikawa and Beach Road.

Table 3-6 Picton Demand Related Projects

Area	Project	Budgeted Year	Budget Cost
Picton	Universal metering	2021-22	$2,200,000
Picton	Pressure Management	2020-21	$260,00
Picton	Waikawa Pressure Management	21024-25	$503,000

3.3.7 Havelock Sources

Historically the water supply for Havelock was drawn from bores close to the shore of the current port area. These were abandoned due to increasing salinity and the current town supply is accessed via a bore further south in the Kaituna Valley, which was commissioned in 1992. Exploration of a deeper aquifer in 2006 proved to be low yielding and a second bore was drilled close to the existing supply in 2007.

Winter demand of around 600 m^3/day increases to 1,000 m^3/day during the summer. Current abstraction rates of 14 l/sec are expected to rise to a combined 25 l/sec, and the combined water allocation limit is 2,000 m^3/day. However in periods of low rainfall and high abstraction there is evidence of increased conductivity in the source water, indicating saline intrusion of the aquifer. A condition of the resource consent restricts abstraction rates as conductivity rises. Following extensive public consultation, universal metering has been adopted for Havelock and meters will be installed by 2019 to help manage demand.

Significant investigation has been conducted to search for an additional source of water for Havelock. Desk-top search and test drillings failed to find a reliable to the south along the Kaituna Valley. The nearest reliable source appears to be in Te Hoiere/Pelorus Valley. An outline budget of over $3M has been estimated for the new pipeline but this would appear to be conservative estimate

[4] O:\Corporatereference\WaterReticulation\Picton\Modelling\07pw

3.3.8 Havelock Treatment and Reticulation

The bores supplying Havelock access an unconfined aquifer that does not meet the DWSNZ criteria for 'secure bore' status. Chlorine disinfection is sufficient for treating bacteria but additional treatment is required to remove protozoa. A treatment plant to meet the standards is planned for 2019-21 subject to public consultation and approval

The old concrete reservoirs were replaced in 2011 with a single 360 m^3 steel tank which provides storage equivalent to approximately 50% of daily demand. A second steel tank is planned for 2019/20. The old 5 inch cast iron main in Lawrence Street was upgraded to 150 mm PVC in 2009.

Havelock Reticulation

There is an active leakage detection programme to help reduce the level of unaccounted water. Universal metering has been agreed with the community to defer the requirement to develop the new source. Trials have been conducted with new 'drive-by' meters that can be read without the costs of manual reading. Around 350 new meters are planned to be installed in 2018-19.

Table 3-7 Havelock Demand Related Projects

Area	Project	Budgeted Year	Budget Cost
Havelock	Universal metering	2018-19	$236,500
Havelock	Pipelines	2020-21,2024-25	$763,494
Havelock	Second Reservoir	2019/20	$580,000
Havelock	Old Coach Road PMZ	2020/21	325,000
Havelock	Pipeline – New source	2028/29 Provisional date depending on demand management and further salt intrusion to aquifer	$3,105,00

3.3.9 Renwick Sources

The existing three bores supplying Renwick are located along a north-south alignment to the northwest of Renwick. The bores are drilled into a shallow unconfined aquifer that is recharged by infiltrating rainfall, surface and sub-surface seepage from the Renwick Terrace to the south and seepage from the Wairau River to the north. The Wairau aquifer influences the northern bore more than the southern bore.

The existing three bores at Terrace Road have three major problems:

- the unacceptable turbidity in the source wells when Ruakanakana Creek (Gibsons Creek) has very high turbidity
- the elevated concentration of nitrate and other contaminants that occur seasonally
- the inability of the supply to meet predicted summer demand in future. In the summer of 2014 water restrictions were imposed from 20 February to 2 April due to low levels of water in the abstraction bores.

New bores were drilled at Conders Bend Road in 2008. The results of an initial evaluation suggest the quality and the yield from these bores is satisfactory. A pipeline to connect the bores to the Renwick treatment plant will cost an estimated $1.6M. Test pumping of the bores was undertaken in the winter of 2017. The results were positive and future use of these bores as part of the water supply is being evaluated in detail in preparation for making a resource consent application to abstract water from these bores.

3.3.10 Renwick Treatment and Reticulation

The Renwick source waters have been analysed to determine the number of log-credits required by the treatment process to comply with the DWSNZ. Detailed design of the plant will be completed in 2018/19, with construction scheduled for 2019/20.

A 2014 report on treatment costs considered two options. One option was based on the treatment of 2,000 m^3/day (with a peak of 4,200 m^3/day) assuming a 25% reduction in water losses and 35% population growth. The second option considered the scenario of 35% growth but no reduction in losses. Considerable capital and operational cost savings were predicted by reduction in water losses.

The Urban Growth Strategy considered the western edge of Renwick to be most suited to future development. This is in reasonable proximity to the treatment plant at Boyce Street and could be readily supplied from an extension to the reticulation. However, no plans have yet been received for this development.

Table 3-8 Renwick Demand Related Projects

Area	Project	Budgeted Year	Budget Cost
Renwick	Universal metering	2018-19	$510,000
Renwick	Conders Bend Pipeline	2018-19	$1,615,000

3.3.11 Riverlands Sources and Treatment

The bore at Malthouse Lane and the two supplementary bores at Hardings Road draw from a confined aquifer which meets the Drinking Water Standards criteria for a ‘secure’ source. The water quality is generally good although the iron and manganese levels exceed the aesthetic quality limits. However, the status of ‘secure’ will be abolished following the outcome of the Havelock North Drinking Water Inquiry, based on the Stage 2 report recommendations published in December 2017. The Council will consider treatment options in 2018.

The primary supply is the Malthouse Lane bore with a Resource Consent limit of 3,900m^3 per day. During the peak processing season in April/May the demand exceeds this limit and the Malthouse bore is supplemented by the Hardings Road bores. The consent for the Hardings Road bores permits the extraction of up to 4,600m^3 per day during the peak processing period but is dependent upon the water level in the aquifer and electrical conductivity.

The resource consent for Hardings Road recognises the rights of existing water users and the risk of salt-water intrusion if the aquifer is over-taxed. The industry is forecasting a 25% increase in wine production over the next five years. The bores are closely monitored to ensure the increased demand for process water can be accommodated from the existing sources. Signs of deterioration in the water quality such as increased electrical conductivity or elevated levels of chloride may indicate the aquifer is over-taxed and alternative sources may be required.

3.3.12 Riverlands Reticulation

The reticulation was upgraded in 2003 when the Cloudy Bay reservoir was linked to the Riverlands reservoir through a 375 mm PVC. A detailed dynamic model of the reticulation is not currently available but a simplified model and on-site flow and pressure tests indicate the pipework is sufficient for the anticipated demand.

Riverlands Demand Related Projects

There are no projects driven by demand in Riverlands but growth in wine industry and evidence of salt-water intrusion into the aquifer are regularly reviewed.

3.3.13 Wairau Valley Sources

The well has a design capacity of 19.7 l/sec although the Council's current resource consent limits the water take to 5.6 l/sec. The surface pumps each have the capacity to deliver duty 3 l/sec at 700 kPa pressure and a maximum capacity of 6 l/s at reduced pressure. The pumps are used to lift the water 10 m to the township and deliver water at a pressure of 300 kPa at the property connection to meet the levels of service standards. The system capacity is limited to the pump capacity. Peak flows from the pumps reach 5.7 l/sec at 400 kPa of pressure.

3.3.14 Wairau Valley Treatment and Reticulation

The scheme has been designed to service a total of 55 properties. At present there are 51 properties connected to the supply but within the supply area there are undeveloped properties with potential to be subdivided.

Universal metering was introduced to Wairau Valley in 2007 and successfully reduced demand by around 40%.

To extend the supply area would require a new consent, larger pump and an upgrading of the current 100 mm diameter reticulation pipes. The treatment system is due to be upgraded to meet the DWSNZ in 2019/20.

Table 3-9 Wairau Valley Demand Projects

Area	Project	Budgeted Year	Budget Cost
Wairau V	Extension of Existing Supply Area	2020-21	$385,000

3.4 Demand Management Plan

Many countries have found it necessary to investigate and implement non-asset solutions to meet future demands for water. Population growth, climate change, pollution of water sources and infrastructure costs have contributed to the urgency to develop demand management strategies. New Zealand is in the fortunate position to be rich in freshwater resources, but even so, some councils are looking to manage demand. Tauranga City Council and Kāpiti Coast District Council have developed water management strategies in order to delay costly capital projects to access additional sources of water.

Some of the components of a comprehensive water management strategy are outlined below.

Universal metering — Metering of all customers is a proven, effective water management technique. Although the exact numbers can vary, universal metering can reduce the demand for water by 18%–35%. Metering also has the merit of being a 'user pays' approach and a more equitable method of charging for water services. However, there are significant costs to fitting meters to every connection and there can be considerable practical difficulties on shared service pipes. There are also ongoing costs for maintenance, reading and billing, as well as issues around establishing a tariff structure to encourage water conservation without threatening public health.

Smart Metering – In 2017a trial of new 'smart' meters was commenced on 47 properties in Renwick and 17 in Havelock. The meters are equipped with a radio transmitter which can send the meter readings to a receiver in a passing vehicle. 'Drive-by' readings are quick and accurate and facilitate more regular reading cycles. The meters also contain a logger than records the meter reading at hourly intervals. This data can be retrieved through the radio transmitter in around 15 minutes.

It is likely that in the near future water consumers will have a visual display in their homes or on their mobile phoned and be able to monitor their water consumption in 'real' time. With this facility the supplier would be able to introduce variable tariffs that encourage businesses and household to use water during low demand periods and thus smooth out the peaks and troughs of daily and seasonal demand.

Leakage on private pipes will be easily detected and customers advised accordingly.

Pressure management — Reducing water pressure can reduce failures on pipes and fittings, resulting in fewer leaks. Reducing the pressure also reduces the volume of water that escapes from faulty pipes. Pressure reduction is particularly relevant in steep areas where system pressures need to be high to deliver water to the properties in elevated locations.

Water models have been used to identify pressure management zones in Picton and Havelock. Plans are in place to modify the reticulation and fit pressure-reducing valves in low lying zones of Picton. Pipework configuration and the need for firefighting water can restrict the number of suitable areas.

Small scale pressure management of rider mains and individual services may also be considered as a viable option.

Active leakage detection — Evidence suggests leakage may be as high as 58% in Renwick.

Night line monitoring, leak-noise correlation, valve sounding, step testing, and find and fix contracts are all techniques that can be employed to assist in leak reduction.

There are significant costs in identifying and fixing leaks. This leads to the concept of an 'Economic Level of Leakage' which identifies the point at which the costs of finding the leaks is more expensive than the cost of the water wasted. In areas where the source water is scarce the cost savings of deferring capital works needs to be factored in to this equation. Generally, trying to reduce leakage below 20% is less economically viable in temperate climates.

However, leak detection technology is rapidly improving and costs reducing. It is likely that in the next ten years the economic level of leakage will be significantly reduced, water reticulation systems will be constantly monitored and leaks rapidly detected, accurately pin-pointed and fixed. The reduction in leakage will prolong existing water sources and reduce operational costs.

Asset performance monitoring — The establishment of District Metered Areas can be used to monitor the network performance and assist with leak detection. Water supplied to discrete areas can be measured and the data returned live through the telemetry system or recorded by data loggers. Absolute and relative data can provide valuable information on system performance and assist with targeting leakage detection, renewals programmes and other works.

Public education and voluntary restraint — Informing the public on water usage and conservation issues can be achieved by raising awareness of consumption through the media, libraries, billboards, dashboard indicators, leafleting and through the Council's website and social media. Setting consumption targets for communities can contribute to an overall strategy. Additionally the community can be consulted on their willingness to accept imposed restrictions such as hose-pipe bans in periods of drought and high demand.

'Green Plumber/Gardener' service — Councils can assist consumers by providing a professional advice or subsidised plumbing service to repair leaks on private property, help identify and fix underground leakage, and implement water saving techniques. Equally consumers can be advised on planting drought tolerant species, efficient irrigation, mulching and water conservation techniques in the garden.

Water saving incentivisation — A water management strategy may include encouraging consumers to reduce, reuse and recycle water. Some councils have partnered with private businesses to promote low water-use plumbing fittings, showers, WC cisterns, and whiteware. Similar incentives can be employed to promote the use of rain water butts, grey water recycling and drip irrigation.

Planning and Legislation — Rules can be introduced into local resource management plans to require rainwater storage and reuse in new houses. Water bylaws can provide additional powers to address issues of leakage, misuse and undue consumption on private property.

Levels of Service — Consideration can be given to revising the existing levels of service. Currently adequate pressure is defined as 300 kPa at the property boundary. In future, with the consent of the community and the adoption of new firefighting practices, it may be possible to revise the standard downwards and reduce system pressures. Likewise, the system is designed to meet unrestricted use on peak demand days. With consultation and general agreement, customer expectations could be managed to accept a lesser service standard and more frequent restrictions, reducing the need for new capital expenditure in water supply infrastructure.

Chapter 4: Life Cycle Management Plan

Components of the Life Cycle Management Plan

4.1 Background Data – physical parameters, asset capacity/performance, asset condition, asset valuation, and historical data.

4.2 Risk Management — identification, assessment and management of risks.

4.3 Routine Operations & Maintenance Plan — maintenance decision making and costs.

4.4 Renewal/Replacement Plan — maintenance of the overall condition and performance of the infrastructure assets.

4.5 Creation/Acquisition/Augmentation Plan — process and costs for capital investments.

4.6 Disposal Plan — decommissioning and disposing of redundant assets.

The life cycle management plan aims to deliver the best value for money for the assets' owners whilst providing an acceptable service to the customers. This involves anticipating and managing risks and optimising decision making throughout the life of the assets. The lifecycle of an asset follows the progression shown below.

Table 4-1 Typical Life-cycle of Assets

Planning	The process of anticipating a need for new asset driven by growth, a need to meet a higher standard of service, or to replace an existing failing asset. The planning process involves engineering evaluation and community engagement to size, locate, programme and consider the design options, whole of life costs, non-asset alternatives and risks.
Creation	The purchase, construction or vesting of an asset to the Council. The management of the design and construction to ensure the required quality is delivered on time and at the agreed cost.
Operation & Maintenance	The day to day running of the infrastructure to ensure continual and cost effective service. The process involves proactive and reactive repair and servicing of the assets, taking into account the 'criticality' of the assets to the overall service.
Condition & Performance Monitoring	Regular, ad hoc and opportunistic assessment of the condition and performance of assets in relation to manufacturers' specifications. Projection of assessments using local and national experience to estimate life expectancy of assets.
Rehabilitation	Proactive restoration of existing assets to extend the serviceability and life expectancy in a cost effective manner.
Renewal	The replacement of assets that have reached the end of their useful lives.
Disposal	The removal of redundant assets by decommissioning, physical removal, sale or re-utilisation for different purpose/activity

4.1 Background Data

Marlborough District Council owns and operates seven water supply schemes — Blenheim, Picton, Havelock, Renwick, Riverlands, Awatere and Wairau Valley. The Council has resource consents to abstract a total of 69,212 m^3 of water. Around 82% of the population of Marlborough are supplied by the Council's reticulated water network (see Table 3-2 Resource consent conditions for water abstractions in Chapter 3). The majority of water is abstracted from shallow aquifers below the main river valleys of the region. The exceptions are:

- the Awatere system that abstracts water through infiltration galleries under the bed of Black Birch Creek

- the Essons Valley impounding dam that supports the Speeds Road bore supply to Picton.

Since the enactment of the Health (Amendment) Act 2007 major upgrades have been undertaken to two treatment plants in Blenheim and two plants in Picton to meet the New Zealand Drinking Water Standards (DWSNZ).

Ongoing capital upgrade planning to bring the other systems up to standard continues but affordability for the smaller communities is an issue. For a summary of the water supply infrastructure refer to Appendix 1 — Water Assets - Background Information.

4.1.1 Treatment

Water treatment in Marlborough has evolved to address local chemical and micro-biological risks. Chlorine disinfection was introduced at a number of sites from the mid -1970s onwards. In other areas dissolved carbon dioxide and low alkalinity combines to create water that is very corrosive to metal pipes and plumbing. Treatment through pH adjustment has been introduced to help resolve this problem.

Prior to 2009 there was no disinfection of the Blenheim water supply and the microbiological quality of the water relied upon a contaminant-free aquifer. Following the enactment of the Health (Amendment) Act in October 2007 two of the existing Blenheim treatment plants were upgraded with the installation of ultra-violet disinfection to meet the requirements of the DWSNZ. The third plant at Andrew Street was decommissioned.

Further plants and upgrades are planned for the other supply areas but the costs are very high for smaller communities. The time frame for compliance stipulated in the Act will not be met.

In 2014 the Council sought, and gained, community approval to share the costs of water treatment across all water users. The decision, along with a Ministry of Health subsidy, helped to resolve the affordability issue at Seddon and stimulate renewed consultation with the communities at Renwick and Havelock.

Table 4-2 Current Water Treatment Plant Summary

Water Treatment Plant	pH Correction		Filtration	Disinfection	
	Caustic Soda	Lime		Chlorine	Ultra-violet
Blenheim Central		2000			2011
Blenheim Middle Renwick Rd	2000				2009
Blenheim Andrew St	2003	2012 De-commissioned			
Picton Speeds Rd		1977		1975	2017
Picton Essons Valley		1995	1995	1975	2012
Renwick Boyce St.				1975	
Havelock Kaituna				1993	
Awatere (incl Seddon) MIOX Blarich				MIOX 2012	
Riverlands. Hardings Rd					
Riverlands. Malthouse Ln.					
Wairau Valley. Morse St.				1991	

Table 4-3 Planned Water Treatment Plant Upgrades

Renwick	*Filtration, disinfection and pH correction*	*2020*
Havelock		*2021*
Awatere	*Point of Entry Disinfection for each household if approval for units can be achieved*	*2021*
Seddon	*Membrane filtration, disinfection*	*2018*
Riverlands	*Disinfection iron & manganese removal*	*2021*
Wairau Valley	*Disinfection and pH correction*	*2020*

4.1.2 Reticulation

Analysis of the reticulation network shows some of the broad attributes of the pipelines.

Materials — The material type of the water network tends to reflect the era in which the pipes were laid. The common materials available for water pipes during the early years of urban development in Marlborough were steel and cast iron. The pipes were often protected from corrosion with zinc galvanisation or bitumen coating. The 1950s to early 1970s saw the ascendency of asbestos cement (AC) as the preferred material. During the late 1960s AC began to be replaced by plastic materials, first with PVC and later the polyethylenes. Steel remained a competitive material for larger diameter mains. Copper was used for small diameter mains and service connections but has been vulnerable to the naturally aggressive water and these copper pipes have largely been replaced (see Figure 4-1 Water Pipe Materials Summary – Mains & Service Pipes).

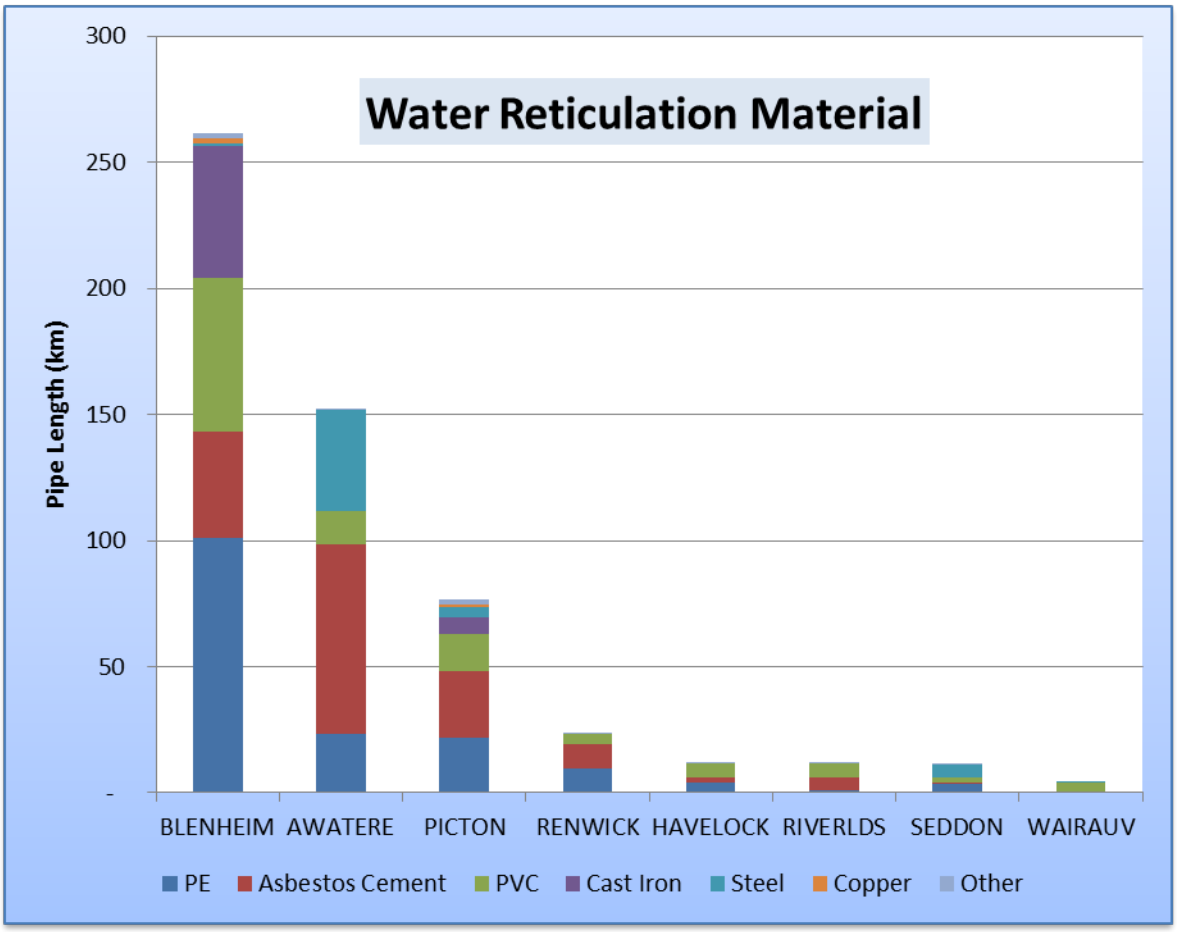


Figure 4-1 Water Pipe Materials Summary – Mains & Service Pipes

Age — The reticulation systems in Blenheim and Picton have evolved with the growth of the settlements they serve. The Awatere water supply project was instigated in 1942 as a rural supply for the largely pastoral community. Major extensions occurred in 1958 and 1967. The age profile of the watermains throughout the Marlborough supply areas is shown in ***Error! Reference source not found.*** and reflects the major periods of growth and the preferred material in use at the time.

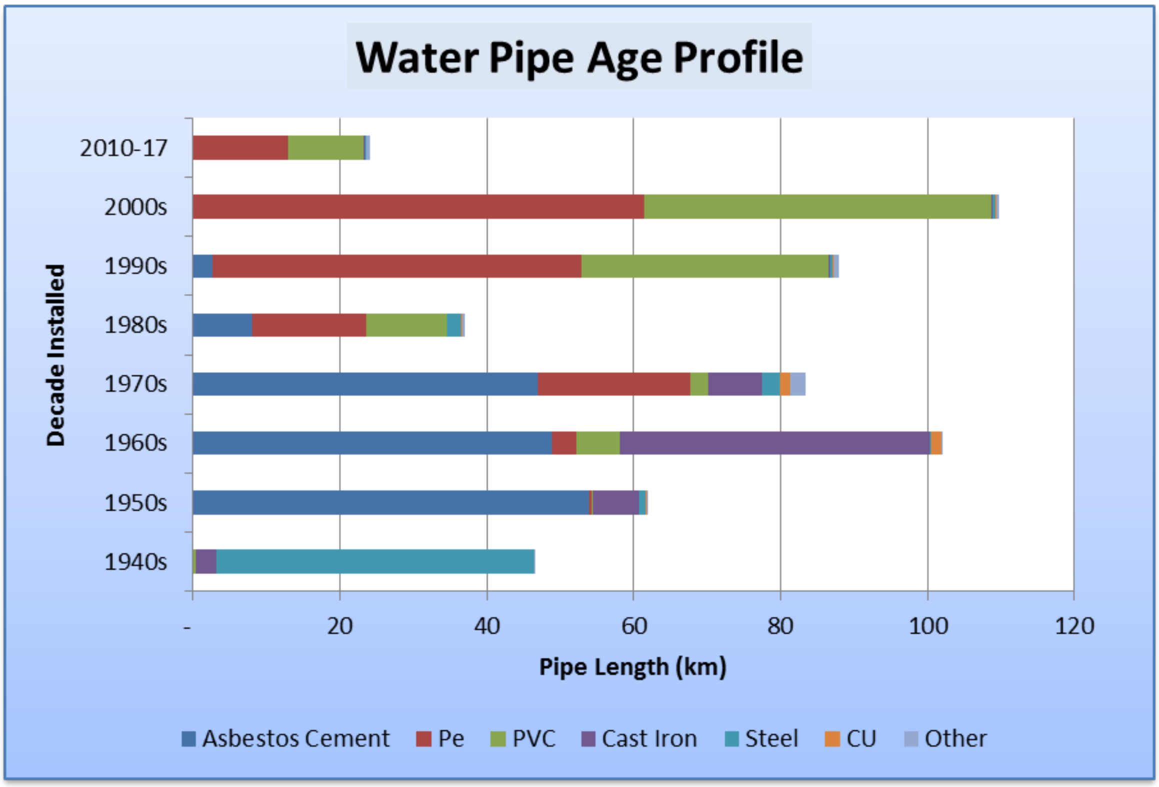


Figure 4-2 Age profile of watermains& services

4.1.3 Asset Capacity and Performance

The capacity of both the treatment plants and reticulation is discussed in detail in Chapter 3 — Future Demand.

4.1.4 Asset Condition

Treatment — The condition of the treatment plants is considered to be very good. During the upgrade of the Middle Renwick Road, Central and Essons Valley treatment plants the opportunity was taken to comprehensively appraise the serviceability of the existing components. The remaining treatment plants at Havelock, Renwick and Wairau Valley are older but are regularly inspected and maintained to a high standard. Progressive upgrades have been undertaken as necessary throughout their life.

Distribution and Booster Pumps — The majority of pumps are monitored through the Supervisory Control an d Data Acquisition (SCADA) telemetry system and critical parameters relayed to operational engineers. Routine maintenance inspections and servicing is undertaken and the pumps are maintained to a high standard. The Wither Road Booster Pump Station is scheduled for a major overhaul in 2027/28.

Storage — Asset Condition — The storage reservoirs display a range of storage of material, size, age and condition.

Modern concrete reservoirs have recently been constructed at the Middle Renwick Road and Central water treatment plants, as well as at the Blenheim High & Low Level reservoirs and the Elevation reservoir in Picton. Polyethylene tanks have also been utilised at sites such as Forest Park, Blenheim, Boons Valley Picton, Marlborough Ridge and various smaller sites. All are in excellent to good condition.

Figure 4-3 Pre-cast concrete slab and ferro-cement reservoirs at Weld Street Blenheim, The Elevation in Picton and at Renwick.

There are a number of older concrete slab and ferro-cement reservoirs at Weld Street Blenheim, the Elevation, Waikawa, Te Koko-o-Kupe/Cloudy Bay Business Park, and at the Renwick WTP. Inspection and structural assessment of the reservoirs at Weld Street and Te Koko-o-Kupe/Cloudy Bay was undertaken in 2008. Additional seismic strengthening and upgrade works have been identified. Work on the Te Koko-o-Kupe/Cloudy Bay Business Park Reservoir was completed in 2014. Strengthening of the Weld Street Reservoir will be undertaken following the construction of the Taylor High Level Reservoir. Work was programmed to take place during a low water demand period in the winter of 2019 but has been brought forward to winter 2018. A series of bacteriological sample failures from near-by sample points in late 2017 suggested that the stored water was becoming contaminated from the ingress of rainwater through the roof of the reservoir.

Older type ferro-cement reservoirs at Wheelers Hill, Flaxbourne and Blind River Loop were damaged beyond repair by the Seddon Earthquake in August 2013. These have since been replaced by modern pre-cast concrete tanks.

Figure 4-4 Havelock reservoirs before and after upgrade

All the ferro-cement reservoirs (except one) at Havelock were replaced with a sectional steel tank in 2011. The single old reservoir was retained as a stand-by for emergency or maintenance purposes.

A schedule of inspection and maintenance of storage units will be incorporated into the asset management information system (AMIS) and referenced to the Water Safety Plans (formerly called the Public Health Risk Management Plan) that has been developed for each supply area.

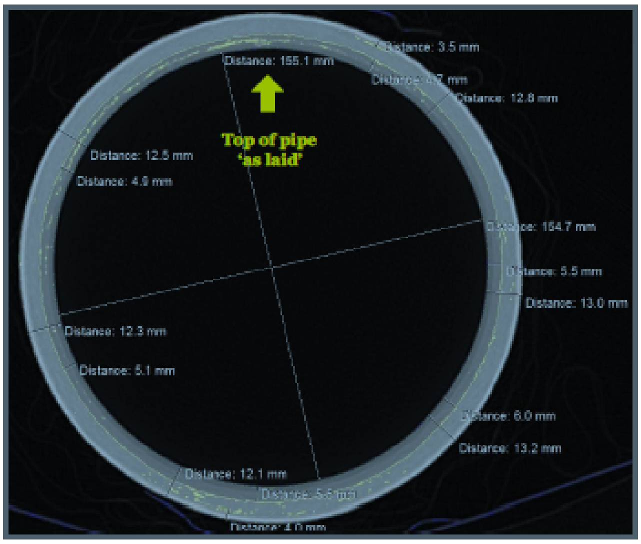
Reticulation Asset Condition — The useful life of buried pipes is dependent upon many inter-related factors including the manufacturer, operating pressures, soil conditions, groundwater levels, water chemistry, operational methods, installation workmanship, surface loading, depth and quality of bedding, pipe surround materials and jointing techniques. The rate of deterioration of the pipe wall, joints, fittings and service connections is a product of a combination of these various factors. Ultimately the combined effects will result in failure of one of the components of the pipeline. However because of the complexity of the inter-related factors it is not easy to determine a predominant factor or to identify a trend that allows reliable forecasts into the future.

Some of the steel pipes laid in the ground are protected from corrosion by a coating of zinc galvanisation. High ground water levels and aggressive (acidic) soil chemistry can cause premature failure of the zinc coating and accelerated corrosion of steel pipe walls. This has been identified as a problem in the Awatere scheme and other areas. Galvanised steel pipes laid in an inert environment have a life expectancy of 80 to 100 years. In the aggressive local environments this has been reduced to 50 years. Further evaluation is required however, as corrosive soils can occur in relatively isolated, localised patches. Accurate assessment of the remaining life expectancy of the reticulation will require further assessment of the remaining asset stock. A project to assess the condition of buried pipes is included in the 2018 Asset Management Improvement Plan (see condition monitoring section).

There is some evidence of reduced life expectancy for small diameter PVC and ABS pipes that have been jointed with solvent welded socket and spigot joints. This technique requires a rigorous standard of workmanship. Early jointing practices by some installers did not always follow manufacturer's recommendations and premature failure at joints has become evident. As a result, the planned life expectancy of the ABS pipes and PVC pipes up to and including 50 mm nominal diameter has been reduced to 40 years within the Awatere reticulation.

Asbestos cement was a popular material for the manufacture of pipes from the 1940s through to 1980. Experience has revealed a number of common failure modes. Acidic waters are capable of leaching the cement out of the asbestos/cement matrix, causing softening of the pipe wall and premature failure. An increase in pipe breaks in Renwick requiring emergency repairs indicates this may be a problem in the area. A pipe sampling programme was instigated in 2016 and short lengths of AC pipe were excavated, removed and sent to a laboratory for analysis (Figure 4-5). The results revealed the 150 mm pipes were in worse condition than the 100 mm diameter pipes but in all cases the pipes were close to the end of their useful life. The Council has approved a budget for the replacement of all AC pipe in Renwick.

Scan Image 258



Pipe Wall Deterioration Measurements	
External Det'n Min – Max (mm)	0.0 – 4.0
Max External Det'n Rate (mm / yr)	0.098
Internal Det'n Min – Max (mm)	4.7 – 6.0
Max Internal Det'n Rate (mm / yr)	0.146
Combined Det'n (mm)	10.0
Max Yearly Rate of Deterioration (mm / yr.)	0.244
Comparison with NZ Average for AC Pipes (% Faster / Slower)	7 % Faster
Comparison with Renwick Average[1] for AC Pipes (% Faster / Slower)	6 % Faster

Comments: *Top of pipe 'as laid' was marked with green paint during the recovery of the pipe sample. The external deterioration on the pipe sample was highly variable.*

Figure 4-5 Extract from a pipe condition assessment report

Historical evidence has shown that steel bands within some types of joint socket are prone to corrosion and bolted gland joints can also corrode. Hillsides that are subject to erosion and the formation of under-runners can undermine the bedding and support of pipelines. AC pipe is a relatively brittle material which needs to be adequately supported, and point loading must be avoided.

The planned life expectancy of asbestos cement pipes in Marlborough has been adopted from the New Zealand Asbestos Cement Watermain Manual 2001[5]. The manual was compiled based on statistical analysis of pipe test results collected from a national survey of 20 water suppliers throughout the country. It is currently being updated and Marlborough has submitted the results of recent sample tests. The national data will need to be interpreted for local conditions.

The water abstracted from the shallow aquifers of the main river valleys (Blenheim, Speeds Road, Picton, Renwick and Havelock) has a naturally low pH (around pH 6) which means it is slightly acidic, and is aggressive to the cement binder in the asbestos cement pipe. The water leaches the cement from the AC matrix and accelerates the rate of deterioration. The rate of deterioration of the pipe wall is reasonably constant and therefore thin walled pipes (small diameter, low pressure rated pipes) are likely to degrade to the point of failure more readily than larger diameter pipes with thicker walls.

[5] New Zealand Asbestos Cement Watermain Manual 2001 (NZWWA, August 2001)

4.1.5 Asset Valuations

The water infrastructure assets are revalued annually. Details of the process and methodology are included in the Asset Valuation Report 2017 and summarised in section 5.3 of this plan. A summary of the main groups in each scheme is shown in Appendix 5: Valuation Details

4.2 Risk Management

The Council's approach to risk management is outlined in the MDC Risk Management Policy[6]. The strategy was initially developed by the Risk Management Steering Committee in 2001 in accordance with the AS/NZS 4360 Risk Management standard and later updated to ISO 3100 (2009).

The aim of the strategy is *to identify, assess, and manage risks in a consistent and demonstrable way.*

Our strategy is to:

- *introduce tools and internal assistance that enables sections to complete a risk analysis relevant to their operation*
- *ensure our decision making is consistent and demonstrable*
- *develop a 'risk aware' culture that encourages everyone to identify risks and associated opportunities*
- *promote and foster communication and risk monitoring throughout the organisation.*

This framework will be managed by the Contract and Risk Manager and supported by the executive management team.

The risks associated with all Council activities may be considered under a number of broad categories (Table 4-4 The risks associated with Council activities.) The wider council risks and assumptions are shown in Table 5-6.

Table 4-4 The risks associated with Council activities

Legal	Events which may lead to criminal or civil proceedings taken against the Council.
Political	Events that prevent or restrict Council from leading the community and making prudent decisions on behalf of the community.
Economic	Events that cause a financial loss to the Council or cause loss or reduced profitability to commercial enterprise.
Environmental	Events which damage natural and man-made environments, resources and/or ecosystems.
Service Delivery	Events which cause an interruption of service, or result in a standard significantly below the levels of service agreed with the community.
Community Health	Events that may cause harm to the health and welfare of residents or visitors to the region.
Human Resources	Events that adversely affect the people who are directly or indirectly employed by the Council.

[6] Risk Management Policy. V7 (Oct 2017) MDC

Financial	Events that cause unplanned financial loss or prolonged financial inefficiencies for Council or within the community.
Information Management	Events which cause damage or disruption to the information systems and infrastructure supporting Council activities.
Reputation	Events that may damage the reputation, image or public confidence in the competence of the Council to perform its core duties.

Risk is defined in the AS/NZS ISO 31000:2009 as "The effect of uncertainty on objectives." It is characterised as the product of the *likelihood* of an event occurring and the severity of the *consequences* that result. This common evaluation methodology has been used by the Council through a standard likelihood/consequence matrix.

It is possible for an event or situation within the water supply to affect the Council and community across several of the categories listed above. For example a severe water shortage may affect the economic prosperity of the region and the health of the community. In extreme circumstances (such as a drinking water contamination issue) the event may have an impact on the reputation of the region leading to consequences at a local or national political level.

4.2.1 Objectives of Risk Management

The objectives of risk management for the water supply are to:

- safeguard community health and wellbeing
- fulfil legal obligations
- maintain a core business activity and customer service
- safeguard continued economic activity
- protect the natural environment
- provide the most cost effective service
- protect the asset value
- protect inter-generational equity.

4.2.2 Risk Assessment in the Water Supply Activity

Under the guidance of the Council's Contract & Risk Policy a small team of senior operational staff, including the Operations & Maintenance (O&M) Engineer, assess the hazards associated with the water supply operation.

The water supply operation is analysed through its major constituent parts: water sources, treatment plants, distribution (the reticulation pipework, pumps and associated plant) and storage reservoirs. General management practices are also analysed.

The risks are also separated on a network basis so that risks to the Awatere system, for example, can be separately assessed and treated, compared to a similar risk in the urban Blenheim system.

The hazards are risk assessed on the standard Likelihood/Consequence matrix to establish a risk profile. The 'controls' for each risk are considered and assessed. The 'controls' are the plans, operational procedures, systems and regulations that can be implemented to mitigate either the likelihood or consequence of any given risk. Once the preferred controls have been identified, an action plan is prepared to implement the controls and ensure their efficacy. Finally, an assessment of the residual risk is made and either accepted or laid-off through insurance. High risks that cannot be readily mitigated are recognised and included in long term planning considerations.

The risk profile is reviewed and updated on an annual basis. New and modified infrastructure is included in the review and lessons from recent events are used to inform the assessments. Hazards are re-assessed in the light of any new information or research.

4.2.3 Water Safety Plans

The Health Act Amendment 2007 placed a statutory duty on water suppliers to introduce and implement a Water Safety Plan for each of its supplies. The Water Safety Plans was preceded by the Public Health Risk Management Plan (PHRMP). The PHRMP was a non-mandatory evaluation of the water supply system. Both plans provide a detailed and methodical framework to address all risks to the water supply.

The Council has developed a water safety plan for each supply area. The plans are submitted to the Drinking Water Assessor for approval. The current status of the Water Safety Plans is shown in Table 2-3 in Chapter Two.

4.2.4 Critical Assets

Critical assets are those which, if they failed, would cause widespread loss of service, serious public health risk, environmental damage or economic loss. Generally in each of the water supply systems the critical assets are:

- water treatment plants
- main storage structures — dams/reservoirs
- trunk mains.

These general groups are supplemented by individual assets that serve locally significant businesses and facilities such as hospitals and retirement homes.

The criticality of particular components of the water infrastructure is recognised in the risk assessment process. Assets are assessed on the basis of the consequences of failure. The likelihood of failure is taken into consideration, as are alternative methods of supply or duplicated assets that can be reconfigured to keep water flowing.

The criteria for the criticality rating has not been rigidly defined as the impacts of failure can differ between communities. The general guidance shown below is based on either the total number of customers affected or as a proportion of the total population:

- high (1) >5,000 properties or 70% of the community affected
- medium (2) > 2,000 properties or 40% of the community affected
- low (3) < 2,000 properties
- not assessed.

The rating is stored on the asset management information system (AMIS) and can be readily displayed on the geographic information system (GIS). (See Section 6.1 of this plan for more information about AMIS.) The rating is widely available to staff and is used to determine preventive maintenance schedules, risk mitigation activities and reactive maintenance priority.

4.2.5 Mitigation Measures

Infrastructure which is recognised as being critical to the water supply is subject to a number of ‘risk treatments’ to help mitigate the impacts of the hazard. Risk treatments can be applied through either:

- capital improvements — building new infrastructure to mitigate the risk, and/or

- operational treatments — implementing systems for the day-to-day operation of the water supply.

Capital improvements can be more readily incorporated into new or replaced infrastructure. Good design practice is to build in redundancy through duplication of assets, alternative sources, providing alternative supply routes and inter-connections, or through the provision of emergency standby facilities.

Operational treatments can include installing controls that are ‘fail-safe’, automated monitoring and control systems, rigorous Standard Operating Procedures, regular proactive maintenance, good alerting/response procedures for system malfunction and emergency call-out rosters.

4.2.6 Emergency Response Planning

The risk assessment process and the consideration of existing and future controls for residual risks provides a convenient framework for emergency response planning. For example power failure is a significant risk to the water supply process. The consideration of the risk treatments (including backup network connections, emergency generators, mobile generators and gravity storage) provides the basis for an emergency response plan.

The risk management process is included in the preparation and review of Standard Operating Procedures used by operational staff. Emergency Management Plans have been developed for ‘sites’ (such as treatment plants and water storage sites) and specific ‘events’ that may affect multiple sites (such as earthquakes, tsunami and floods).

The Assets & Services Department has a well prepared emergency response plan. In a major event an Incident Management team is mobilised and establishes a response centre in the Council offices. Available resources from Council staff and contractors are determined and staff rosters are prepared for long duration events. In major emergencies a staff member is deployed to the CDEM Emergency Management Operations Centre to liaise with CDEM Controllers and to act as the Lifelines Utility Co-ordinator.

A supply of emergency standby equipment is regularly tested and is ready to be deployed at short notice.

Existing service contracts include clauses for the provision of emergency services. There is a pre-determined communications plan to ensure communications are maintained during periods of possible disruption.

In recent years the emergency response plans have been regularly exercised through actual emergency events — including the earthquakes in 2013 and 2016 and local and regional flood events. Each event is subjected to a post-event evaluation at which the strengths and weaknesses are discussed and the emergency plans adjusted.

4.2.7 Insurance

Council mitigates residual risk predominantly through insurance. The Council’s Contract and Risk Policy Manager, with the assistance of an independent broker, considers all of Council’s potential exposures. Insurable risk is mitigated through a combination of commercial insurance, insurance through the Local Authority Protection Programme (LAPP), and self-insurance (risk retention).

LAPP is a not-for-profit co-operative fund established by local authorities to provide mutual insurance for underground assets and other specialist structures that have in the past been difficult to insure through the commercial insurance market. The Council insures water, wastewater and stormwater reticulation, wastewater wet-wells and flood protection structures through LAPP. It has been indicated that LAPP will cease cover for councils at June 2019. Prior to this time the Council will explore other options for cover available in the market.

The Council’s current threshold for claims is $3M at 100%. As the LAPP cover is for 40% of the claim after excess the threshold, once reached, is applied as an excess at $1.2M.

Central government has provided indemnity for 60% of the value of post-disaster recovery costs in relation to agreed critical community assets, on the condition that the local authority has made reasonable provision for the remaining 40%. However, the Government is currently reviewing this commitment.

Different criteria and thresholds apply to the 60% government funding. There is a summary available in the MCDEM Funding Guide.

In 2016 the Council employed AON/Tonkin & Taylor to undertake a Maximum Probable Loss assessment of water, wastewater, stormwater, roading and flood protection infrastructure. The study modelled two scenarios — a 1:500 year and a 1:1000 year earthquake event centred in the Marlborough region. The outcome of the study was a maximum probable loss prediction of $349M and $485M respectively. This was a significant increase on the previous estimate of $78M. The Council's current strategy is to use a combination of LAPP, government emergency funding, cash reserves and deferred capital expenditure to cover the costs of potential losses.

4.2.8 Engineering Lifelines

Assets & Services staff (including the O&M Engineer) are active participants in the Marlborough Engineering Lifelines Group, which has been chaired by the MDC Asset Management Engineer since its inception in 2008.

The Engineering Lifelines Group facilitates the exchange of information and planning with utilities such as Marlborough Lines and Marlborough Roads. The inter-dependencies between the Lifeline agencies are explored and plans are evolved within the CDEM 4R framework — Reduction, Readiness, Response and Recovery.

An annual action plan is prepared and agreed with all members. The Lifeline agencies also participate in civil defence exercises to test their response capabilities and to prepare for major events.

In 2016 the Lifelines agencies contributed to the update of the Marlborough Civil Defence Emergency Management (CDEM) plan[7]. The development of the plan included two regional risk assessment workshops. The workshops involved a thorough evaluation of the hazards in the region. A detailed risk assessment and prioritisation process was undertaken. Participation in the workshops provided insight into the relative risks and informed the discussion on the risk mitigation strategies required for the water supply.

4.2.9 Resilience

Following the Christchurch earthquake sequence there has been substantial research into the resilience of utility infrastructure. This is particularly relevant to Blenheim as the Wairau Plains has many common geological/geographical features with the Canterbury Basin and comparisons can be usefully made.

Lateral spread of the land adjacent to watercourses was particularly damaging to stopbanks, buried utilities, bridge abutments and other nearby structures. New setback standards are being incorporated into new designs.

Differential settlement was also a problem, particularly for pipelines passing from normal ground conditions to rigid structures such as bridge abutments or connections to reservoirs. Similarly, buried chambers have a tendency to 'float' in liquefied ground conditions, causing damage to assets. Flexible joints, paired gibaults and resilient materials are incorporated into the design of new and replacement assets at these transition zones.

Post-earthquake surveys have shown a marked difference in the performance of different materials. Modern materials such as PVC, and particularly polyethylene, were more resilient to ground shaking than some of the traditional materials such as earthenware, vitreous clay, un-reinforced concrete and asbestos cement.

The Stronger Christchurch Infrastructure Re-build Team (SCIRT) has been generous in publishing its findings and solutions. The team has created a depository of technical advice and engineering standards which will help local authorities to design and build more resilient infrastructure in future.

[7] Marlborough Civil Defence Emergency Management Plan 2017-22 (MDC)

4.2.10 Natural Hazards — Learning From Experience

New Zealand is exposed to a range of serious natural hazards — volcanoes, earthquakes, tsunami and numerous severe weather storms. By definition, the most severe events are less frequent. However the less frequent, lower intensity events also test both the structural integrity of the infrastructure and the management systems in place to respond to natural hazard events.

In July 2013 a 6.5 Magnitude earthquake off the coast of Seddon was followed by a sequence of after-shocks. The initial shake damaged water service reservoirs on the hilltops at Wheelers Hill, Blind River and Flaxbourne on the Awatere system. Major cracks developed in the ferro-cement walls around the base of the tanks. The tanks were rendered unserviceable and six were replaced at Wheelers Hill and Blind River, and three at Flaxbourne in 2014.

On 14th November 2016 the simultaneous rupture of a number of faults around Culverden generated an earthquake of 7.8 Magnitude — the third largest earthquake recorded since European settlement. Once again the Awatere system experienced the greatest damage. A dozen major breaks were discovered and repaired in the three days immediately following the shake. A number of remote properties were without water for up to 72 hours whilst the sources of the breaks were found and repaired. The recently replaced tanks at Wheelers Hill performed well but the differential movement between the tanks and the buried pipework caused the connections to be pulled apart (see photo in Figure 4-6) It took several days for the outlets and pipes to be realigned and the tanks to be returned to service.

There were extensive power outages along the east coast south of Blenheim following the earthquake. The power supply to Upton Downs Pump Station was interrupted which caused downstream water shortages.

In Blenheim the watermain to Elizabeth Street was ruptured when the footbridge to which it was secured shifted during the earthquake. Downstream supplies to around 250 houses in the Riversdale part of town were adversely affected until a temporary connection could be made.

Severe weather storms have less impact on the public drinking water system. The exceptions are the Awatere and Renwick water supplies. On the Awatere system high rainfall events in the Black Birch catchment can cause high turbidity through the intake gallery. The MIOX water treatment plant is ineffective in highly turbid water, and the treatment plant is switched off after severe rain storm events. The water supply to Renwick can also be affected by high turbidity in Gibson’s Creek. Careful management of the bore abstraction, and the use of storage, can reduce the impact on the water supply services.

After each major event a debriefing review is undertaken to examine the lessons learnt. Operational practices are updated where necessary, specifications are modified and design improvements are incorporated into future construction works.

Figure 4-6 The effect of differential movement between the tanks and buried pipework

4.3 Routine Operations and Maintenance Plan

The operation and maintenance of the water supply system involves the procedures and tasks necessary to deliver the agreed level of service to the customers whilst preserving and extending the serviceability of the infrastructure to maximise its useful life.

The strategic purpose of the water supply system is threefold:

- to facilitate public health and well-being
- to provide a resource for economic activity
- to preserve the environment.

This plan seeks to achieve these objectives through the following commitments.

Operational Works — Routine operational works will be undertaken by suitably trained and supervised staff or contractors at sufficient intervals to ensure the efficient functioning of the system.

Repairs — Reactive repairs will be assessed and undertaken in a timely fashion to minimise disruption to the service, meet the customer service standards, minimise collateral damage and avoid unnecessary water wastage.

Preventative Maintenance — Planned maintenance schedules will be established and implemented to minimise the risks and costs of premature failure or service interruptions, promote the effective and efficient functioning of assets, and optimise the whole life service potential of the infrastructure.

Operational management — Operational activities are undertaken by Assets & Services engineering officers and technicians under the direction of the O&M Engineer to ensure the outcomes and service standards are achieved in the most efficient and cost effective manner.

System Control and Monitoring — The water supply system will be continuously monitored and a procedure implemented to respond to detected abnormalities according to need.

Incident management — Assets & Services staff will prepare and plan for managing emergency incidents; to mitigate the effects of a major system failure and return to business as usual as soon as possible.

4.3.1 Reticulation Maintenance Activity

Table 4-5 shows a summary of the customer service requests received between the 2014/15 and 2016/17 reporting years.

Water leakage continues to be the main cause of customer requests. The 'Broken or Inoperable' category is mainly related to faults on toby valves.

Table 4-5 Customer Service Requests Water Supply 2015–17

Service Request	2015	2016	2017	Grand Total
Broken or Inoperable	118	176	173	467
Damaged or Displaced	2	3	3	8
Leaking	343	542	578	1463
Location Enquiry	19	24	33	76
Meter Reading Request	29	82	88	199
No Water Complaint	19	45	39	103
Pressure Complaint	13	19	31	63
Quality - Discoloration	4	3	4	11
Quality - Odour	1	3	8	12
Quality - Other		2	33	35
Quality - Taste	2	1	3	6
Control Malfunction			1	1
Other	31	35	49	115
Grand Total	**581**	**935**	**1043**	**2559**

A Water Service Repair database was introduced in March 2010 to improve the recording of customer service requests. That database has now been replaced with the Customer Service Requests in the Asset Management Information System (AMIS), introduced in December 2014. The smaller number of faults recorded in 2015 was probably caused by under recording during the transition from the old database system.

4.3.2 Operational Management

General maintenance and repairs on the water supply system in Blenheim, Renwick, Havelock and Wairau Valley are undertaken by the Works Operations staff within the A&S Department. Similar work in Picton and Awatere is undertaken by a term contract in each of the areas. The term contract was re-tendered in 2014 and awarded to the incumbent contractor for a further three years with two options to renew for two years each. The contract is managed by a dedicated MDC engineering officer. The conditions of the contract specify the operational procedures, skills of the operatives and the quality of materials and fittings to be used. Renewal of the contract is reliant upon meeting minimum key performance indicators.

The Works Operations team and contract labour repair and maintain the reticulation and provide a 24/7 call-out service. Routine maintenance of the treatment plant and pumps is undertaken by the engineering officers whilst more specialist work is contracted out.

A full-time technician is employed to oversee the maintenance of electrical and telemetry components within the system. More specialist work is contracted out to specialist electrical, mechanical, telemetry or civil engineers.

The major components of the water supply system are monitored by a SCADA telemetry system and many routine functions are controlled by automatic PLC (programme logic control) computers. The telemetry data is returned to the engineering officers who have direct access to the information and can monitor real time data and trending of the parameters. A 24/7 standby roster is maintained to monitor the system and an automated tiered alerting system is employed to ensure staff respond to system alarms.

All maintenance activity is recorded through work orders. The AMIS is intrinsically linked to the purchasing and financial software so the costs of maintenance are recorded, as well as the nature of the repair, and details of the performance and condition of the asset.

4.3.3 O & M Decision Making

The maintenance decision making process seeks to resolve conflicting issues, as outlined below.

Uninterrupted service versus risk and costs — A guaranteed uninterrupted 24/7 water supply can be delivered to the Marlborough customers. However the cost of engineering and maintaining such a service has to be balanced against the willingness and ability of the community to pay for it, and managing the risks and consequences of occasional interruptions.

The additional costs of providing improved service levels can become disproportionate to the marginal benefit. For example, improving the target for restoring a water supply interruption from 10 hours to 8 hours has a relatively small marginal cost. However, to further improve the response time to four hours or less would involve significant additional cost in terms of manpower and disruption to scheduled work programmes. The current levels of service have been developed to provide risk-based prioritisation and to balance cost and customer expectations.

Asset maintenance versus renewal — The A&S Department seeks the optimum balance between the cost and disruption of ongoing maintenance and renewal of assets that have reached the end of their useful life. Currently, achieving this balance is based on the judgment of the operational engineers. One of the priority aims of the upgraded asset management information system is to provide good data on maintenance costs and frequency to support the engineers' decisions.

Planned versus unplanned maintenance — A well planned preventative maintenance schedule may reduce disruption to services, increase the life expectancy of assets, reduce the whole life costs and reduce the risks associated with failure. Planned and scheduled work can often be undertaken in a more cost effective manner than reactive maintenance.

Maximum efficiencies are gained by recognising the appropriate intervention interval. In cases where the risks of failure are low it can be cost-effective to allow the asset to fail and respond to the breakdown. Planned maintenance schedules have evolved for the critical components of the water supply infrastructure. More formal documentation and evaluation of the current process is required, as the current reliance on the experience of individual staff may not be sustainable.

Efficient asset utilisation versus risk reduction through redundant capacity — There can be serious consequences from the failure of some critical assets, and a level of redundancy or contingency options can mitigate the risks. However there is an obvious cost to duplicating assets that are not fully utilised in normal operating conditions.

Blenheim and Picton have two independent but inter-connected sources of supply. Most distribution pumps are duplicated with a duty/standby arrangement. Both systems can operate from a single source only. The main trunk mains are able to meet demand although restrictions may need to be introduced at peak demand periods.

Storage reservoirs help to provide a continued supply in the event of power failure. In recent years storage capacity has been increased to improve resilience. Wherever possible water distribution pipelines are configured into inter-linked networks that can provide alternative supply routes in the event of a pipe failure.

Resolving these conflicting issues exists within the context of risk. The function of each of the components of the infrastructure is assessed for its critical contribution towards achieving the desired outcomes. Maintenance tasks and programmes are planned accordingly.

4.3.4 Summary of Operational Costs

The main items of operational costs are shown in Figure 4-7 below.

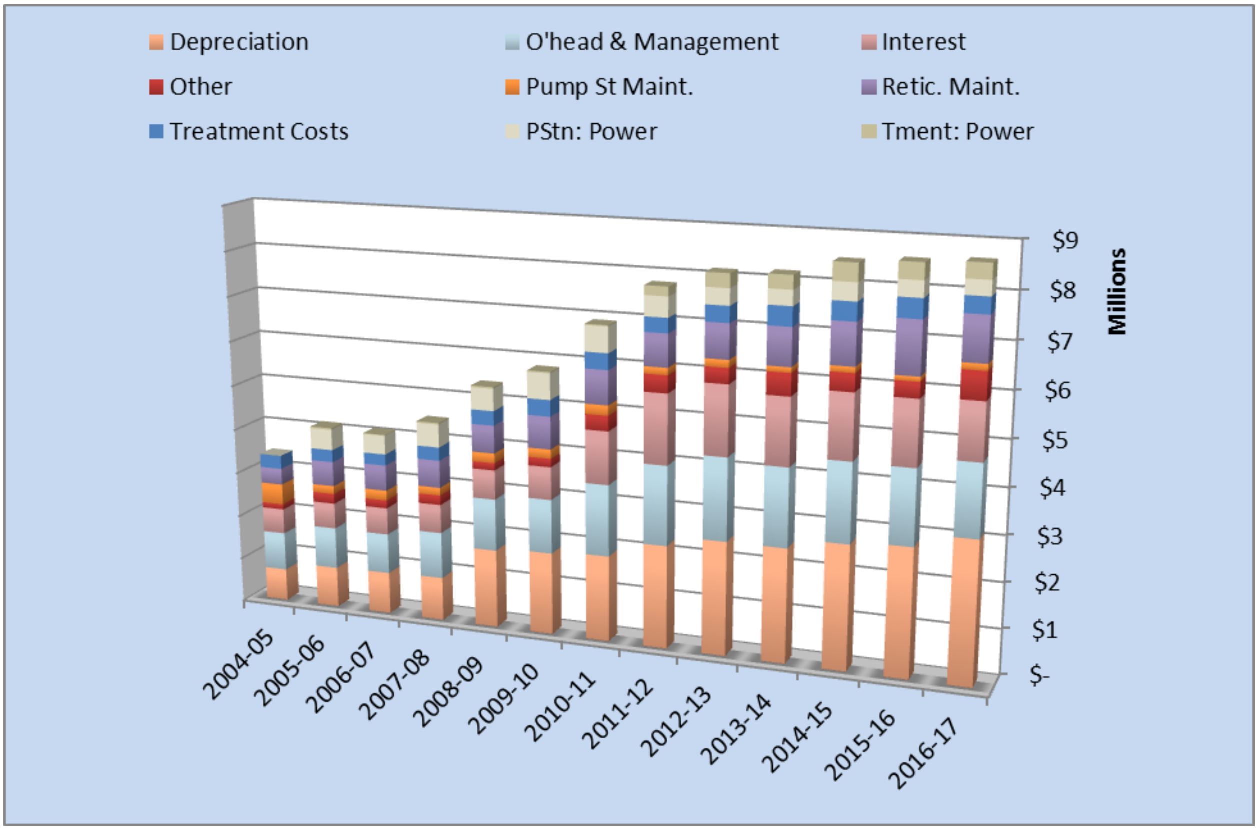


Figure 4-7 Summary of operational expenditure 2004–2017

The graph shows the significant increase in operational costs over the past 13 years. The cost of depreciation has risen, the asset base has increased, and experiences such as the Christchurch rebuild have provided more data on asset replacement costs.

Good energy management techniques combined with negotiated price contracts with energy suppliers have helped to manage the costs of water treatment and pump station operation.

The cost of finance increased significantly between 2009 and 2011 as new treatment plants and reservoirs were under construction but this has remained reasonably steady since then.

4.4 Renewal/Replacement Plan

The renewal strategy is designed to maintain the overall condition and performance of the asset infrastructure through a continuous, progressive cycle of replacement. Assets are analysed to determine the intervention point at which it is most cost effective to replace the asset. See Table 4-6 for a list of the major capital investment projects from 2018–28. The renewal programme is formulated from the following criteria.

Age — Age is generally the most consistent indicator of an asset's position in its life cycle. The installation date of each asset is recorded in the asset management information system (AMIS).

A nominal useful life for every asset is allocated based on industry standards. The nominal life is modified from experience, individual assessment or fault trend analysis.

Condition — To date the condition of assets is assessed through observation during reactive or routine maintenance/servicing. Specialist consultants are employed to assess complex structures such as reservoirs. Pipe sample analysis is used to investigate specific concerns and was recently employed to investigate the condition of the asbestos cement mains in Renwick. More analysis of this sort will be undertaken as the reticulation ages.

Performance — Information is gathered on the performance of assets through post-storm analysis of surcharging and surface flooding. Consent compliance issues are recorded and contaminant ingress or inflow incidents are investigated and traced to the source.

Maintenance Costs — Routine and reactive maintenance is recorded against individual assets. Both the quantum of maintenance and the costs are used to assess the full life cost of asset ownership.

Customer Service Delivery — Requests for service and customer complaints are analysed.

Economic Obsolescence — The availability of spares, skills, techniques or restricted access through resurfacing may pre-empt reductions in the useful physical life an asset.

Renewal of water assets is planned by the O&M Engineer and the Planning & Development Engineer. A schedule of potential renewal schemes is maintained and updated by the O&M Engineer.

Project prioritisation is based on a number of factors including a risk assessment of repeated failure of an asset. Intervention points are established based on the criticality of the asset. Pipes and pumps that provide a critical water supply are given greater priority. The critical assets are routinely monitored and maintained. Deterioration is monitored and renewal planned to avoid service failure.

Similarly, additional priority will be ascribed to projects where the existing asset is under-performing and causing a level of service issue. The costs of all capital projects are distributed between the main drivers — renewals, improvement to levels of service, and growth.

Wherever possible the renewal programme is coordinated with capacity upgrades. The continued growth in urban development provides a limited number of opportunities to renew infrastructure and apportion costs accordingly.

Currently non-critical assets are allowed to fail and are renewed when the cost of maintenance or service interruptions become untenable. This strategy ensures the useful life of the asset is maximised and delays renewal as long as possible. This is considered a rational approach at this time.

The condition of the whole asset base has yet to be determined through comprehensive survey and assessment. The sequence and detailed design of the urban development pockets is also yet to be established. These are good reasons for delaying renewals whilst the overall strategy and condition monitoring becomes more highly developed.

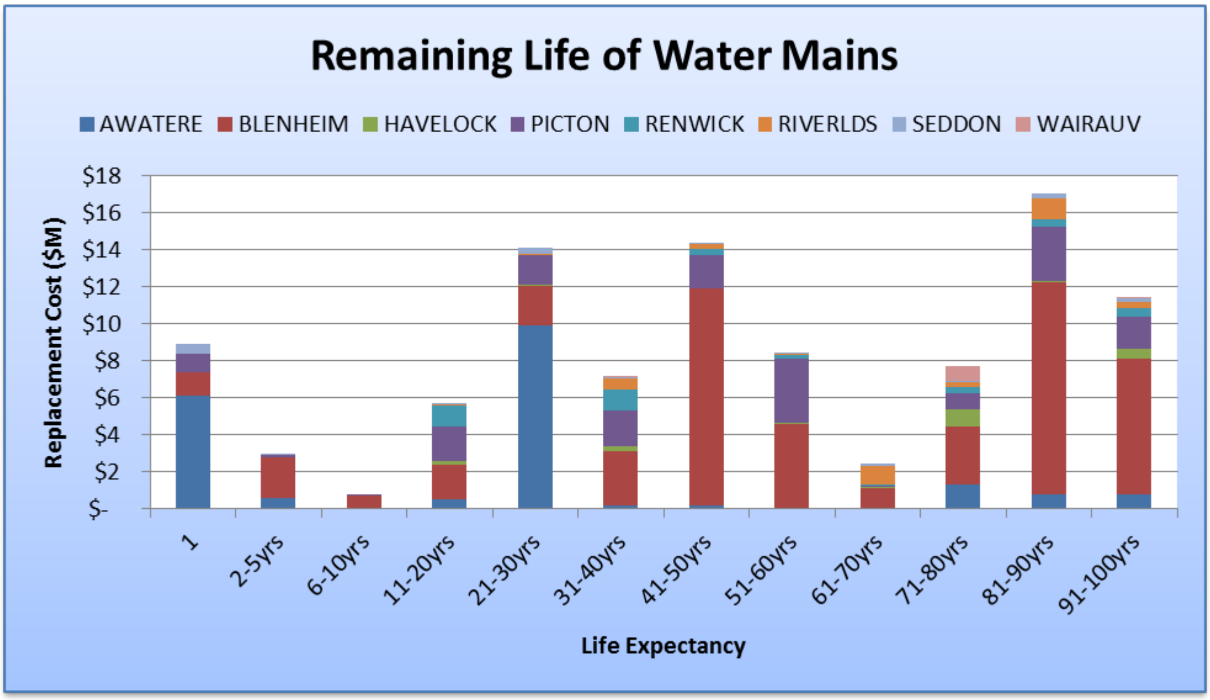


Figure 4-8 Replacement Value and Renewal Profile - Watermains

The costs shown in Figure 4-8 and Figure 4-9 have been determined from the revaluation data using the nominal life expectancy of the pipes within the system. There is a need to verify the nominal life with improved condition grading. The data suggests an average annual renewal expenditure of around $2.6M over the next ten years will be required, which is a significant increase in current expenditure.

More than 90 kms of mains have a life expectancy of less than 10 years Approximately 15 km of the mains are made of small diameter (50 mm – 75 mm) galvanised steel, 0.5 km of 50 mm ABS and the remainder asbestos cement (51.5 kms in the Awatere scheme).

A more detailed renewal programme will be developed once the pipe condition assessment and data analysis has been undertaken and used to inform a renewals strategy.

The theoretical life expectancies adopted by the Council suggest there is a significant issue with watermains that have reached the end of their useful life. However the quantity of failed mains and subsequent repairs would see a marked increase. This is not apparent from an analysis of repair and maintenance activity. The quantity of bursts and mains repairs has decreased in recent years. An exception this was recognised with an increased number of burst mains in Renwick. An analysis of the work orders showed that the bursts were concentrated on asbestos cement pipes. A project was quickly instigated to remove a number of representative pipe samples and send them to a specialist laboratory for analysis. The results showed that the 100mm diameter pipe samples were in Condition Grade 4 marginally better than 150mm diameter pipes that were assessed as Grade 5 (End of Useful Life.) – see Figure 4-5 Extract from a pipe condition assessment report

The evidence was submitted to the Assets & Services Committee in November 2016. The 150mm AC mains will be replaced in the five years commencing 2018. The 100mm pipes will be replaced the following 11 years with an approved budget of $1.25M and $902,000 respectively.

Whilst this is a satisfactory response to a specific problem, the age profile of the underground assets would suggest this type of issue is likely to recur in the future. Therefore there is clear need for further work to assess the condition of pipelines and adjust the assumed useful life of material types (or other groupings) in order to provide more accurate predictions for future planning.

Pipe sampling, on-site condition assessment and non-destructive pipeline surveying are techniques that can be deployed to improve the data quality. A programme of pipe condition assessment is being developed and is included in the improvement in chapter 6.

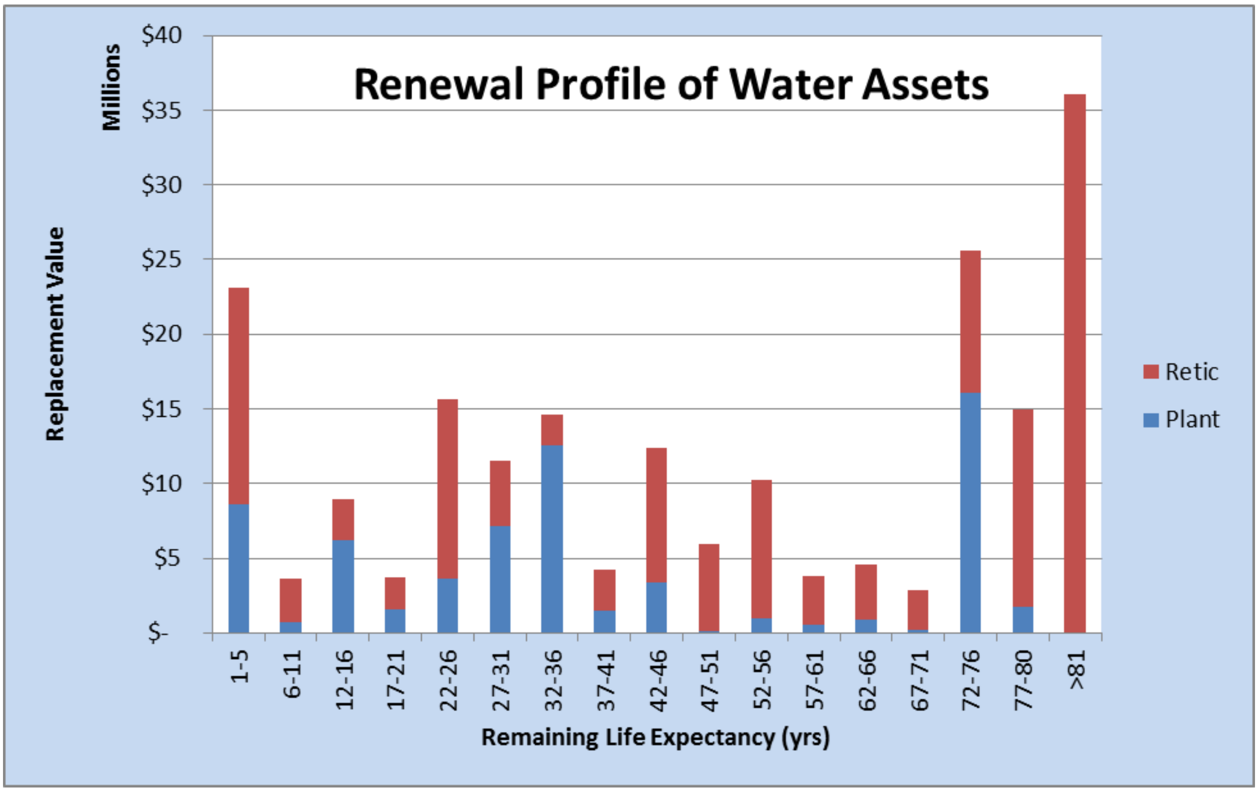


Figure 4-9 Renewal Profile of Water Plant and Reticulation

Asset upgrades are included in the capital programme and the costs apportioned between growth, renewal and improved level of service, as shown in Table 4-6 Major capital investment projects 2018-28.

4.5 Creation/Acquisition/Augmentation Plan

All capital upgrade projects for the water supply infrastructure follow a process from inception though to construction and commissioning. At critical points in the process reports are prepared and submitted to higher levels of governance for approval. Generally projects are over seen by the Executive Management Team, the Assets & Services Committee and the Council depending on the complexity, cost and community sensitivity. The process is as follows.

Identification of Need — New or upgraded infrastructure is identified as necessary for a variety of reasons. Drivers include: as a result of community consultation, higher standards (eg; Drinking Water Standards), structural weakness and inability of critical structures to withstand earthquakes, and increased growth in demand.

Project prioritisation — Projects are prioritised through a risk management process of considering the effects of not providing the new or upgraded infrastructure and taking account of budgeting constraints. Upgrades driven by the Drinking Water Standards generally have prescribed time limits which drive the capital works programme.

Alternatives and Options — Alternatives including non-infrastructure solutions are considered before examining different design options.

Once an outline design solution has been agreed detailed design can proceed. Further options or unforeseen problems may be encountered at this stage and the decision making process may need to be reviewed. Additional specialist consultancy, and peer review for larger projects, continues through the process.

Project Approval — This is usually done through the annual plan and LTP processes. Where options are available with significantly different costs and/or risks, those options are typically presented to the Council's Assets and Services (A & S) Committee for consideration.

The outline budget costs and the sources of funding are considered during the annual plan process and aligned with the objectives of the Long Term Plan. The decision of the A & S Committee is forwarded to the full Council for ratification.

Detailed Design — An approved project will progress to the detailed design stage. Specialist engineering consultants are often employed as they have greater experience in the design of major works. Draft designs are submitted to the Planning & Development Engineer and may be passed on for peer review. Generally all engineering works are designed to national or international specifications and standards. The standards may be amended to local conditions.

Tender — Once a final design has been proposed and agreed with Council engineers, most construction projects are advertised for competitive tender. The Council has a rigorous procurement policy which was recently subjected to scrutiny from an independent lawyer following unsupported allegations of corruption. Tender submissions are typically evaluated on the basis of a series of pre-determined weighted attributes. The weighted attribute methodology is designed to provide the best possible overall outcome and may consider such matters as health and safety, value for money, productivity, certainty of outcome, previous experience, innovation and risk. Occasionally a lowest price conforming method is used.

It is usual for specific contracts to be prepared for every tender. Each one is updated to include the latest standards, materials and techniques. A specialist contract lawyer is employed to check and review larger contracts prior to tendering.

Construction — The construction phase is normally managed by the Council's project engineers supported by specialist consultant project managers and supervisors. A risk register is compiled at the beginning of each project and is monitored throughout construction to help ensure smooth progression and a successful outcome.

Significant variations in the final design may have to be returned to the Assets & Services Committee for verification and approval.

The capital works programme is led and planned by the Planning and Development Engineer. The main drivers of the capital programme are categorised between growth, levels of service improvement and renewal, and the costs are apportioned to each category.

4.5.1 Capital Investment Strategy

A number of techniques have been developed to identify and prioritise the demands for new and upgraded infrastructure. These are discussed in more detail in the chapters relating to levels of service and future demand (chapters 2 and 3).

Dynamic mathematical models have been developed to provide detailed and accurate predictions of flow and pressures throughout most of the reticulation networks. The models for Riverlands and Wairau Valley are less advanced.

The models are built to represent the individual characteristics of each of the distribution systems. They are then used to simulate a demand pattern or system configuration. The outputs of the models are compared with the actual flow and pressures experienced in the system so the models can be calibrated and verified.

Areas of poor flow or low pressure can be found through the models. The causes of localised problems, such as under-sized pipes or restrictive fittings, can be identified and solution options considered.

New developments, requests for connections to the system, or increases in demand, can be added to the model in order to predict the likely effects. The benefit of dynamic models is that multiple combinations of demand parameters can be compiled into different scenarios, the consequences can be quickly determined and possible remedies tested.

The models are used both in-house and by specialist design consultants to derive preliminary design solutions. Depending on the size and costs of the project, the design options may be peer reviewed. The models are constantly under review and development. They were recently used to determine the number, size and configuration of distribution pumps at the Central Water Treatment Plant in order to meet current and future demand at optimal efficiency, within the constraints of the site. The models are also used to determine the expected flow and pressure within the system to comply with the Firefighting Water Supply Code of Practice.

Construction costs are one of the criteria to be considered when evaluating major investment projects. The whole life costs of the new infrastructural assets are evaluated along with the cultural, social and environmental implications. Tools and techniques such as Cost/Benefit Analysis, Assessment of Environmental Effects and Cultural Impact Assessments have recently been employed on major projects and will continue to be used.

The Council uses a variety of methods to communicate with communities that may be affected by proposed capital works, including consultation through the annual plan and long term plan (LTP) processes, meetings with residents' associations, distribution of pamphlets to households and information on the Council's website. Consultative working groups are particularly valuable for specific larger projects. Many community concerns can be raised and addressed through the group meetings.

The Awatere Water Users Group has been actively involved in seeking an economically acceptable solution to the water treatment issue in Seddon and rural Awatere. The Smart & Connected strategy has formed working groups in many of the small communities. These have proved useful conduits for initiating consultation in Renwick and Havelock regarding both demand management and water treatment options.

Vested Assets — The Council will accept ownership of assets constructed by private developers. These are normally extensions to the reticulation to serve new subdivisions. The assets will only be accepted if they are designed and constructed to rigorous standards. The process is supervised by the Infrastructure Project Engineer and subject to his final approval regarding their quality.

Purchased Assets — The Council has previously purchased water supply assets or taken them over by agreement from private owners. There are no plans for similar acquisitions in the future. However, the future of small community supplies will come under close scrutiny as a result of the Havelock North Drinking Water Inquiry. There is potential that local authorities may be required to take on more responsibility for these private schemes in future.

4.5.2 Summary of Future Costs

In the past the water supply capital works programme has been adjusted to meet the overall Council rating target. Deferment of major capital expenditure has been one of the techniques used to reduce overall Council expenditure and balance the budget.

The capital budget is shown in Table 5-2 in Chapter 5. The budget is based on the Council engineers' estimates or outlines cost estimates and includes contract costs, design, supervision, land purchase, access costs and a contingency sum. The estimates are moderately to highly accurate. However, the programme has traditionally been optimistic as it assumes the optimum progression through the feasibility, design, public consultation, consent approval and land purchase processes. This is a conservative, but necessary, assumption to ensure that all necessary funding is in place for the programmed start date. However, the progression of construction projects is seldom straightforward and unspent finance is carried forward to future budgets. This needs to be carefully managed to ensure undue costs are not incurred through capital funds being misaligned with expenditure.

Table 4-6 Major capital investment projects 2018-28 shows the distribution of costs between growth, level of service and renewal for the major capital schemes proposed over the next ten years. The capital investment outline over 30 years is shown in the Infrastructure Strategy 2018-48.

Table 4-6 Major capital investment projects 2018-28

Project	Outline Cost ($000)	Start and Completion	Growth	Level of Service	Renewal
Awatere					
Seddon WTP	4,454	2017-18	10%	90%	0
Awatere Rural Treatment	1,500	2019-21	0	100%	0
Awatere Rural Reservoirs	625	2019-21	20%	80%	0
Blenheim					
Reticulation Upgrades	3,829	2018-28	46%	23%	31%
Wither Booster PS Renewal	1,180	2026-28	10%	76%	14%
Wither Hills Res. Strengthening	1,850	2018-19	0	100%	0
Havelock					
Reservoir	630	2018-19	20%	80%	0
Universal Metering	237	2018-19	20%	80%	0
Water Treatment Plant	4,925	2019-21	15%	85%	0
Picton					
Universal Metering	2,030	2019-21	30%	70%	
Speeds Rd Trunk Main Renewal Ph1	1,117	2017/18	0	0	100%
Speeds Rd Trunk Main Renewal Ph2	4,195	2021-23	0	0	100%
Essons Valley WTP Upgrade	2,130	2020-22	0	100%	0
Renwick					
Water Treatment Plant	5,640	2018-20	20%	80%	0
Reservoir	2,500	2018-19	20%	60%	20%
Raw Watermain	1,615	2018-19	20%	75%	5%
Universal Metering	512	2018-19	30%	70%	0
Riverlands					
Water Treatment Plant	6,880	2020-21	50%	50%	0
Wairau Valley					
Water Treatment Plant	490	2019-20	20%	80%	0

4.6 Disposal Plan

Disposal planning recognises there are costs and consequences associated with the decommissioning and disposal of redundant assets.

Underground assets are generally left buried but capped to prevent them from acting as land drains. Surface features are removed and the surface reinstated. Component parts are salvaged and reused wherever practicable. Decommissioned pipelines may have value as ducts for other service providers although their value is not formally recognised in the revaluation process. The position of the pipelines remains on the geographical information system (GIS) and they are archived as ‘expired’ assets in the AMIS.

The new water treatment plants at Renwick and Havelock and the Speeds Road Watermain renewal will replace a number of existing assets.

Chapter 5: Financial

The water supply activity accounts for around 8.5% of Council activity expenditure. The asset management plan therefore has important implications for the overall budget and consequences for developers, ratepayers and other sources of funding which contribute to the activity.

The drivers to improve the quality and quantity of water supplied have been discussed. Affordability has been highlighted as a key challenge in the Infrastructure Strategy and throughout the asset management plan as more infrastructure is built and maintained to meet the demands. The challenge is exacerbated by the anticipated change in demographics for the region over the medium/long term.

Generally financial data and projections are for the ten year period 2018-28. Longer term forecasts are included in the Infrastructure Strategy.

Components of the Financial Section

5.1 Financial Strategy and Projections

The Council has developed a number of key strategies and plans that meet statutory requirements and explain how future financial demands will be met. Documents such as the Financial Strategy, the Revenue and Financing Policy, the Treasury Policy and the Development Contributions Policy form the basis for the Council's financial planning

These policies and plans are regularly reviewed and updated. The cycle usually corresponds with the three-year update of the Long Term Plan.

The Council's financial statements are published in detail in the Long Term Plan and the Annual Reports. They are prepared in accordance with the Local Government Act 2002 and comply with Generally Accepted Accounting Practices in New Zealand. They comply with New Zealand's International Financial Reporting Standards (NZIFRS) and other applicable financial reporting standards as appropriate to public benefit entities. All documents are scrutinised and approved by Audit New Zealand.

The Financial Strategy was updated and published for public consultation in April 2018. The strategy seeks to demonstrate how Council will:

- ensure that the levels of rates and borrowing are financially sustainable and kept within pre-set limits
- maintain levels of service
- maintain the assets it owns on behalf of the community
- provide for growth and changing demand patterns within the District
- fund improvements to infrastructural and other community facilities
- manage Council's investments and liabilities.

Council's responsibility for financial prudence is defined by statutory obligation and is recognised in the strategy.

"Under section 101 of the Local Government Act 2002, Council considered its financial management responsibilities where it must manage revenues, expenses, assets, liabilities,

investments and general financial dealings prudently and in a manner that promotes the current and future interests of the community. The Council also considered whether it was sustainable to undertake the level of capital expenditure proposed in the Long Term Plan together with increased operating costs associated with the higher debt level. If the Council has too much debt then future ratepayers will subsidise current ratepayers. If population growth, which is expected to fund the growth portion of assets incorporated into the capital expenditure programme, does not occur or occurs at a slower rate this may either increase rates or slow the delivery of capital projects."

The strategy continues with regard to maintaining the assets in the following way:

"The policy of fully funding depreciation except for Community Assets has been continued in the Long Term Plan 2018–28 and is considered an appropriate measure to ensure the concept of intergenerational equity is maintained. That is, current ratepayers will pay for its use and a share of its replacement cost in relation to the assets provided."

Regarding growth the strategy states:

"Council believes that, as development increases the consumption of its current infrastructure capacity and accelerates the requirement for new infrastructure, developers should bear the cost of this increased demand.

"Through the application of its Development Contributions Policies to fund the cost of this additional infrastructure, Council is seeking to achieve an appropriate balance between encouraging growth and reducing the potential for additional burden on the ratepayer.

"Undertaking development in a planned, co-ordinated manner can reduce costs as infrastructure development is not responding to "adhoc requests" for isolated, scattered, piecemeal development. Responding to adhoc development can mean that parts of the infrastructure networks are replaced earlier in their life than optimum while allowing other parts of the network to remain comparatively underutilised."

Regarding levels of service the strategy states:

"During the development of the 2018-28 Long Term Plan, the Council considered how to maintain its current levels of service, operating expenditure and capital expenditure needed to replace existing assets and provide new infrastructure and facilities to meet the levels of growth that are forecast within the 10 years of the Long Term Plan. The Long Term Plan as presented should, for the majority of activities, enable Council to maintain current levels of service."

For the water supply activity the level of service will undergo significant improvement over the course of the Long Term Plan as water treatment plants are constructed to comply with the DWSNZ.

The Financial Strategy makes it clear that to achieve the required financial prudence there were four main factors to consider:

- "*The estimated expenses of achieving and maintaining the predicted levels of service provision set out in the Long Term Plan, including the estimated expenses associated with maintaining the service capacity and integrity of the assets throughout their useful life;*
- *The projected revenue available to fund the estimated expenses associated with maintaining the service capacity and integrity of assets throughout their useful life;*
- *The equitable allocation of responsibility for funding the provision and maintenance of assets and facilities throughout their useful life;*
- *The funding and financial policies."*

Council's Financial Strategy sets out the strategic financial direction; the external and internal factors expected to have a significant impact (in particular over the next 10 years); and the approaches used to fund this scenario in a prudent manner.

The strategy identifies that in general:

- growth driven capital expenditure is funded by Development Contributions
- capital expenditure to increase levels of service, e.g. improve quality of drinking water supply, is funded by borrowing
- renewals capital expenditure is funded from revenue — rates and charges — set to recover depreciation expense, and accumulated until spent. This funding source emphasises the importance to Council of continually fully funding depreciation on infrastructural assets.
- In practice any funds available are used before new loans are drawn down, to avoid paying interest unnecessarily; except in the case of Development Contributions which are only ever used to fund growth projects.

The major water supply projects are primarily to

- build water treatment plants to ensure the water supply is safe for human consumption
- facilitate water demand management to ensure there is an adequate supply in the future
- reinforce the reticulation network to ensure there is sufficient water for firefighting.

The renewals expenditure based on expected useful life has been budgeted to "fill the gaps" between the major projects.

Beyond the planning horizon of the asset management plan and into the later 15 years of the Infrastructure Strategy 2018–2018 the focus of capital expenditure is forecast to move to renewals.

5.1.1 Operational Maintenance Expenditure

There are increasing pressures on the operational expenditure from a number of causes:

- improved water quality levels of service will require additional water treatment staff, chemicals, electrical power and plant maintenance
- growing infrastructure will require additional maintenance and depreciation costs
- finding and fixing leaking pipes to help meet water demand management targets will incur additional costs
- maintaining an ageing infrastructure will require additional maintenance
- mitigating risks through insurances will fluctuate as national and international insurance markets respond to demand and claims.

The financial impact of these decisions have been estimated and included in budget projections into the future.

Historical operational expenditure is discussed in Chapter 4 — Life Cycle Management Plan.

Table 5-1 Projected Operational Expenditure 2018-28

Water Supply 2018-28 (un-inflated)	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28
Treatment costs	421,500	529,500	647,100	752,600	752,600	752,600	752,600	752,600	752,600	752,600
Treatment - Power	365,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000
Pump Stations - power	360,500	378,500	391,813	391,813	391,813	391,813	391,813	391,813	391,813	391,813
Reticulation - mains maintenance	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000
Reticulation - connection maintenance	292,000	292,000	292,000	292,000	292,000	292,000	292,000	292,000	292,000	292,000
Reticulation - toby maintenance	115,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000	135,000
Treatment - monitoring/testing	109,000	109,000	146,332	183,644	219,000	219,000	219,000	219,000	219,000	219,000
Meter maintenance	72,500	72,500	72,500	72,500	72,500	86,500	92,500	113,500	133,500	148,500
Pump stations - mechanical	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000
Reticulation - valves maintenance	56,550	56,550	56,550	56,550	56,550	56,550	56,550	56,550	56,550	56,550
Pump stations - electrical	56,250	56,250	56,250	56,250	70,250	70,250	70,250	70,250	70,250	70,250
Backflow prevention	49,000	49,000	49,000	49,000	49,000	49,000	49,000	49,000	49,000	49,000
Pump stations - other	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000
Reticulation - hydrant maintenance	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500
Pump stations - buildings/civil	33,200	33,200	33,200	33,200	33,200	33,200	33,200	33,200	33,200	33,200
Meter reading	21,580	26,580	26,580	31,580	41,580	41,580	41,580	41,580	41,580	41,580
Pump stations - telemetry	21,030	21,030	21,030	21,030	21,030	21,030	21,030	21,030	21,030	21,030
Reticulation - infiltration/leaks	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700
total infrastructure costs	2,459,310	2,610,310	2,778,555	2,926,367	2,985,723	2,999,723	3,005,723	3,026,723	3,046,723	3,061,723
operating costs of new schemes										
personnel	36,956	104,956	179,956	198,706	198,706	198,706	198,706	198,706	198,706	198,706
operating costs	277,552	277,552	277,052	277,052	277,052	297,052	297,052	297,052	297,052	297,052
internal charges	67,113	69,113	67,113	67,113	67,113	67,113	67,113	67,113	67,113	67,113
depreciation	3,360,704	3,551,996	3,831,799	4,064,134	4,215,208	4,357,494	4,320,421	4,355,541	4,426,097	4,468,414
interest expense	1,145,956	1,232,098	1,511,833	1,722,674	1,650,338	1,631,233	1,703,314	1,696,809	1,595,459	1,539,355
overheads allocated	1,562,005	1,594,526	1,633,007	1,659,240	1,686,358	1,717,344	1,745,114	1,769,620	1,794,198	1,837,941
Total operating costs	**8,909,597**	**9,440,551**	**10,279,315**	**10,915,286**	**11,080,498**	**11,268,665**	**11,337,442**	**11,411,564**	**11,425,348**	**11,470,304**

5.1.2 Capital Expenditure

The major focus for capital expenditure over the first years of the programme will be the construction of water treatment plants to ensure water quality meets the New Zealand Drinking Water Standards.

The following chart shows the major projects of the capital investment programme. It illustrates the major areas of investment, the types of infrastructure project and the time line for delivery. Minor projects, management and overhead costs and non-specific renewals have been removed from the data for clarity

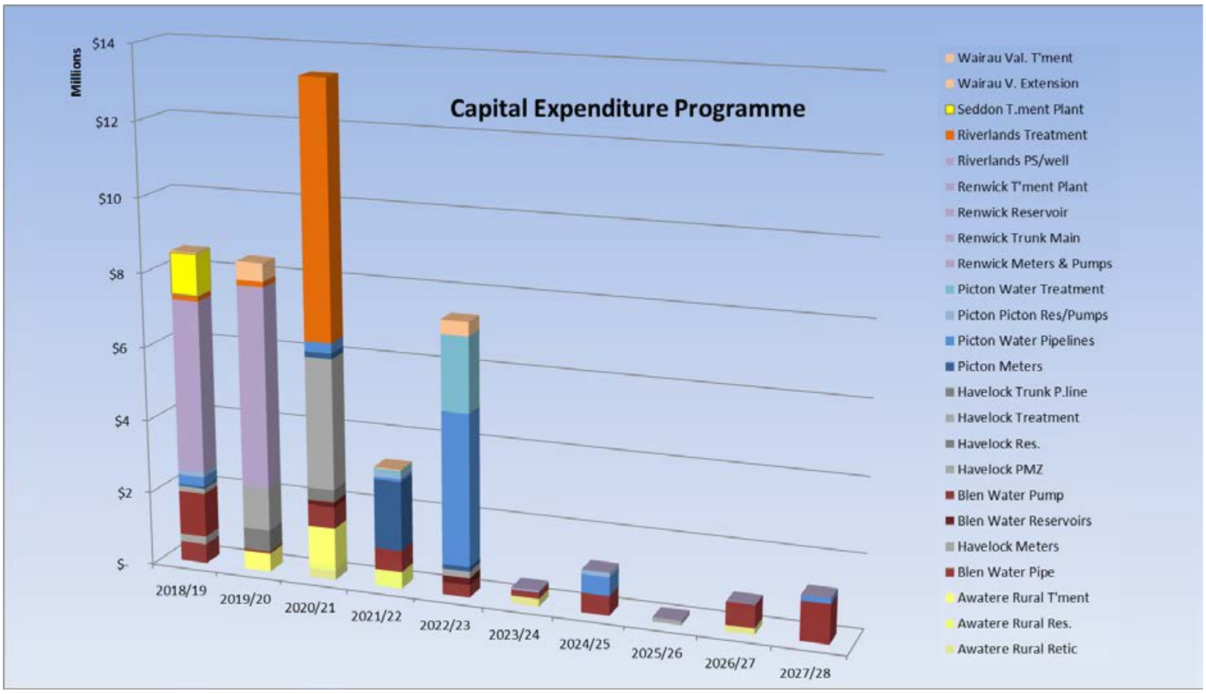


Figure 5-1 Major Capital Projects 2018-28

The timing of the delivery of the capital programme is highly dependent on preliminary investigation and preparation — resource consent approval, land purchase, public consultation, etc. Thorough investigation is time consuming but valuable to ensure smooth progress of works and certainty of contract cost and delivery. It is common to underestimate the time required for project preparation to ensure Council approval and funding is sourced in good time. However, unnecessary finance servicing costs can be incurred if funds are secured too early and not spent.

In the past five years the Council's overall actual Capital Expenditure has ranged from $28.3M in 2013 to $42.7M in 2017 with an average of $34.1M. The projection for 2017/18 is over $50M. In all of these years the actual spending was below budget, often significantly. Capital project timing has been delayed due to:

- finalising community consultation
- obtaining land access
- obtaining resource consents
- the availability of external professional expertise
- receiving acceptable contract price and contractor availability.

It is unlikely that projects will rapidly overcome these types of obstacles described and accelerate much beyond an annual expenditure of $60M. The Council has therefore been decided to limit its overall capital financing to $60M per annum for the first three years of the LTP.

Table 5-2 Capital Programme 2017-27

Water Supply 2018-28 (un-inflated)	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28
Blenheim										
renewal	100,000	150,000	100,000	150,000	100,000	150,000	150,000	100,000	100,000	-
level of service										
growth										
other capex	1,971,439	300,000	973,457	825,000	765,887	410,000	770,038	240,000	855,924	1,300,000
Havelock										
renewal	100,000	-	100,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
level of service										
growth										
other capex	369,250	1,764,501	3,871,999	3,250	183,250	3,250	3,250	123,250	3,250	3,250
Picton										
renewal	62,560	62,560	62,560	62,560	62,560	62,560	62,560	62,560	62,560	62,560
level of service										
growth										
other capex	200,000	15,000	425,191	2,200,000	6,275,000	65,000	638,303	15,000	15,000	165,000
Renwick										
renewal	250,000	250,000	250,000	250,000	82,000	82,000	82,000	82,000	82,000	82,000
other capex	4,958,650	5,453,950	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
Awatere										
renewal	-	-	-	-	-	-	-	-	-	-
other capex	-	-	-	-	-	-	-	-	-	-
Awatere Rural (POE)										
renewal	55,860	131,400	-	295,560	115,500	388,280	35,880	-	-	-
level of service										
Growth										
other capex	82,500	506,500	1,429,179	461,500	6,500	214,955	6,500	6,500	175,306	6,500
Seddon										
renewal	-	-	-	-	-	-	-	-	-	-
other capex	1,116,904	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Riverlands										
renewal	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
other capex	150,000	150,000	6,880,000	-	-	-	-	-	-	-
Wairau Valley										
renewal	-	-	-	-	-	-	-	-	-	-
other capex	40,000	490,000	-	25,000	385,000	-	-	-	-	-
Combined Water										
renewal	-	-	-	-	-	-	-	-	-	-
other capex	-	-3,000,000	1,000,000	1,000,000	1,000,000	2,000,000	2,000,000	-	-	-
	9,458,162	6,278,411	15,109,886	5,292,370	8,995,197	3,395,545	3,768,031	648,810	1,313,540	1,638,810
capitalised overheads	218,531	261,615	616,112	187,453	288,185	76,243	437,526	28,750	216,609	672,739
Total capex	**9,676,694**	**6,540,026**	**15,725,998**	**5,479,823**	**9,283,382**	**3,471,788**	**4,205,557**	**677,560**	**1,530,149**	**2,311,549**
level of service	6,005,720	3,333,276	9,034,896	3,397,000	3,423,568	2,053,442	2,588,467	90,000	240,698	825,000
growth	1,875,275	1,799,378	5,176,812	1,013,000	633,059	346,329	653,319	275,000	517,905	381,000
renewal	1,795,699	1,407,372	1,514,290	1,069,823	5,226,755	1,072,017	963,771	312,560	771,546	1,105,549
Total capex	**9,676,694**	**6,540,026**	**15,725,998**	**5,479,823**	**9,283,382**	**3,471,788**	**4,205,557**	**677,560**	**1,530,149**	**2,311,549**

5.1.3 Growth/Levels of Service/Renewals

In accordance with Schedule 10(3) of the Local Government (Financial Reporting) Regulations 2011, capital expenditure budgets are apportioned between three elements — renewal, improvement in levels of service and growth. Correctly apportioning the costs is important to ensure funding is retrieved from the appropriate sources. It is normally obvious at the outset of a capital project as to the main 'driver' — growth, level of service or renewal. The Council's strategy to apportioning costs is to assess the expired/remaining life of an asset and to attribute the depreciated value of the life-to-date to 'renewal'. This value is obtained from the annual asset revaluation. The remaining costs are apportioned between growth and level of service according to the additional capacity or improvement to be experienced by the customers.

In instances where new assets are built or modern, serviceable assets are replaced, it is possible to assign costs to growth and/or levels of service only.

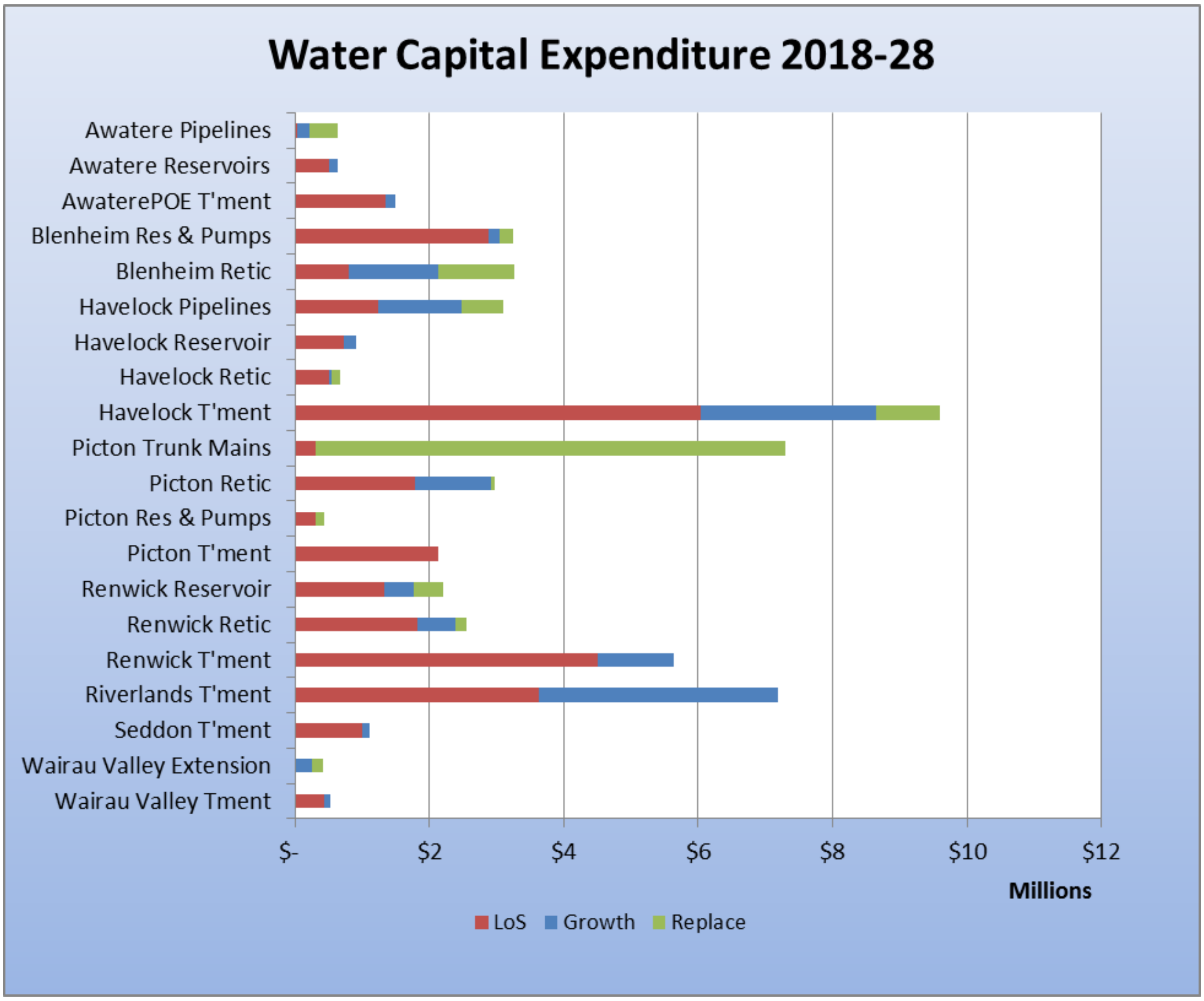


Figure 5-2 Water Capital Investment by Main Drivers

Figure 5-2 shows how the costs of the major capital projects have been attributed to the major drivers – growth, level of service and renewals.

5.2 Funding Strategy

The Revenue and Financial Policy sets out the sources of funding available to Council and how the funding source is allocated between different activities and the drivers for expenditure (growth, level of service and renewal).

Sources of funds available to Council are as follows:

- general rates
- targeted rates
- lump sum contributions

- fees and charges
- interest and dividends from investments
- borrowing
- proceeds from asset sales
- development contributions
- financial contributions
- grants and subsidies
- other sources permitted by statute.

In determining which funding sources were appropriate, Council gave consideration to the following matters in relation to each activity to be funded:

- the community outcomes to which the activity primarily contributes
- the distribution of benefits between the community as a whole, any identifiable part of the community, and individuals
- the period in or over which those benefits are expected to occur
- the extent to which the actions or inaction of particular individuals or a group contribute to the need to undertake the activity
- the costs and benefits, including consequences, for transparency and accountability, of funding the activity distinctly from other activities
- the overall impact of any allocation of liability for revenue needs on the current and future social, economic, environmental, and cultural well-being of the community.

Council's approach to the different sources of funding is listed in the Revenue and Financing Policy, which highlights the funding sources for every Council activity and any sub-activity which may exist. The policy shows the rating tools which Council has determined to be fair and equitable for each activity.

"Ratepayers who are connected to the water schemes are creating the need for the Council to undertake work relating to the availability of potable water. It is considered appropriate for these people to fund the work through targeted rates. Developers who are adding to the demands placed on schemes which require the Council to undertake new capital; works related to growth will contribute to these costs."

5.2.1 Separate Targeted Rates and Charges

Targeted rates and charges are levied to meet the full cost of water and sewerage schemes. The Council considers separate targeted rates are the most equitable funding mechanism based on the benefits assessed for the targeted area.

Council has adopted differential land value rates to fund the debt servicing requirement of the combined sewerage and water schemes, which takes account of the median land values for each scheme; and a differential uniform annual charge for the Combined Water Scheme. The most significant benefits derived from these combined sewerage and water funding schemes are a smoothing of rating spikes in smaller schemes and better cash flow management through the timing of capital works.

Note: The combined sewerage and water rates and charges do not include the initial debt servicing requirements for any new schemes not paid by lump sum contributions.

The overall costs of providing the water supply are made-up of the day-to-day operational expenses and the capital costs of developing, improving and renewing the infrastructure.

Operational Expense Funding

There are several sources of funding for the water supply activity — general rates, targeted rates, lump sum contributions, fees and charges, interest and dividends from investments, borrowing, proceeds from asset sales, development contributions, grants and subsidies and other sources as permitted by statute.

Prior to determining the “residual amount to be funded by general-type rates”, Council identifies all other funding sources appropriate to the type of cost incurred for the water supply service after the exclusion of fees, charges, subsidies, grants and general revenue.

Fees and Charges — These have been set at a level to recover private benefits where it is practical and economic to do so, unless there have been determinations arising from previous funding reviews to fund all or part of such benefits from rates.

Grants and Subsidies — These are sought and applied for whenever they are available.

General Revenues — these are allocated to geographic rating areas in proportion to the gross general-type rates and charges.

The Council has determined the fair and equitable charge for the operational costs of the water supply service to be funded through a combination of general rates, uniform annual charge and metered charges. The allocation of charges is dependent on geographical location and the details are included in the Long Term Plan.

Funding of Capital Investment

The sources of funds for capital expenditure are as follows:

- development and financial contributions
- capital grants and subsidies (where available)
- user charges
- general revenue sources
- Council’s financial reserves, including Depreciation Reserves
- loans
- targeted rates (directly charged).

5.2.2 Development Contributions Policy

The Development Contribution Policy was reviewed and updated based on the latest forecasts and included in the Long Term Plan 2018-28.

Marlborough District has experienced significant growth over the last decade. Although this is often hailed as positive for the community, growth also presents a number of challenges. Not least is Council’s task of expanding infrastructure networks to support the increased use of essential services.

The cost of expanding these networks is often high, and the issue of funding inevitably arises. Funding the expansion of these core networks entirely from general rates (or other indirect means) is inequitable, because existing ratepayers may neither cause these works to occur, nor materially benefit from them. As a result, alternative means for funding these capital works must be considered. Development Contributions is one such source.

Council adopted a Development Contributions Policy effective from 1 July 2009. The Development Contributions Policy replaced the Financial Contributions Policy with the exception of the North West zone, parking contributions and where the new Policy is silent on issues in the operative Resource Management Plans.

Council considers the use of the Development Contributions mechanism under the Local Government Act 2002 to provide a fair and robust means of recovering the cost of growth as compared to charging ratepayers.

The purpose of the Development Contributions is to recover an appropriate proportion of the costs of growth-related capital expenditure from participants in the property development process, rather than from general rates or any other indirect funding source. The full policy is included in the LTP.

Charges are calculated for each catchment and each activity on the basis of:

- the expected scale and timing of capital works required to service growth
- the expected rate and timing of developments for which the works are required.

The growth projections used to determine income from Development Contributions in the modelling are based on long run straight line averages using the Department of Statistics population projections. For infrastructure outside of Blenheim forecast Household Equivalent Units (HEUs) used in the modelling are higher than the Department of Statistics populations projections. This favours developers as it has the effect of reducing the modelled Development Contributions results. This approach recognises the slower development rates in these areas and the lack of economies of scale. The drivers for capital works projects are categorised into growth, improvement/maintenance of the level of service and renewal of existing capability. The costs and source of funding the work is apportioned accordingly.

The capital expenditure used for modelling what the appropriate charges include:

- expenditure previously incurred to create spare capacity to enable future development to occur
- expenditure beyond the ten year programme which is required to cater for the cumulative effects of growth
- an assessment of expenditure which relates to future growth beyond the life of the LTP.

5.3 Valuation Forecasts

5.3.1 Asset Valuation

The asset valuation has been undertaken annually since 2008. The asset register of water reticulation consists of nearly 4,000 pipes with individual age, length, diameter and life expectancy characteristics. A data set has been collected of the out-turn costs of water pipeline renewal contracts. From this data set a cost curve has been established and unit rates for pipe-laying estimated. The rates are reviewed and updated each year and used in the revaluation. A summary of recent valuations is shown in Table 5-3. A detailed breakdown of asset values is included in Appendix 5.

Table 5-3 Summary of water revaluations 2001-17

Valuation	Replacement Cost	Optimised Depreciated Replacement Cost	Annual Decline in Service Potential
2001	$ 44,232,026	$ 27,650,356	$713,930
2005	$ 81,400,598	$ 58,582,474	$ 1,137,242
2008	$ 155,202,356	$ 97,876,059	$ 2,211,837
2009	$ 131,925,205	$ 85,693,284	$ 1,918,194
2010	$ 156,226,295	$ 104,993,608	$ 2,176,377
2011	$ 162,813,271	$ 106,532,663	$ 2,346,820
2012	$ 183,765,748	$ 121,191,161	$ 2,807,162
2013	$ 189,339,360	$ 122,490,486	$ 2,828,780
2014	$ 200,721,145	$ 127,568,353	$ 3,068,051
2015	$ 208,018,119	$ 129,279,813	$ 3,184,288
2016	$ 219,575,423	$ 135,050,394	$ 3,407,531
2017	$ 228,644,649	$ 140,980,537	$ 3,529,418

The pipe installation rates have been separated into urban and rural. The costs difference reflects the additional traffic management, greater density of other underground utilities and reinstatement costs of urban pipe-laying.

New assets are added to the register as they bought, built or vested to the Council. There has been a significant increase in recent years as four major water treatment plants have been upgraded and new reservoirs built to increase storage capacity.

Table 5-3 shows the annual depreciation of water assets to be assessed at $3.5M. This sum includes the Southern Valleys Irrigation Scheme infrastructure (DISP in 2017 was $333,700.) Reference to Table 5-2 shows that expenditure on renewals is projected to be between $1.0M and $1.7M until around 2022. Depreciation is fully funded through the rates. The balance is held in reserves and used as internal loans to fund other capital projects. There is a significant spike in renewal expenditure in 2022/23 as two major trunk mains in Picton are programmed for replacement.

5.3.2 Depreciation Methodology

The Gross Replacement Cost is the sum of the replacement costs of each of the components if it is replicated with *modern equivalent asset* and recognises the use of modern materials, standards and installation techniques to replicate the existing system.

The Depreciated Replacement Cost distributes the value of the asset across its useful life.

“The way in which depreciation is allocated over the life of the asset must reflect the pattern in which the assets’ future economic benefits are expected to be consumed by the entity.” (NZ International Accounting Standard 16).

The above straight line depreciation is considered appropriate for the assets included in this valuation. The Depreciated Replacement Cost has therefore been calculated by:

Depreciated Replacement Cost = Replacement Cost x (Remaining Life/Life Expectancy).

The Annual Depreciation (Decline in Service Potential) spreads the current value of the asset across the remaining life of the asset. (Depreciated Replacement Cost /Remaining Life).

It is Council policy to fully funded depreciation. The Annual Decline in Service Potential is used for determination of Council's general and targeted rates for the funding of future infrastructure renewal.

The valuation provides fundamental information for the Long Term Plan as required by Schedule 10 of the Local Government Act 2002. It has been prepared in accordance with the New Zealand Accounting Standards Board Public Benefit International Public Sector Accounting Standard 17 – Property, Plant & Equipment (PBE IPSAS 17) and follows the guidance provided by the National Asset Management Steering Group (NAMS) in the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines, Version 2 (2006).

An annual report is compiled by the Asset Management Engineer in collaboration with the engineering managers. It is peer reviewed by an independent external valuer and scrutinised by auditors from Audit NZ.

A sharp increase in the valuation occurred in 2008 when the unit rates were re-assessed. Prices had increased as a result of high global demand and an economic boom in many international markets. Since then prices have stabilised substantially although there is evidence that the current rates are again under pressure. The rates have not been increased in response to the latest data as it is not clear if the prices are a transient spike or a long term trend.

5.3.3 Revaluation Rates

In recent years the revaluation rates have been increased by the application of an index derived from the Capital Goods Price Index published by Statistics New Zealand.

A cost curve has been established by graphing the out-turn costs of pipe renewals contracts undertaken within the region. The data is updated with all new contract costs. Between 2013 and 15 an additional 8% was factored into the rates for pipe-laying and 12% for plant and equipment. The increase to contract rates covers design, supervision and other overheads.

Recent tender prices have shown a sharp increase in pipe-laying costs, particularly at larger diameters. Whilst these have been added to the data, the cost curve has not been realigned as there is some doubt as to whether this a permanent increase in prices or a transient peak. Council will continue to review and adjust them as necessary.

In 2017 revaluation rates were exchanged with five other local authorities and information from a survey by Hayes Consulting. No immediate adjustments were required as a result of the comparison.

In the foreseeable future depreciation will continue to be calculated on a straight line basis.

There are significant and unpredictable risks to the valuation process – including prices of raw materials, local plant and labour costs, and fluctuations in international exchange rates. Perhaps the major risk to future valuations is a significant shift in life expectancy of a large group of assets, if either a material type is deteriorating faster than expected or an external influence is causing accelerated deterioration to an assets group.

The earthquake in November 2016 caused some damage to the reticulation in Awatere but overall there was little damage to the water supply infrastructure. Subsequent CCTV surveys have shown significant damage to the stormwater and wastewater earthenware pipes.

5.3.4 Optimisation

The Marlborough water supply systems are relatively young and continuing to expand as the population continues to grow. None of the systems are over-designed or have significant redundant capacity. There are very few opportunities for optimisation.

The reservoir at Aerodrome Road, Blenheim is unlikely to be needed for the drinking water supply but may be required as a similar store of water may be needed for firefighting purposes due to its close proximity to the airfield.

The small water treatment plant at Seddon School will become obsolete once the general supply is treated to comply with the NZ Drinking Water Standards.

Due to the problems of water quality in the Barnes Dam (Picton) and the extreme difficulty of access to rebuild the dam it is unlikely to be replaced. However an equivalent source will need to be developed and an equivalent sum has been included in the valuation.

The Andrew Street borehole and treatment plant was de-commissioned in 2012/13. The components have been removed from the site and put into storage for reuse or sale. They have been given a nominal resale value and will be depreciated over five years.

5.4 Key Assumptions

The key assumptions including the level of uncertainty, risk and financial impact for all Council activities are described in the Long Term Plan – See Appendix 4. Topics include legislation, inflation, interest rate on Council borrowing population growth, economic life, subsidy rates, natural disasters, taxation framework, asset ownership and valuation, sources of funding for capital projects, climate change, the emissions trading scheme and resource consents.

Issues specific to water assets are described below or in greater detail elsewhere in this plan.

The life expectancy of the water supply pipes is based on the NAMS Guidelines with the exception of asbestos cement which is based on the tables in the New Zealand Asbestos Cement Watermain Manual 2001. The life expectancy varies with the diameter of the pipe and the subsequent wall thickness. Life expectancy of the diameters has been capped at 100 years.

Replacement of reticulation pipework will be with modern materials — PVC, polyethylene, ductile iron, steel or concrete. All plant and equipment will be replaced with modern equivalents.

Pipe-laying rates are inclusive of manholes, valves, hydrants, air valves, fittings apparatus and branch connections. The rates are an average across all ground conditions and depths, and include trench support and de-watering.

Reticulation pipework below a nominal diameter of 75 mm is assumed to be predominantly installed in non-carriageway locations and with a proportion of low-dig installation techniques.

Service lines are valued separately at the connection fee rate. An adjustment is made if meters are included in the rate, and the meters are valued separately.

The life expectancies that have been adopted suggest there is a significant amount of pipework that is beyond its theoretical life. This is particularly apparent for asbestos cement pipe in the Awatere. However there has not been an equivalent increase in mains bursts or repair activity. A pipe sample assessment of asbestos cement pipe in Renwick showed the pipe to be in poor or very poor condition. The 150mm diameter pipe had deteriorated faster than the 100mm pipes. More targeted pipe surveys are to be undertaken in the future to determine condition trends and to amend life expectancy if necessary.

The life expectancy of plant and equipment assumes the continuation of the good standard of planned pre-emptive maintenance currently undertaken. The NAMS guidance on life expectancy has generally been followed unless there is clear local evidence to the contrary.

Table 5-4 Asset life expectancies used in revaluation

Material Type	Pipe Diameter	Useful Life		Material Type	Pipe Diameter	Useful Life
AC	25	38		EW		77
AC	32	38		FT		100
AC	40	38		HEL		100
AC	50	38		MPVC		100
AC	75	43		NOF		60
AC	100	53		NOVA		100
AC	125	63		PE 100		100
AC	150	72		PE 80		100
AC	200	90		PVC		100
AC	250	98		RC		100
AC	300	100		SP		100
AC	375	100		ST		100
AC	225	100		ST-CC		100
ALUFLO		100		ST-D		100
B-ARCH		80		ST-GL		60
C-ARCH		80		ST-SW		100
CC		80		UNKNOWN		100
CI		100		UPVC		100
CU		40		VC		80
DI	0	100				
DRUM		50				

Plant	Useful Life
Mechanical Plant	40
Electrical Plant	25
Civil Structures	100

5.4.1 Data Confidence

The data quality is regarded as good. Of the pipes recorded in the asset management database one or more of the attributes (age, diameter or material type) was missing for around 1% of records. Estimates were made for the missing data based on adjacent pipes or the known history of land drainage in the area.

Table 5-5 Estimated asset data quality provides an indication of the quality of data held regarding the water reticulation in each of the service areas.

1 = Excellent, 2 = Good, 3 = Average, 4 = Poor, 5 = Unknown

Table 5-5 Estimated asset data quality

Area	Length	Diameter	Material	Age	Condition
Blenheim	1	2	2	2	3
Picton	3	3	3	3	4
Havelock	1	2	2	2	4

Area	Length	Diameter	Material	Age	Condition
Renwick	1	2	2	2	3
Riverlands	1	2	2	2	2
Wairau Valley	1	2	2	2	2
Awatere	1	2	2	2	4
Spring Ck /Grovetown	na	na	na	na	na
Other	3	3	3	3	3

5.4.2 Risks and Assumptions

The risks and assumptions considered in the plan are shown in Table 5-6. The wider assumptions for Council activity are described in the Long Term Plan and are included in Appendix 4..

Table 5-6 Risks and assumptions

Risks & Assumptions	Discussion	Responses	Confidence in Assumption	Risk
Financial assumptions All expenditure has been stated at 2017 values and inflated through the Local Government Price Index (LGPI).	The LGCI is typically 1 or 2 percentage points above CPI. The LGCI includes a bundle of prices representative of all Council costs that may not represent the cost increases in water materials and contract rates.	Many costs are subject to fluctuations in international markets out of the control of the Council. The A&S Department uses the best information practically available and seeks Council approval with updated estimates as the projects progress.	Medium	Low
Accuracy of capital project cost estimates The capital project cost estimates are sufficiently accurate to determine the required funding level.	Under-estimation of project out-turn costs will cause a problem in delivery of projects within the agreed budget. Delays or refinancing may result. Over-estimation of the capital projects may incur additional financing costs.	Outline costs are prepared during the feasibility stage. Detailed construction costs are peer-reviewed prior to contract tender and returned tenders are compared with the engineers' estimates. Project constructions are closely supervised to avoid delays or additional costs.	Low	Low
Emergency funding The level of funding available to the Council will be adequate to cover asset rehabilitation following an emergency event.	Funding requirements and sources are regularly reviewed and updated. The Council has employed consultants to undertake a Maximum Probable Loss assessment and advice on risk management strategies.	Funding sources include use of reserves, central government relief, commercial and cooperative insurance (LAPP). Once other sources of funding have been exhausted capital projects will be deferred and money reassigned.	Low	High

Risks & Assumptions	Discussion	Responses	Confidence in Assumption	Risk
Impacts of climate change There remains some uncertainty on the extent and timing of climate change impacts in the region.	The Council follows the recommendations of the Ministry for the Environment and research and advice from international organisations.	Infrastructure is designed for the worst case projections but only constructed 'as and when' necessary. This approach maintains the maximum flexibility and defers investment.	Medium	Medium
Changes in legislation and national policy	The risk of major change is high due to the changing nature of the Government and political focus. The outcome of the Havelock North Drinking Water Inquiry is a particularly relevant example.	The Council takes all opportunities to engage with central government and local government representation — LGNZ, SOLGM, NZWWA, etc to help anticipate future policy development.	Medium	Medium
Growth forecasts The region will grow as forecast in line with current projections.	The capital expenditure programme is based on the medium to high growth forecast. Migration is likely to have a greater influence on growth as birth rates decline. Migration will respond more rapidly to changes in the economic prosperity of the region than natural growth.	Continue to monitor population statistics and influencing factors. Ensure the design of long life assets can accommodate the higher growth projection, and assets with a shorter life can be readily upgraded as necessary.	Medium	Low
Demographic projections The age profile of population will increase significantly.	An older population will see an increase in the proportion of ratepayers on a fixed income and a decreasing ability to respond to cost increases. An older population will have a different lifestyle and will change demand for services.	Ensure infrastructure is flexible and appropriately sized. Manage operational and capital costs and seek cost efficiencies.	Low	Low

Risks & Assumptions	Discussion	Responses	Confidence in Assumption	Risk
Timing of capital projects Capital projects will be undertaken when planned.	The risk to the programme timing of capital projects is high due to factors such as delays in the approval of resource consents, public consultation and land purchase.	The Council tries to mitigate these issues by undertaking the consultation, investigation and design phases sufficiently in advance of the construction phase. Budgets are prepared for the best case scenario but delays can result in additional costs from under-utilised funding.	Medium	Low
Resource consents The approval of resource consent applications and the imposed consent conditions have been reasonably anticipated.	There is a high risk that a resource consent application will have restrictive conditions that will delay or incur costs of construction or operation of new infrastructure.	Thorough public consultation, early engagement with the regulatory authorities, and completion of Environmental Assessments help to manage the risks.	High	High
Asset data knowledge The Council has adequate knowledge of the assets and their condition so that the asset management plan will allow the Council to meet the proposed levels of service.	Increased frequency of asset failure will affect the capacity to meet levels of service without increased maintenance costs or an accelerated renewal programme.	Above-ground assets are generally well monitored. There is additional effort to conduct CCTV surveys of underground assets and improve data collection on their condition. The hydraulic modelling of all areas has advanced to a good standard. Maintain flexibility within renewal programmes and funding models to absorb fluctuations in timing and investment.	Low	Medium

Risks & Assumptions	Discussion	Responses	Confidence in Assumption	Risk
Network capacity That Council's knowledge of network capacity is sufficient to accurately programme capital works.	The Council hold good records on the existing networks which assists in the development of hydraulic models.	Detailed hydraulic models have been developed and verified for most networks. The models can be used to assess changing patterns in demand as a result of climate change, population growth, changing lifestyles, etc.	Low	Low
Demand patterns Both total demand and the daily/seasonal pattern have been accurately assessed.	The factors contributing to changes in demand, such as population, lifestyle, climate, economic development, have been included in future projections.	Other influences such as Smart Metering and the Internet of Things is likely to have a beneficial influence on the current demand pattern by reducing the peaks.	Low	Low

Chapter 6: Plan Improvement and Monitoring

Council asset management practices and processes are continually evolving to help improve decision making related to the operation and investment in high value infrastructure. New data collection practices are being deployed. Advances in electronic data management and performance monitoring technology are providing improved information to support key decisions.

Previous asset management plans and subsequent decisions are reviewed and the plan is adjusted to meet the changing demands of customers and stakeholders, and to match the financial realities of the future.

Components of the Plan Improvement and Monitoring section

6.1 Status of Asset Management Practices — current and desired state of AM processes, data and systems.

6.2 Improvement Programme Progress — review of progress on the 20015/25 improvement programme.

6.3 2018–21 Improvement Programme — issues identified and to be progressed.

6.4 Monitoring and Review Procedures — includes three yearly AMP reviews, annual asset revaluations, and six monthly monitoring of levels of service.

6.5 Performance Measures — including the national non-financial performance measures.

6.1 Status of Asset Management Practices

6.1.1 Asset Management Information System

The Assets & Services Department has used proprietary databases for the collection of asset data for over 20 years. A project was commenced in 2011 to upgrade the asset management information system. The project was led by the Information Systems Department and a small team of subject experts. External consultants were employed to examine the asset management information needs throughout the Council including Reserves, River Control, Regulatory, Fleet, Libraries, Property, the Harbour Master and others.

In February 2013 the Works and Assets module of the TechnologyOne software was purchased. Extensive effort was required to build and configure the software to meet the needs of water, wastewater and stormwater asset management. The project evolved to include the revision and integration of the financial accounting system. In December 2014 all data from the previous (Hansen) database was migrated and the new system went live.

The register of assets and their attributes is stored in the Asset Management Information System (AMIS) along with the maintenance history, maintenance schedules and performance data. The system is linked to service requests, the Council's document management system and the financial expenditure database.

The AMIS has universal access across the Council. Editing rights are controlled but ownership of the data is devolved as close to the source of the data as possible.

The quality and completeness of the stored data is continually improving. Data is extracted from a variety of historical and contemporary records — service record plans, property files, new connection records, as-built records (internal and contractor) and maintenance works orders. The quality of historical data can be variable and considerable effort is deployed to check the accuracy of the data sources.

Ensuring there is consistency and accuracy in contemporary data collection is also a challenge. Discussions with staff throughout the A&S Department has resulted in the development of a protocol that defines a common understanding of the accuracy of asset data and the confidence in the source data. In conjunction with this, there has been a continued effort to ensure consistent contract specifications are included and in-house record checks are undertaken.

6.1.2 Geographical Information System

The ESRI ARCMap GIS system has become a cornerstone for information management within the Council. The AMIS has an automated interface with the GIS. The GIS has many tools and features that can be leveraged by the AMIS and a well-developed integration was a prime criterion in the selection of the AMIS upgrade.

Water asset information can be viewed by all staff across the Council through the GIS viewer, Dekho. Brief details of the asset are available in an inquiry window within Dekho, including the asset reference number to use to access additional information.

6.1.3 Computer Modelling

The Council has very high quality in-house network modelling capability which is augmented by specialist consultants. Models are used extensively to predict the behaviour of the reticulation network and as a planning tool for future designs.

Models are verified by on-site observations and measurement and have a high level of reliability. They are extensively used to predict flows and pressure in the water supply system, and to model the effects of infrastructure upgrades and operational configuration.

6.1.4 Financial Forecasting

An extract/transform/load programme has been developed to undertake the annual revaluation of assets from the asset register. Unit rates and prices are updated from contemporary contract prices and where possible are verified with rates from other councils. Where insufficient direct information is available, historical construction/purchase costs are inflated through nationally published construction cost indices.

Current financial forecasts are considered to be moderate to good. Asset condition grading and subsequent determination of life expectancy is being improved. Further refinement of asset components and unit rates estimation may be expected in future.

The quantum of capital expenditure forecasting is good/very good. Project costs are regularly reviewed as they progress or particular cost pressures become apparent. Estimation of the timing of capital works is more challenging. Public consultation, land purchase and resource consent applications can be very time consuming and the outcomes are difficult to predict. Project budgets are normally scheduled on a best case scenario to ensure sufficient funds are available for projects to proceed on time.

6.1.5 Customer Service Data

The introduction of the Water Services Database in 2010 and the accurate logging of customer service requests have added great value to asset management. The database was superseded in December 2014 following the introduction of the TechnologyOne AMIS and the use of the Customer Request Module.There is now a good mechanism for registering customers' calls and recording response times. There is a facility to sort and filter service requests in order to monitor the performance of assets.

6.1.6 Asset Data Collection

Asset data is constantly being updated and checked. Assets & Services staff are converting the hard copy asset records to a digital format in the linked Geographical Information System (GIS) and the AMIS database. The spatial information on the location of assets, zones and catchments area is kept in the GIS whilst the individual asset attributes are stored in the AMIS.

A small team of staff systematically ‘sweep’ through a networked area, trawling through the data sources to extract accurate attribute details in order to test the systems are operating correctly.

Table 6-1 Data capture completion

% Completed	Blenheim	Picton	Havelock	Renwick	River-lands	Awatere	Wairau Valley	Grove’n/ Spring Ck
Water	100	50	100	100	85	75	80	na
Wastewater	100	50	100	100	70	60	na	90
Stormwater	100	50	100	90	70	50	na	40

Information sources include as-built drawings supplied when the asset was constructed. These are produced when the asset is built and can therefore be quite old. Quality can be variable and many drawings are in imperial measurements. Recent as-built drawings can be either hard copy or electronic CAD drawings. These are carefully scrutinised by the Asset Development Officer and the asset will not be accepted for adoption by the Council until the drawings meet the specified standard.

From time to time specific surveys are undertaken. Often plans and long-section drawings are produced and data such as depth and invert levels of underground pipes recorded. Closed circuit TV (CCTV) surveys of sewer and stormwater pipelines are generally undertaken to investigate specific problems or confirm particular requirements. The surveys are reviewed by engineering staff and pipe condition grades are assessed and recorded. The location of laterals can also be ascertained and recorded.

Applications for connections from the mains to new properties or subdivisions are kept as separate records. The Council’s property files often record the location, size and material of underground services within the property boundary.

The repairs and maintenance operatives return records of the assets they have worked on. In the past the quality of the records has been variable, with little consistency in how they are provided. Recently efforts have been made to improve the quality of this source of information. Field staff have been trained and mentored in the data requirements. The current status of data quality is shown in Table 6-2.

Table 6-2 Assessment of data quality

	Bores	Mains	Service Lines	Treatment Plants	Storage	Pumps	Pump Stations
Age	A	C	C	A	A	A	A
Material	A	B	B	A	A	A	N/A
Diameter	A	B	B	N/A	A	A	N/A
Location	A	B/C	B/C	A	A	A	A
Criticality	A	A	A	A	A	A	A
Performance	A	B	B	A	A	B	A
Condition	A	C	C	A	A	A	A

Data quality is rated from A to E as outlined below.

A = Highly reliable — Data is based on sound records, procedures, investigations and analysis, documented properly and recognised as the best method of assessment. Data set is complete and estimated accuracy is +/- 2%.

B = Reliable — Data is based on sound records, procedures, investigations and analysis, and documented properly but has minor shortcomings, for example some data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or extrapolation. Dataset is complete and estimated to be accurate to +/- 10%.

C = Uncertain — Data is based on sound records, procedures and investigations, and analysis which is incomplete or unsupported or extrapolated from a limited sample for which grade A or B data are available. Dataset is substantially complete but 50% is extrapolated data and accuracy is estimated to be +/- 25%.

D = Very Uncertain — Data is based on unconfirmed verbal reports and or cursory inspection and analysis. Dataset is substantially complete and most data is estimated or extrapolated. Accuracy is +/- 40%.

E = Unknown — No, or very little data, is available.

6.2 Improvement Programme Progress

During the preparation of this asset management plan, improvements have been identified that will assist in the management of assets and delivery of services in the future. Improvement is required as technology progresses, the operating environment changes and the aspirations of stakeholders evolve. The provision of water services is also subject to changes in the legal framework and the political climate. Business processes need to continuously adapt to meet new demands.

Progress on the 2015-25 improvement plan is detailed in the table below.

Table 6-3 Progress on the 2015–2025 improvement plan

Modelling	**Target Date**	**Progress**
Development of dynamic hydraulic models for remaining reticulation systems (Havelock, Renwick, Awatere, Riverlands)	2015 onwards	Completed (but Awatere needs updating)
AMIS Upgrade Project		
Ensure the migration of data from Hansen to TechOne is complete and accurate	2014 onwards	Completed
Introduction of upgraded AMIS to A & S	2014	Completed — ongoing mentoring
Implementation, training, business process management	2012 onwards	Completed
Prepare and implement business reports from the new AMIS	2015 onwards	Progressing — see Ch 6
Implement scheduled maintenance programmes through the AMIS software	2015 onwards	Completed
AMIS Data		

Modelling	Target Date	Progress
The new AMIS will improve data searching, auditing and facilitate updating	Dec 2014 onwards	Completed
Correction of ‘best estimate’ data in the asset register	June 2015	Ongoing
Leakage		
Evaluate the effectiveness of the Renwick ‘Find & Fix’ contract	June 2015	Progressing — see Ch 6
Inclusion of leakage/unaccounted for water in water demand management solutions	2014 onwards	Progressing — see Ch 6
Growth	**Target Date**	**Progress**
Develop outline service plans for the new development zones.	2015	Progressing — see Ch 6
Evaluate the growth potential following the Census projections publication in summer 2015.	2015	Completed (continued review will occur as further information becomes available)
Financial		
Review and update until rate cost curves	June 2015 onwards	Progressing — see Ch 6
Revalue water treatment plants	2015/16	Completed
Revise the Development Contributions Policy in line with current growth projections and costs	March 2015	Completed
Asset Condition	Target Date	
Develop the condition survey and monitoring tactics for watermains	2016	Progressing — see Ch 6
Develop operative skills in identification and recording of asset condition	2015	Completed — ongoing mentoring
Develop condition grade recording and reporting systems within the asset management information system (Asset Management Engineer)	2015	Progressing — see Ch 6
Asset Performance		
Improved performance monitoring	2015/16	Progressing — see Ch 6
Maintenance Scheduling		
Proactive maintenance schedule of asset groups	2015	Completed

Modelling	Target Date	Progress
Resilience		
Post Canterbury earthquake risk re-evaluation	2012 onwards	Completed
Adopt appropriate best practice and learnings from SCIRT	2013 onwards	Completed

6.3 2018- 21 Improvement Programme

Issues identified, and to be progressed in future, are outlined below.

6.3.1 Modelling

Accurate dynamic hydraulic models have been developed for the Waikawa–Picton and Blenheim water distribution networks. These are used to assist in the design of upgrades and new works, to identify ‘choke points’ and predict the effects of future development. Basic models are available for Renwick, Riverlands and Awatere. Further improvements to the models will assist in future.

Issue	Responsibility	Target Date
Development of dynamic hydraulic models for remaining reticulation systems (Havelock, Renwick, Awatere, Riverlands)	Planning & Development Engineer/Services Development Engineer/Consultants	Completed (but Awatere needs updating)

6.3.2 Asset Management Information System (AMIS)

The AMIS upgrade project was delivered in December 2014. The implementation of the new AMIS involved a major programme of training and familiarisation. A large amount of work was undertaken to check the migrated data and remedy errors in the previous data set that became apparent during the changeover.

Planned maintenance schedules were established and operatives trained to use and update the schedules.

Business processes were revised in order to improve field data collection. Electronic field data collection has been introduced and further development will be progressed. The process of head office authorisation of field data can be revised as skills improve.

Familiarisation with the AMIS has assisted with simple interrogation and reporting from the database. Additional software has been purchased to help facilitate more elaborate business intelligence reporting. More work is required to develop the potential of the programme and provide asset managers with relevant and accurate reports.

Issue	Responsibility	Target Date
Prepare and implement business intelligence reports from the new AMIS	Asset Management Engineer	2018/19
Continued improvement of field data capture and the ‘back-office’ approval system	Asset Management Engineer/Operations Manager	2018 onwards

6.3.3 Asset Register

Significant advances have been made in the transfer of hard copy records into the GIS and AMIS systems. Existing records include original public works utility plans, multiple and overlapping as-built plans of new subdivision and mains extensions, field books, new connections records, maintenance records, property files, and the PIMs/LIMs. These sources of information are rarely consistent and considerable effort is required to determine the accuracy and reliability of the data.

The system of assigning the accuracy of key data with a confidence grade has become well established:

1 = high confidence in accuracy (location within 300mm)

2 = medium confidence in data accuracy (within 1m of location)

3 = low confidence in data accuracy (>1m from location).

A small team of skilled technicians have been systematically transferring data from the various hard copy sources to the electronic information systems. A programme for the systematic 'sweeping' of areas has been implemented and progress is regularly reviewed and communicated to staff.

There are instances within the asset register of data that has been estimated or taken from less accurate sources. For example the installation date of some pipes in Picton was recorded as the date the drawing was created and not the correct installation date. Non-critical errors and estimates have been tolerated and will be corrected when resources allow.

Issue	Responsibility	Target Date
Continue 'sweeping' network areas to transfer hard copy plans to electronic data	Asset Manager Engineer	Ongoing
Correction of 'best estimate' data in the asset register	Asset Manager Engineer	Ongoing

6.3.4 Unaccounted for Water

The desktop assessment of leakage concluded the apparent levels of leakage in most networks is high or very high. On unmetered systems, domestic private use is estimated based on minimum night flows. Best estimates of unknown parameters are included but further investigation is required to validate the estimates.

Annual leakage surveys in Renwick and Havelock have detected leaks both on Council and private pipework. Early analysis of the data from domestic water metering trials in Renwick and Picton has shown very high consumption within properties particularly in Renwick. The consumption appears to be mainly related to garden irrigation.

Issue	Responsibility	Target Date
Continue leak detection contracts in Havelock and Renwick and consider extending to other targeted networks	Operations Engineer	Ongoing
Evaluate the domestic water metering trial in Havelock and Renwick. Consider the consequences for future demand management plans	Planning & Development Engineer/Operations Engineer/Asset Manager Engineer	2018–20

6.3.5 Urban Growth

The “Growing Marlborough” urban growth strategy has provided a clear definition of the quantum of land required to meet the needs of growth, and identified potential growth pockets. The ability to service the areas with water utilities was included in the assessment. Council provides outline service plans to ensure infrastructure is installed to meet the demands of all future development in the area. Costs are reapportioned to individual developers through development levies.

The 2013 Census confirmed previous projections of slowing population growth, an ageing population and movement of population from rural areas to urban centres. These trends are unprecedented in recent history. The Council must remain vigilant of national trends, understand the regional context and adopt flexible plans to respond to changes.

Issue	Responsibility	Target Date
Continue to develop outline service plans for the new development zones	Infrastructure Projects Engineer	Ongoing
Continue to monitor population growth trends and adjust infrastructure plans accordingly	Development Engineer/ Infrastructure Engineer/Asset Management Engineer	Ongoing

6.3.6 Financial

The Council compared pipe and asset renewal rates with a number of other New Zealand councils during the revaluation of water assets in 2017. There were a number of variations in rates and methodologies. Overall there was no evidence to support a major change to the rates or life expectancy assumptions. Contract costs will continue to be monitored to check contemporary market costs.

The ETL (extract/transform/load) process performs very well on the live data set. Some adjustments have been necessary to align the operational treatment plant with the ‘treatment’ definition for financial reporting. Configuration of the valuation reporting to separately identify financial and operational assets has been difficult to resolve to the satisfaction of external audit.

The costs of major treatment plant renewal are well recognised following both the recent upgrade of four plants in the region and engineering estimates for a further three.

Issue	Responsibility	Target Date
Ensure operational and financial asset reconciliation is achieved and maintained	Asset Management Engineer/Accountants	June 2018 onwards

6.3.7 Condition Monitoring

The current life expectancy of pipes is based on a theoretical maximum of 80–100 years or guidance from the AC Pipe Manual. This methodology is predicting a significant proportion of the network is reaching the end of its useful life — a prediction that is not substantiated by actual pipe failures. There is, therefore, a need for a more systematic condition analysis of the reticulation. The asbestos cement mains laid at the instigation of the Awatere water supply scheme in 1942 need to be treated as a priority but a comprehensive condition assessment plan should be developed.

Asbestos pipe sampling was undertaken in Renwick and revealed greater deterioration in the 150mm diameter pipe than the 100mm diameter samples. This was an unexpected result as it was assumed that (at a constant rate of deterioration) the thinner walled, small diameter pipes would have a shorter life expectancy than larger diameter pipes with thicker walls.

The long-established and experienced workforce has a good knowledge of the performance of the pipes. Visual condition assessment and photographic recording is undertaken during repair and maintenance works. Further improvements could be made in the consistency and quality of the field data returned the recording of the data, the interrogation of the data set and subsequent business intelligence.

New techniques to assess the in-situ condition of water pipes will continue to be evaluated and deployed where appropriate. Condition monitoring will be prioritised based on the criticality of the asset and the risk of failure

The asset management information system must be able to accept and report/display the condition grades for management decision making.

Issue	Responsibility	Target Date
Extend pipe condition sampling and surveys to improve life expectancy projections. A more methodical programme will be developed and prioritised based on asset criticality and risk.	O&M Engineer/Asset Management Engineer	2018 onwards
Develop operative skills in identification and recording of asset condition	O&M Engineer/Asset Management Engineer	Ongoing
Improve the quality and consistency of condition grade recording and reporting systems	Asset Management Engineer/Operations Engineer	2018
Develop business intelligence reports to assist with renewal decision making	Asset Management Engineer	2018

6.3.8 Performance Monitoring

A key output of the asset management information system upgrade is the introduction of a suite of performance reports available to engineering management and other staff. The structure of the database does not allow maintenance activity to be readily analysed by asset type. Reporting software has been purchased to enable integration of data from separate data sets. Additional work is required to configure the software, learn the analysis tools and prepare useful business intelligence reports.

Reports on topics such as service request response times, failure modes, performance of materials and fittings, operational costs, number and cost of reactive maintenance activities and maintenance costs of asset groups will be beneficial.

Drinking water quality information is provided to the national database ‘Water Online.’ The Water Online database superseded the Water Information for New Zealand (WINZ) database during the spring of 2017. Further work is required to ensure local water quality results are securely recorded and readily transferred to the national database.

Issue	Responsibility	Target Date
Improved business intelligence reporting on asset performance	Asset Management Engineer	2018

6.3.9 Proactive Maintenance Scheduling

The introduction of the upgraded AMIS has facilitated the scheduling of preventive maintenance by operational staff. Scheduled work orders can be produced for routine maintenance work. Repairs and costs can be recorded against specific assets. Maintenance schedules can be created on either a calendar or on an ‘hours-run’ basis. Further improvements could be achieved through customised data collection forms.

Issue	Responsibility	Target Date
Improve data collection recording of scheduled maintenance activities	Asset Management Engineer/O&M Engineer	2019

6.3.10 Cost Effectiveness

Under Section 17A of the Local Government Act the Council is required to review the cost effectiveness of its governance, funding and delivery of good quality local infrastructure.

A paper, prepared by the chief financial officer, was presented to the Planning, Finance and Community committee of Council in June 2017. All Council Services were reviewed. It was decided that the three waters activities will be exempt from further review under Section 17A until the outcome of the Havelock North Inquiry is known.

6.4 Monitoring and Review Procedures

The asset management plan is a compilation of day to day planning and management by the engineering managers and other senior Assets & Services staff. Subsequently the asset management plan is 'live' and under constant review.

The asset management plan is formally reviewed and updated every three years and the update is timed to provide supporting information for the development of the Long Term Plan. The draft asset management plan is submitted to an external consultant for peer review.

The Council's asset management plans are made available to the auditors of the Office of the Auditor General (OAG) during the audit of the Long Term Plan and the intervening Annual Plans.

The introduction of increased business intelligence reporting from the asset management information system will help to ensure the currency and accuracy of asset data collection.

Asset valuation is undertaken annually. The valuations and all supporting calculations are submitted to an external valuer for independent verification. The valuation is scrutinised by Audit NZ to ensure asset management is adequately resourced in future plans and budgets.

Levels of service performance indicators are monitored at six monthly intervals and reported to the Council's Executive Management Team. Council results in relation to the performance indicators are published in the Annual Report, which is made publicly available. The Council intends to elevate the status of performance measures and supplement them with other internal benchmark measures in future. These will be under constant review and published on the internal intranet. Progress has already been made towards this goal.

6.5 Performance Measures

The Local Government Act 2002 Amendment Act 2014 enabled the introduction of national non-financial performance measures for water, wastewater, stormwater, roading and flood protection. The introduced measures for water supply are broadly similar to the previous levels of service measures of drinking water quality, response and resolution of service requests and the number of customer complaints. The addition of performance measures for water losses and household consumption may focus more attention on these areas.

Some performance measures adopted by the Council have been difficult to measure, and there was no defined interpretation of the method of measurement. Detailed methodologies have subsequently been documented for each measure to ensure repeatable consistency and accuracy. Recommendations by the OAG to improve the control environment, including the data collection and storage mechanisms, have been actioned.

The AMIS is partially integrated with the customer request management system. There is a capability to trace service requests to subsequent work orders. The system allows response time monitoring, symptom and fault analysis, interruption and restoration monitoring, and cost recording.

The Council also participates in the annual National Performance Review undertaken by Water NZ. Fifty councils submitted data for the 2016 review covering 90% of the population of New Zealand. The data is categorised into large, medium and small participants (some water service providers are not councils). The report covers the three water services and provides an opportunity for councils to compare their performance on a large number of financial and non-financial performance indicators. Inevitably there is some difficulty in 'normalising' data across numerous agencies but the report still provides a good comparative guide on the performance of the Council's water supply activity within a national context.

Appendix 1 — Water Assets - Background Information

Blenheim Water Supply

The public water supply in Blenheim began in 1921. Initially water was abstracted from the Taylor River upstream of the town centre and distributed through a 12-inch spiral-wound, riveted, steel main in Taylor Pass Road and Maxwell Road.

By the 1950s it was clear the Taylor River source would require considerable reinvestment to upgrade the quality and improve the reliability of the water supply. It was therefore decided to progressively abandon river abstraction in favour of the underground Wairau aquifer as the source of water for Blenheim. The sinking of wells in Andrew Street, Grove Road and Colemans Road in the early 1960s enabled the Taylor River supply to be discontinued.

The Wairau Aquifer is mainly recharged from percolation through the bed of the Wairau River. It is a reliable source of water and has proved to be more than adequate to meet both urban and rural demand in the area to date. The aquifer is relatively shallow and is unconfined to the west of Blenheim. Tests have shown that the water abstracted from the aquifer is generally less than two years old. The source of supply therefore fails to meet the criteria for 'secure groundwater' as defined by the Drinking Water Standards for New Zealand 2005 (and the revised 2008 DWSNZ) and does not comply with the protozoal requirements unless treated.

The Blenheim water supply was untreated until 1998. However, the chemistry of the raw water was aggressive to metal pipes, causing rapid corrosion of the reticulation system and private plumbing. Between 1998 and 2000 three treatment plants were built close to the borehole abstraction points at Bomford Street, Andrew Street and Middle Renwick Road. Lime water or caustic soda is injected into the supply to raise the pH and reduce the corrosivity.

In 2009 a major upgrade to the Middle Renwick Road Water Treatment Plant was completed. The plant is served by three boreholes. The water is treated by caustic soda to achieve pH correction followed by disinfection in ultraviolet light reactors. The treated water is then stored in a new reservoir before being pumped into the reticulation.

The Bomford Street Water Treatment facility received a major upgrade in 2011. Two new boreholes were sunk at the existing Grove Road site and one at the treatment plant site. An ultraviolet disinfection plant was constructed and a new storage reservoir and distribution pumps installed at the plant. The lime water pH correction plant remained. The Auckland Street bore and one of the original Grove Road bores were decommissioned. The Bomford Street site has been renamed the Central Water Treatment Plant.

The Andrew Street Water Treatment Plant (WTP) was decommissioned and the plant was removed in 2011.

Following the upgrades the Blenheim water supply meets the DWSNZ requirements for bacteria and protozoa.

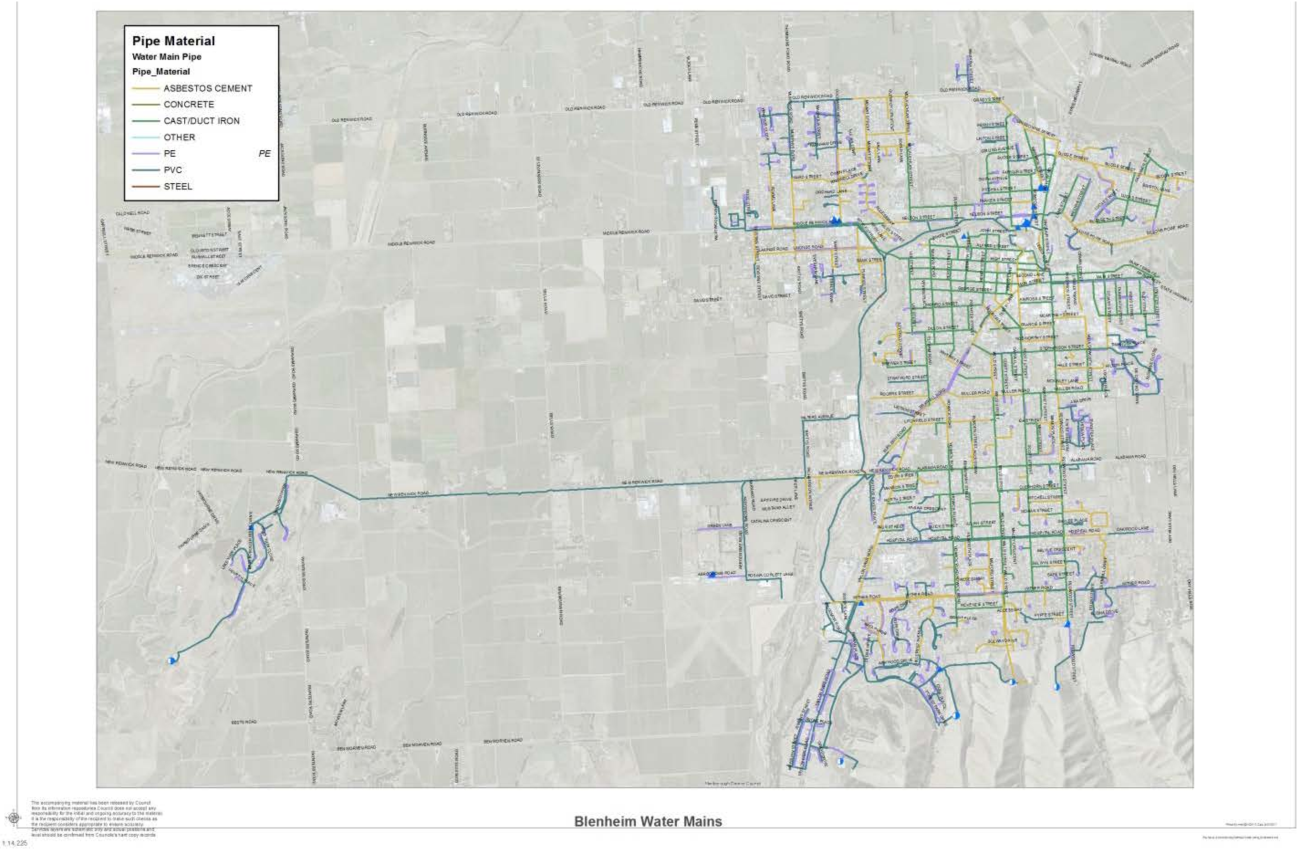
Blenheim Reticulation

The Blenheim water reticulation system has evolved in order to meet demand for a public drinking water supply, and has increased in scale as the town has grown. Generally, cast iron and asbestos cement pipes were the preferred materials throughout the 1940s, 50s and 60s. These were gradually superseded by PVC and polyethylene materials. Originally copper was used extensively for service connections but these have largely been replaced by polyethylene.

Between 1954 and 1968 around 40 km of the original watermains (mainly spiral riveted steel) was replaced by cast iron and asbestos cement mains. During the 1960s the public water distribution system was extended to the area south of Alabama Road (Redwoodtown).

The reticulation continued to grow as the town expanded. A major extension was undertaken in 1998 when a new pipeline was laid to the Marlborough Ridge development. A small pump station and reservoir tank farm were built to boost supply to the higher elevations. Around the same time the supply to the town was reinforced with a new trunk main along the bank of the Taylor River from the Middle Renwick Road WTP to the Wither Road Booster Pump Station. In 2004 the trunk main was linked to the Central WTP.

During the upgrade of the water treatment plants, distribution pump stations were incorporated into the design. Four 220kW pumps were installed at the Central WTP and three pumps at the Middle Renwick Road WTP.



Throughout the day the variable demand for water is met by automatic adjustment of pump output at the two water treatment plants. There are three main service reservoirs on the Wither Hills. The larger zone covering all of Blenheim north of Hospital Road is served by the 10,000 m^3 Taylor Pass Low reservoir. The area south of Hospital Road is served by the 5,500 m^3 Weld Street reservoir. A third major reservoir, Taylor Pass High Level, was commissioned in 2017. This reservoir provides support for the Weld Street reservoir and will be used extensively when the older reservoir is decommissioned for refurbishment and earthquake strengthening.

The area of Blenheim to the south of Hospital Road includes higher ground at the foot of the Wither Hills which requires a separate supply zone to maintain pressures. The Wither Road booster pumps transfer water to the higher zone as well as the Weld Street and Taylor Pass High Level reservoirs.

There are three smaller, high elevation zones at Marlborough Ridge, Forest Park and Redwood Street. Each zone is supplied through a booster pump station. A number of smaller reservoirs (arranged in tank farms) assist with pressure and balancing of demand in these zones.

There are a small number of private bores within the distribution area that continue to be used. They are separate from the public supply and are mainly used for irrigation.

Picton Supply

Picton's water supply was first developed in 1891 when a dam was installed in the Waitohi Stream catchment. Water was delivered into the town via a 225 mm trunk main installed in 1907, running from the dam to Oxford Street. In the 1920s Humphreys Dam was added to the system.

By the 1950s a new source of water was needed to meet the demand of a local freezing works and the growing demands of Picton town. A new impounding dam and reservoir were constructed in the Essons Valley. A 225 mm cast iron watermain providing a direct supply from the new Barnes Dam to the freezing works was completed in 1952. The freezing works had paid the cost of the development and was given priority use of the water. However, a 1958 agreement between the freezing works and Picton Borough Council allowed a public supply from Barnes Dam whilst there was sufficient water for both. When water levels dropped below a predetermined level the Borough supply was cut off and the public reverted to using water from the Humphrey's and Williams Dams.

In 1975 the Borough developed a new bore water source at Speeds Road, Koromiko, 8 km south of Picton. Three bores abstract water from a shallow aquifer. The water is treated with a lime solution to increase the pH and reduce the corrosivity. Chlorine gas is injected to disinfect the water.

In 1984 the freezing works closed and Barnes Dam became available exclusively for the municipal supply.

Today, the older dams (Humphreys and Williams) are no longer used. Picton's water is supplied from the Speeds Road bores and the Essons Valley (Barnes Dam) sources. Speeds Road is the primary source.

The Speeds Road supply has proved a reliable source of water to meet demand. An exception occurred during the prolonged dry spell of 2000/01 when water abstraction was reduced due to falling groundwater levels. Water restrictions were imposed on the town to prevent further drawdown. Since then the bores have been re-drilled deeper into the aquifer and the pumps lowered to increase resilience to drought. The water from the Speeds Road bores is disinfected with chlorine and the pH is raised by lime dosing before being pumped to the main Elevation Reservoir on the southern edge of Picton.

In 2016 work commenced on the upgrade of the Speeds Road treatment plant. New ultraviolet disinfection units were installed and a reservoir constructed to improve the contact time of the chlorine dose. The plant was commissioned in the autumn of 2017.

The Essons Valley supply is mainly used to support the Speeds Road supply during the summer peak demand periods. Dual raw watermains feed water from the Barnes Dam by gravity to the Essons Valley treatment plant. A coagulant is added to the raw water which is then passed through four dual media filters at the treatment plant. In 2011 the Essons Valley WTP was upgraded with the addition of ultraviolet disinfection and improved monitoring of chlorine levels. The output of the plant now meets the requirements of the DWSNZ.

The impounded water in Essons Valley can suffer from water quality problems during the summer. The water stored behind the dam can become subject to thermal stratification (a layer of warm water above a layer of cold water with low oxygen levels). High temperatures in the upper layer provide ideal conditions for algal growths. Compressed air can be introduced at a low level to mix the two layers of water and therefore reduce the conditions for algal growth. In the most severe circumstances the Essons Valley supply is turned off.

Picton Reticulation

Many of the original watermains were constructed of cast iron, the oldest dating back 70–80 years. From the late 1940s asbestos cement pipes became a popular alternative material to cast iron and were increasing installed. These in turn were succeeded by PVC and polyethylene pipes which were introduced in the 1970s and have been the main pipe materials from 1990 onwards.

Due to the terrain in Picton, high water pressure is required to feed the properties on the upper hillsides. Consequently properties on the lower slopes and valley floor receive high pressure. Modifications to the reticulation have been made in order to create pressure management zones. Pressure reducing valves are installed to lower the pressure experienced by customers and reduce the wear and tear on plumbing and fittings in these areas.

The Elevation Reservoir was constructed in 1973 and stores around 2,200 m^3 of water. A second reservoir was constructed at the site in 2015 to provide additional security of supply. In 2010 a new 3,000 m^3 reservoir was constructed at Victoria Domain to provide increased storage capacity. The reservoir is fed through gravity from the Elevation Reservoir, although the supply can be boosted by the Lincoln Street Booster Station.

An additional three 30 m^3 water tanks were added in 2011 to the two tanks at the Boons Reservoir site. Waikawa Reservoir at the northern end of the reticulation receives water when demand is low and feeds water back into the system at peak periods. A number of other small ‘energy harvesting’ reservoirs provide a similar facility to localised subdivisions. The booster station at Lincoln Street pumps water to higher properties in north Picton and Waikawa and fills the ‘energy harvesting’ reservoirs.

Figure A1.1 — Picton reticulation network

Renwick Supply and Reticulation

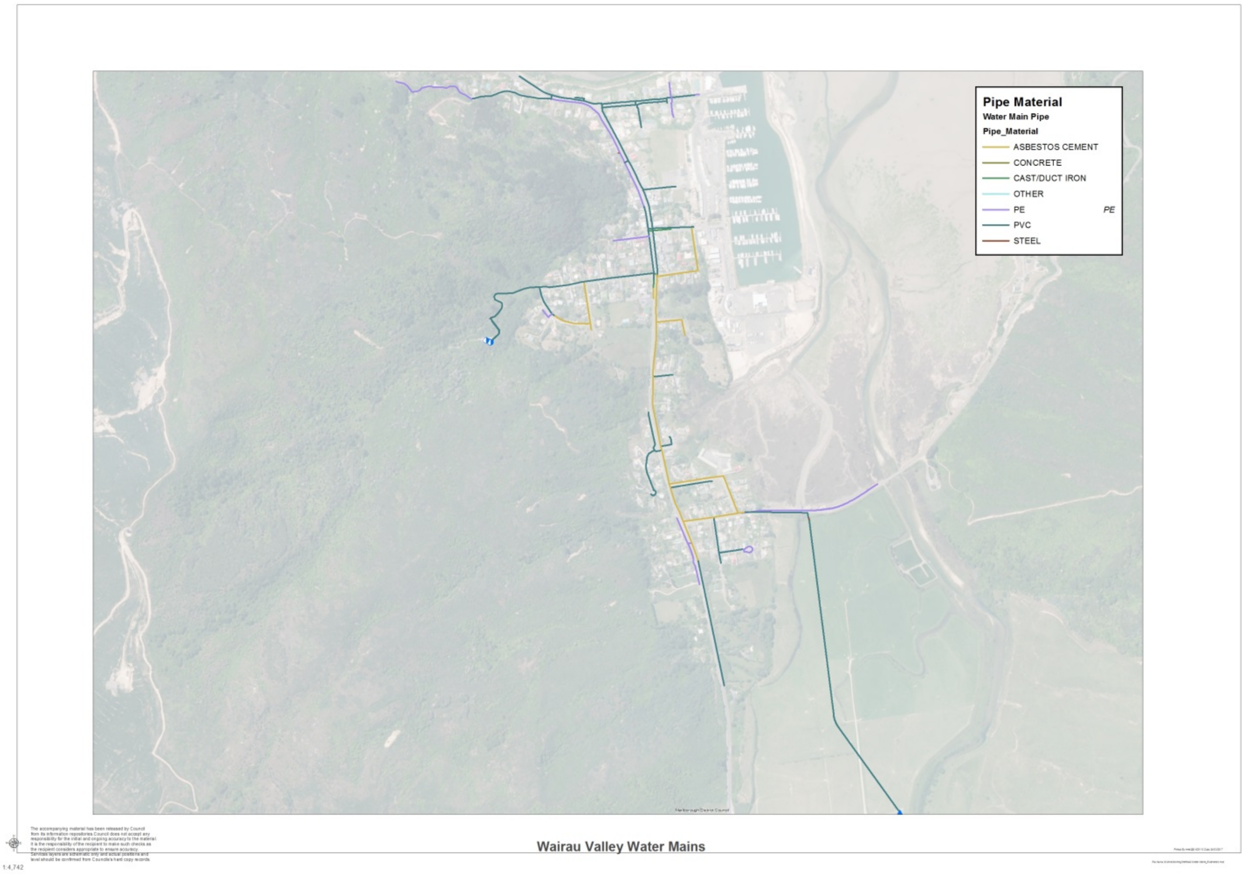
The public water supply to Renwick was first established in 1975. Water was abstracted from a well in Terrace Road and pumped to a storage reservoir at an elevated site close to Boyce Street. After basic treatment the water was pumped into the water supply. Since then two further bores have been installed and a tank farm of 10 storage tanks added to the Boyce Street site. The water is aerated through a trickle aerator on the way to the tanks. The aeration is designed to raise the pH of the water to make it less corrosive to metal pipes. The water is disinfected with chlorine before being pumped to the town.

In recent years the supply has struggled to meet the demand for water. Water restrictions were imposed during the summer of 2014 and voluntary restraint was requested in 2015 and 2016. Three new bores have been drilled at Conders Bend Road and a pipeline constructed to allow the test pumping of the bores. The testing undertaken in 2017 will provide data for a resource consent application. Subject to approval, the water from these bores will be piped to a new water treatment plant to be constructed adjacent to the existing plant. The plant will disinfect the water to meet the protozoal requirements of the DWSNZ.

Flow and pressure are monitored at the treatment/pump station and the two distribution pumps are automatically started and stopped in response to fluctuations in demand. Around half of the reticulation is asbestos cement pipe. The remainder is split evenly between polyethylene and PVC. Pipe samples taken in 2015 showed the 150 mm diameter asbestos cement mains had deteriorated significantly. A budget has been secured for the replacement of the AC mains.

Havelock Supply and Reticulation

The Havelock water supply scheme has evolved over a number of years. A small impounding dam on a creek above Takorika Street to the west of the town was constructed pre-1950 and created a small reservoir of 300 m³. The reticulation consisted of 3 inch and 5 inch cast iron pipes that served the area of the settlement north of Lawrence Street. The system was expanded to include the southern part of the town in 1977, and 150 mm and 100 mm diameter AC pipes were installed.



In 1993 a bore was sunk to the south of the settlement adjacent to the Kaituna River and storage was improved by the addition of 5 x 45 m³ storage tanks sited close to the Takorika dam. In 1996 a new 150mm diameter PVC main was laid from Lawrence Street north to increase the firefighting capacity.

Today a second bore has been drilled adjacent to the first to provide additional security of supply. Chlorine is added to the delivery main at the wellhead by a dosing pump. Water is pumped to a new steel service reservoir, built in 2010, and the old ferro-concrete tanks have been demolished except for one which has been retained as an emergency backup until a second steel reservoir is constructed in 2018/19. The Kaituna well pumps are activated automatically based on the level of water in the reservoir. The settings are remotely adjustable by Council's operators via the Datran Supervisory Control and Data Acquisition (SCADA) system. The bore pumps will also be started when a preset outflow rate from the reservoir is exceeded. This is a precaution in case of a fire.

The dam in the Takorika catchment has been isolated from the water supply and decommissioned because of the risk to health from protozoa contamination of the water.

The Havelock distribution system is relatively new. The original cast iron main in Main Street and Lawrence Street was identified as the source of discoloration problems (it was badly tuberculated) and a likely source of leakage and flow restriction. It was replaced in 2009.

Two thirds of the mains are constructed of modern plastic material — PVC or polyethylene.

Awatere Supply and Reticulation

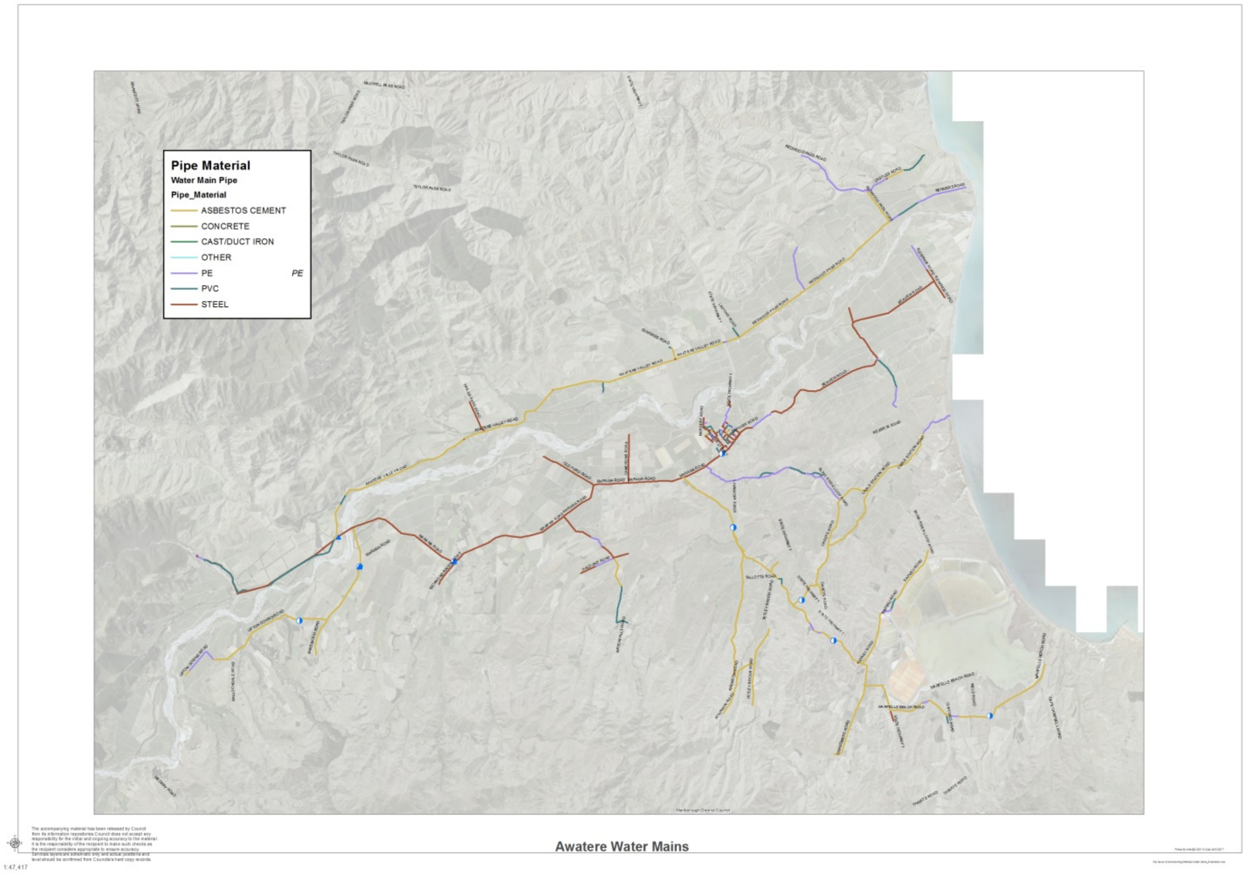
The original Awatere water supply scheme was designed around 1938 and was installed and operational by 1942. The Awatere water scheme was initiated as both a stock and domestic water supply.

The initial scheme involved installation of 32 km of pipeline to serve an area of 10,000 ha although it was envisaged that eventually the scheme could serve an area of up to 20,000 ha.

The scheme took water from the Black Birch Stream, piped it along the north bank of the Awatere River to just downstream of Blairich Station, where the pipeline crosses the Awatere River and continues down the south bank to service the Seddon township and beyond to Seaview and the coastal properties which are eight km from Seddon.

A number of extensions serving the Tetley Brook, Blind River, Grassmere and Upton Downs were installed in the late 1950s and early 1960s.

Later the Dashwood scheme was constructed in 1967/68 to service a further 30 properties with a total area of 5,300 ha.



In some areas privately installed pipelines have been vested with the Council, which now maintains them. These areas include Marfells Beach Road and Waterfalls Road.

Today the Awatere water supply scheme services an area in excess of 30,000 ha through 154 km of pipeline with approximately 750 connections. The pipe layout displays characteristics of a rural water scheme. There is a small inter-connected network of mains around the Seddon township and long lengths of main radiating out to service rural properties. Around half of the total length of the reticulation is asbestos cement pipe and a further 30% is steel (concrete lined or galvanised).

The expansive nature of the reticulation and the hilly terrain of the Awatere Valley requires booster pumps to distribute the water, combined with pressure reducing valves to deliver it at a practical pressure to the consumer. There are three pumping stations in the system at Blairich Rise, Upton Downs and Denton's Pit. Storage tanks are located at Upton Downs, Denton's Pit, Lion's Back, Blind River and Wheeler's Hill. An ultraviolet water treatment plant is located at Seddon School to supply treated water to the school and a tap is available for the public to draw 'treated water'.

In 2012 a MIOX water treatment plant was installed and commissioned at Blarich at a point close to where the Dashwood reticulation separates from the remainder of the system. MIOX is a patented system that generates sodium hypochlorite and other oxidants from a concentrated brine solution. The hypochlorite is injected into both the Dashwood and Blarich trunk mains. The plant does not meet the requirements of the DWSNZ for protozoa but has been installed as an affordable process to treat bacteria and viruses when the turbidity is low. During and following significant storm events the turbidity increases and the chlorine generated by the MIOX system becomes ineffective. Filtration is required to reduce the turbidity and remove protozoa.

Disinfection through chlorination is inhibited in turbid water. The turbidity of the raw water passing through the infiltration gallery at the Black Birch water intake can be high, particularly during storms and high turbulence in the stream. During the Easter storms of 2014 the plant became ineffective due to the very high turbidity of the raw water. Filtration is required to improve the turbidity and assist with the treatment of protozoa.

The Seddon community was engaged in a consultation exercise to find a water treatment process that was acceptable to the community. The cost of a treatment plant was relatively high. An application was made to the Ministry of Health for a subsidy to assist with the costs of building a water treatment plant for the settlement. In August 2015 a subsidy of just over $1 million was granted.

Tenders were invited for the design and construction of a water treatment plant.

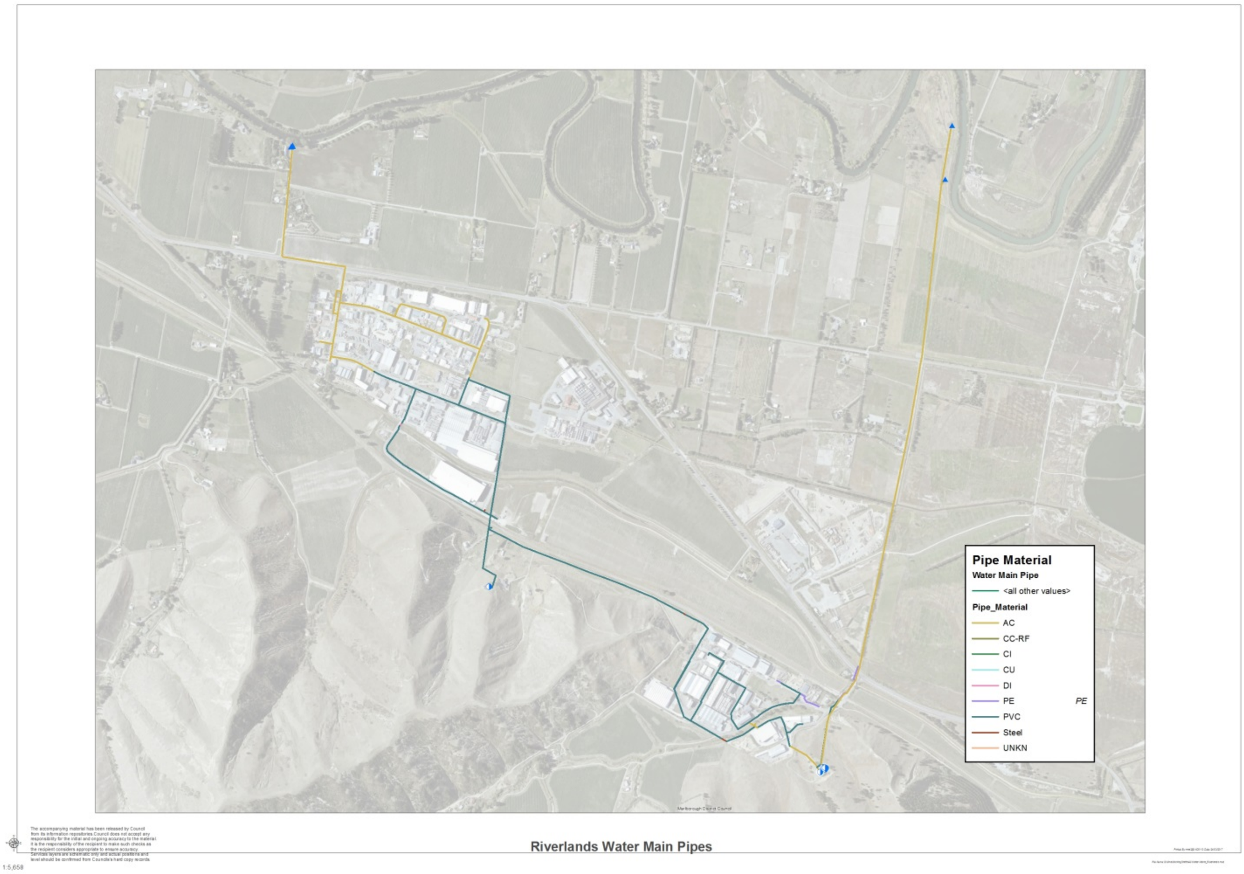
Riverlands Supply and Reticulation

The Riverlands water supply was first developed in 1970 to service the Riverlands Industrial Estate east of Blenheim. A bore and pumping station were installed at the end of Malthouse Road. Water was taken from the well by surface pumps that operated continuously to meet demand. In the mid 1980s the original well began to fail and a new 200 mm bore was drilled. In 1997 the current system was developed — a 370 m^3 reservoir and 920 m of 200 mm diameter pipe were added to the system.

Today, water is drawn from the bore with a submersible pump that delivers water at low pressure directly into two surface mounted centrifugal pumps that alternate (duty and standby) to pump water into the reservoir via the reticulation system. The duty pumps are activated by Datran SCADA and start when the reservoir level falls to a predetermined minimum level and stop when the reservoir is full. The water is drawn from a confined aquifer and is not treated or disinfected.

The Te Koko-o-Kupe/Cloudy Bay Business Park (CBBP) is adjacent to the Riverlands Industrial Estate. The CBBP was developed from the former Primary Producers Cooperative Society (PPCS) meat processing plant and surrounding land. In 2002 the PPCS plant closed and the privately owned water and wastewater infrastructure was purchased by the Council. This included two bores at Hardings Road, a 4,500 m^3 concrete reservoir and associated reticulation. In 2003, 1500 m of 375 mm diameter pipe was laid to connect the CBBP site with the Riverlands Industrial Estate. The Riverlands supply remains primarily for industrial use and the estates are now dominated by wineries which have experienced very significant growth in recent years.

There is a small irrigation system associated with this supply that is not included in this asset management plan.



Wairau Valley Supply and Reticulation

The Wairau Valley scheme became operational in 1991. Water is sourced from a bore adjacent to the Wairau River, accessed via Keith Coleman Road. Two surface pumps alternate between duty and standby. The water is disinfected with chlorine as it is pumped into the town reticulation. An Akdolit Filtration plant has been installed at the wellhead to raise the pH of the water, although this has been bypassed for many years without significant consequences.

The supply services an area in the Wairau Valley Township on the northern side of SH 63 from Church Street to Northbank Street only. The scheme was funded from a capital contribution made by residents and a subsidy from the Ministry of Health.

Naturally occurring arsenic has been identified in the groundwater to the south of SH 63 and this is currently under investigation. The water in this area is very corrosive to metal plumbing. The existing scheme has no spare capacity in its present form to service any properties outside of the designated supply district.

The reticulation was installed with the development of the scheme and therefore no pipes are more than 25 years old and all of them are made of PVC.

1:4,742

Wairau Valley Water Mains

Appendix 2 Levels of Service 2018-28

Levels of Service - Proposed Performance Indicators 2018-28

Levels of Service 2018-28: Water Supply

Performance Targets (for the financial year)

Level of Service	Indicator	Baseline	2018-19	2019-20	2020-21	2021-28
Customer satisfaction	Resident satisfaction with this service as measured by survey, where 10 = "service delivered extremely well".					
Provide an overall level of service that meets or exceeds residents' expectations.	The total number of complaints received by the local authority about any of the following:					
	(a) drinking water clarity	1.30	1.30	1.10	1.10	1.30
	(b) drinking water taste	1.90	1.90	1.70	1.90	1.90
	(c) drinking water odour	0.65	0.65	0.60	0.65	0.65
	(d) drinking water pressure or flow	1.90	1.90	1.90	1.70	1.50
	(e) continuity of supply, and	1.30	1.30	1.30	1.30	1.30
	(f) the local authority's response to any of these issues	0.65	0.65	0.65	0.65	0.65
	expressed per 1000 connections to the local authority's networked reticulation system[8].					
Safety of drinking water Provide a level of water quality that meet community needs and is appropriate to the degree of public health risk.	The extent to which the local authority's drinking water supply complies with: (a) Part 4 of the drinking-water standards (bacteria compliance criteria), and (b) Part 5 of the drinking-water standards (protozoal compliance criteria).	Blenheim	a)Y b)Y	a)Y b)Y	a)Y b)Y	a)Y b)Y
		Picton	a)Y b)N	a)Y b)Y	a)Y b)Y	a)Y b)Y
		Havelock	a)Y b) N	a)Y b) N	a)Y b) N	a)Y b) Y
		Renwick	a)Y b) N	a)Y b) N	a)Y b) Y	a)Y b) Y
		Riverlands	a)Y b) N	a)Y b) N	a)Y b) N	a)Y b) Y
		Awatere	a)N b) N	a)N b) N	a)N b) N	a)Y b) Y
		Wairau Valley	a)N b) N	a)N b) N	a)Y b) Y	a)Y b) Y

[8] Assumes 15,591 connections. Estimated in accordance with DIA recommended option 2. Minimum Night Flow Analysis. Riverlands not included as industrial night consumption volumes not available.

Level of Service	Indicator	Baseline	2018-19	2019-20	2020-21	2021-28
Maintenance of the reticulation network	The percentage of real water loss from the local authority's networked reticulation system.[9]	Blenheim ≤44%	37%	37%	37%	37%
		Picton ≤48%	32%	32%	30%	28%
		Havelock ≤51%	49%	38%	30%	28%
		Renwick ≤50%	35%	32%	30%	28%
		Awatere ≤28%	15%	15%	15%	15%
		Wairau Valley ≤42%	15%	15%	15%	15%
Fault response times Provide a service that is timely and responsive to customers' needs. .	Where Council attends a call-out in response to a fault or unplanned interruption to its networked reticulation system, the following median response times measured:					
	attendance for urgent call-outs: from the time that the local authority receives notification to the time that service personnel reach the site, and	30 minutes	30 minutes	30 minutes	30 minutes	30 minutes
	resolution of urgent call-outs: from the time that the local authority receives notification to the time that service personnel confirm resolution of the fault or interruption.	3 hours	3 hours	3 hours	3 hours	3 hours
	attendance for non-urgent call-outs: from the time that the local authority receives notification to the time that service personnel reach the site, and	8 hours	8 hours	8 hours	8 hours	8 hours
	resolution of non-urgent call-outs: from the time that the local authority receives notification to the time that service personnel confirm resolution of the fault or interruption.	13 hours	13 hours	13 hours	13 hours	13 hours

[9] The water loss figures shown are based on the best available information and do not include legitimate commercial/industrial night usage, day/night adjustment factor or system specific issues that are not currently monitored. Water loss has been calculated in accordance with Method Option 2 (minimum night flow analysis) recommended by the Department of Internal Affairs guidance for non-financial performance measures for water supply.

Appendix 3: Climate Change

Extract from the Ministry for the Environment's advice on their website (updated December 2017) on the likely impacts of climate change in Marlborough is as follows:

"Projections of climate change depend on future greenhouse gas emissions, which are uncertain. There are four main global emissions scenarios ranging from low to high greenhouse gas concentrations. This page presents regional projections as a range of values from a low emissions to a high emissions future.

The projected changes are calculated for 2031–2050 (referred to as 2040) and 2081–2100 (2090) compared to the climate of 1986–2005 (1995).

Temperature — Compared to 1995, temperatures are likely to be 0.7˚C to 1.0˚C warmer by 2040 and 0.7˚C to 3.0˚C warmer by 2090.

By the end of the century, Marlborough is projected to have from 6 to 38 extra days per year where maximum temperatures exceed 25˚C. The number of frosts could decrease by around 7 to 19 per year.

Rainfall —Rainfall will vary locally within the region. The largest changes will be for particular seasons rather than annually.

Summer rainfall in Blenheim is projected to increase by up to 9 per cent by 2090.

According to the most recent projections, extreme rainy days are likely to become more frequent in Marlborough by 2090 under the highest emissions scenario.

Snowfall — The Marlborough region is likely to experience significant decreases in seasonal snow. By the end of the century, the number of snow days experienced annually could decrease by as much as 30 to 40 days in some parts of the region. The duration of snow cover is also likely to decrease, particularly at lower elevations.

Less winter snowfall and an earlier spring melt may cause marked changes in the annual cycle of river flow in the region. Places that currently receive snow are likely to experience increasing rainfall as snowlines rise to higher elevations due to rising temperatures. So for rivers where the winter precipitation currently falls mainly as snow and is stored until the snowmelt season, there is the possibility for larger winter floods.

Wind — The frequency of extremely windy days in Marlborough by 2090 is likely to increase by between 2 and 10 per cent. There may be an increase in westerly wind flow during winter, and north-easterly wind flow during summer.

Storms — Future changes in the frequency of storms are likely to be small compared to natural inter-annual variability. Some increase in storm intensity, local wind extremes and thunderstorms is likely to occur.

Sea-level rise — New Zealand tide records show an average rise in relative mean sea level of 1.7 mm per year over the 20th century. Globally, the rate of rise has increased, and further rise is expected in the future."

Appendix 4: LTP Assumptions

Assumptions, Disclosure and Compliance

Assumptions

With any financial forecasting, a number of assumptions must be made. The following assumptions have been made in the preparation of this document. Also presented for each assumption is the "Level of uncertainty", "Risk" and "Financial Impact" for each.

Legislative

Assumption

Local Government may be significantly affected by changes in legislation as a result of a new Government being elected in late 2017. However, until the Coalition settles in fully there is no certainty as to its policy direction and specifics to achieve its desired outcomes. As a result of the uncertainty, it is assumed that legislative and Government policy changes will not significantly impact upon Council's current responsibilities and activities.

Level of Uncertainty

Medium.

Risk

It is highly likely that the new Government will want to advance its own agenda. As a result of local government having a very broad range of activities it is also very probable the cumulative effect on Council will be significant.

Financial Impact

To date Government's reforms have not reduced legislative obligations, costs or the impact on the ratepayer. It is too early to assess the financial impact of the Government's signalled policy announcements. However, it is expected that there will be specific requirements resulting from legislative change, the Havelock North Water Quality Inquiry and a continued issuance of National Policy Statements. However, Council is moving to address the likely outcomes of the Havelock North Inquiry in its infrastructure planning.

Inflation

Assumption

The costs, revenues and asset values reflected in this plan reflect the following "Forecasts of Price Level Change Adjustors to 2028" produced by Business Economic Research Limited (BERL) in September 2017 for the Society of Local Government Managers.

Label Year Ending	Planning and Regulation	Roading	Transport	Community Activities	Water and Environmental
	% change on year earlier				
June 2017	1.4	1.6	1.6	1.8	1.2
June 2018	1.8	1.9	1.9	1.7	1.8
June 2019	2.0	2.0	2.0	1.7	2.3
June 2020	2.1	2.2	2.0	2.0	2.5
June 2021	2.1	2.2	2.1	2.1	2.3
June 2022	2.1	2.3	2.2	2.1	2.4
June 2023	2.2	2.4	2.2	2.2	2.4
June 2024	2.3	2.4	2.3	2.3	2.5
June 2025	2.3	2.5	2.4	2.3	2.6
June 2026	2.4	2.6	2.5	2.4	2.6
June 2027	2.4	2.7	2.5	2.4	2.7
June 2028	2.5	2.8	2.7	2.6	2.8
20 year average % pa	2.3	2.5	2.4	2.3	2.6

BERL also consolidates the above adjustors into a consolidated Local Government Cost Index (LGCI) which is further split between operating and capital expenditure.

Year ending	OPEX	CAPEX	TOTAL
	annual average % change		
June 2017	1.5	1.5	1.52
June 2018	1.8	1.8	1.80
June 2019	2.0	2.0	2.06
June 2020	2.2	2.2	2.12
June 2021	2.2	2.2	2.17
June 2022	2.2	2.2	2.21
June 2023	2.3	2.3	2.35
June 2024	2.3	2.4	2.29
June 2025	2.4	2.4	2.41
June 2026	2.5	2.5	2.53
June 2027	2.5	2.6	2.55
June 2028	2.6	2.7	2.64

Level of Uncertainty

Medium to high.

NB: The forecast increases for Capital Expenditure are generally higher than operating cost increases and it is the Capital Expenditure that has historically driven rates increases.

Risk

There is a risk that the local inflation rates may be higher or lower than the national averages forecast by BERL.

Financial Impact

Should local inflation exceed the national average, this could result in either an increase in rates and debt servicing or deferral of capital projects which may impact upon the level of service that can be provided.

Interest Rate on Council Borrowings

Assumption

Council has assumed a long term interest rate on internal loans of 5.5% for the entire 10 years covered by the Long Term Plan. External interest rates may vary depending on the term of the debt and prevailing market conditions.

Level of Uncertainty

Medium.

Risk

As a result of the continuing impact of the Global Financial Crisis and the expectation of increased interest rates in the future, Council has adopted a conservative position compared to current market rates to mitigate the risk associated with interest rate movements. Council has adopted this approach as interest rates can increase significantly within short timeframes, as has happened in the past. Council will attempt to mitigate the impact of interest rate rises with a prudent hedging programme that operates in accordance with its Treasury Policy. However, because of Council's current low debt level, its ability to hedge significant amounts of its forecast debt is limited.

Financial Impact

Increases in interest rates above 5.5% will result in higher debt servicing costs and rates funding requirements. Council only debt (internal and external) is currently forecast to peak at approximately $225 million. As a result a 1% increase in interest rates above the 5.5% forecast would result in increased interest costs of $2.3 million.

Population Growth

Assumption

In preparing the Long Term Plan Council has assumed population growth will occur at slightly above the Department of Statistics medium population growth projection. Population growth is further discussed in the Key Issues and Infrastructure Strategy sections of the Long Term Plan.

Level of Uncertainty

Low.

Risks

Population growth occurs at rates above or below the level forecast with corresponding impacts on the revenue received from rates and development contributions.

Financial Impact

If population growth occurs at a slower rate than forecast, then the level of development contributions received will be lower than expected. However, there is the opportunity to mitigate the financial impact by slowing the Capital Expenditure programme. It is not expected that levels of service will be impacted upon significantly.

Economic Life

Assumption

Council has made a number of assumptions about the useful lives of its assets. The detail for each asset category is shown in the Statement of Accounting Policies. The useful lives are consistent with Council's experience with respect to its ongoing replacement programme.

Level of Uncertainty

Low — above ground.

Medium — below ground.

Risk

Assets wear out and need to be replaced earlier than anticipated.

Financial Impact

Depreciation and borrowing costs would increase if replacement Capital Expenditure was required earlier than anticipated. However, these impacts could be mitigated in part by reprioritising the Capital Expenditure programme. There may also be an increase in maintenance costs to keep the asset operational until it is decided to proceed with replacement.

Subsidy Rates

Assumption

The New Zealand Transport Agency (NZTA) has recently reviewed its financial assistance policy and it is assumed that Council will retain, for the period of the Plan, its current subsidy rate of 51% for road maintenance and construction works.

Level of Uncertainty

Low.

Risk

NZTA will either reduce the subsidy rate and/or toughen the criteria for the inclusion of works in the qualifying programme.

Financial Impact

If the subsidy rate is reduced, either a reduction in the level of service or an increase in rates would be required. Council is already receiving very good pricing for road maintenance compared to other Local Authorities, through its collaboration with NZTA in the form of Marlborough Roads.

Natural Disasters

Assumption

Should a major natural disaster occur the District could be faced with significant repair and reconstruction costs. Council has estimated the maximum probable loss (MPL) cost as a result of a major earthquake, flood or tsunami at approximately $485 million, following a joint Treasury supported exercise with AON and Tonkin and Taylor. It is assumed that this forecast is accurate. It is also assumed that:

The forecast contributions from the Local Authority Protection Programme (LAPP), insurance, Government and the NZTA will be received.

Through a combination of Council's reserves, investment realisation, credit facilities and rescheduling capital and other works, Council can meet the remaining costs associated with a major disaster over a seven year period.

As a result of a second earthquake occurring in Christchurch, Council has also modelled the financial impact of second significant event. Through the use of the same mechanisms identified in the two bullet points above, Council could meet the remaining costs associated with a second major disaster over a seven year period post the second event.

The LAPP fund is a mutual pool set up to assist councils cover their share of damage to "below ground" and river protection assets resulting from a significant natural event. At the time the fund was formed commercial insurance alternatives for these assets was not available. There was also a clear requirement from Central Government that any assistance given to rebuild infrastructure following a disaster will only be made available if Council has made adequate financial provisions to cover its own repair obligations.

Above ground assets are insured through commercial insurance. These costs are in addition to LAPP contributions. Insurance costs have increased over recent years as a direct result of national and international disasters. Council has mitigated the effect by joining with Nelson City and Tasman District councils and a pool of over 600 Australian Local Authorities.

2016 Kaikōura Earthquake. Council is still investigating the damage caused by the November 2016 Kaikōura earthquake. Evidence suggests the earthenware sewerage network pipes in Blenheim and Picton have sustained extensive damage. The LTP includes a provisional $12.0 million for their replacement over 10 years. Council is working with Government officials and its insurers to reduce the amount it must fund itself. Strengthening work is also required for a number of Community Facilities. These allocations have reduced the dedicated Emergency Events Reserve to a forecast balance of just over $9 million at 30 June 2018. Council had intended to rebuild this Reserve using the surpluses from the General Revenues Account, but the forecast balance in 2028 is still only $3 million. This is because of the expected ongoing funding demands from Road and River damage following rainfall events and the reduction in revenue into the account resulting from the decision to reduce the interest rate assumption. While Council would like to increase this balance over time, it is also aware of its ability to reprioritise its capital works programme, probable insurance and Government funding and its total Reserve position. As a result Council believes that it has sufficient capacity to meet its obligations should a significant natural disaster occur without the need for an immediate rates increase.

Level of Uncertainty

Low.

Risks

The actual costs of recovery from a major natural disaster are higher than the forecast MPL of approximately $485 million.

Financial Impact

Should Council's current estimate of MPL and existing arrangements prove inadequate, either an increase in debt and corresponding increase in rates or a slowing in the rebuild would need to occur.

Taxation Framework

Assumption

Council has assumed that existing taxation framework for the Marlborough District Council group will continue for the period of the Long Term Plan.

Level of Uncertainty

Low.

Risk

That the Inland Revenue Department (IRD) takes a view that Council's Holding Company structure is inconsistent with taxation legislation resulting in an increase in associated tax costs.

Financial Impact

Council has mitigated the potential for this to happen by obtaining independent legal advice and a "Binding Ruling" from the IRD on the establishment of MDC Holdings Ltd. Council has not deviated from the principles determined at establishment, so the risk and financial impacts should be low.

Asset Ownership and Valuation

In the preparation of the Long Term Plan it has been assumed that Council will retain:

Ownership of MDC Holdings Limited and its subsidiaries:

Its ownership share (88.5%) in Marlborough Regional Forestry, with Kaikōura District Council owning the remaining 11.5%.

Ownership of all substantial assets currently owned.

It has also been assumed that Council will revalue its major assets annually.

Level of Uncertainty

Low.

Risk

The asset values shown in the Long Term Plan have been adjusted based on the BERL indices. The risk is that the results of actual revaluations may be higher or lower than those disclosed in the Long Term Plan.

Financial Impact

If asset revaluations are higher than forecast, this will increase the resulting depreciation cost and rates as Council moves to provide for asset replacement.

Sources of Funds for Capital Expenditure

The Financial Strategy identifies the expected sources of funds for Council's Capital Expenditure programme. It has been assumed that the funds identified for each of these sources will be received.

Level of Uncertainty

Low.

Risk

That the forecast funding will not be received as forecast.

Financial Impact

As it is proposed to fund Capital Expenditure from a range of sources it should be possible to compensate a funding shortfall from one source with funding from another i.e. borrowing. If it is decided to increase borrowing a debt servicing cost and a corresponding increase in rates will arise. The alternative is to slow Capital Expenditure especially if the project is growth related and the funding shortfall relates to Development Contributions.

Climate Change

Council has assumed that the climate changes in relation to rainfall, temperature and sea level will occur as predicted. It has been further assumed that climate change will have minimal impact over the period of the 2018–2028 Long Term Plan. This topic is considered in greater depth in Council's Infrastructure Strategy. This is appropriate given this Strategy covers a longer 30 year period.

Level of Uncertainty

Low.

Risk

That asset and hazard planning has not adequately assessed climate change.

Financial Impact

For the period of the Long Term Plan, the financial impact is assessed as low as climate change on the whole is occurring very slowly, providing extended lead times for mitigation measures if required.

Emissions Trading Scheme (ETS)

Any direct impacts of the ETS through potential price increases are assumed to be covered by Council's inflation assumptions and thus factored into the forecasts.

Specific ETS costs relating to waste and landfill have been incorporated into those estimates, together with the increased revenue that will be received.

Pre 1990 forestry has been registered. Any costs associated with the ETS will be minimal given Council's rotation and replanting policy.

Level of Uncertainty

Low.

Risk

The impact and scope of the ETS may be more than assumed.

Financial Impact

The Council will face increased compliance and operating costs, which if significant enough, may require higher fees and charges or increased rating requirements to fund them. However, Council had already taken steps to reduce the landfill liability and fix the price of the Emission Trading Units that will be required to be surrendered for the first three years of the Scheme's operation.

Resource Consents

Council has assumed that it will continue to hold and comply with appropriate resource consents to enable it to continue its activities, especially in relation to sewerage and stormwater.

Level of Uncertainty

Low.

Risk

Appropriate consents are either not renewed or require improvements in level of service before being granted. The trends in Resource Consent requirements are covered more fully in the Infrastructure Strategy.

Financial Impact

The main financial impact could occur if levels of service require improvement before a resource consent renewal is granted. The resulting increase in costs will likely require an increase in borrowing which in turn will impact on rates.

Area	Site	ORC	ODRC	DISP
AWATERE	Pump Station		$ 101,679	$ 10,724
AWATERE	Retic. Fittings	$ 90,911	$ 20,913	$ 8,877
AWATERE	Source	$ 203,074	$ 182,767	$ 2,538
AWATERE	Storage	$ 700,585	$ 665,214	$ 10,048
AWATERE	Treatment Plant	$ 294,961	$ 222,049	$ 14,568
AWATERE Total		**$ 1,289,530**	**$ 1,192,622**	**$ 46,755**
BLENHEIM	Pump Station	$ 1,974,857	$ 408,873	$ 82,297
BLENHEIM	Retic. Fittings	$ 390,143	$ 254,653	$ 29,453
BLENHEIM	Source	$ 1,663,421	$ 772,946	$ 38,493
BLENHEIM	Storage	$ 14,451,400	$ 11,103,669	$ 203,104
BLENHEIM	Treatment Plant	$ 17,738,178	$ 13,337,675	$ 497,533
BLENHEIM	Unknown	$ 823	$ 82	$ 82
BLENHEIM Total		**$ 36,218,823**	**$ 25,877,898**	**$ 850,963**
HAVELOCK	Retic. Fittings	$ 10,889	$ 5,134	$ 874
HAVELOCK	Source	$ 47,959	$ 24,897	$ 1,698
HAVELOCK	Storage	$ 491,647	$ 430,466	$ 8,152
HAVELOCK	Treatment Plant	$ 952,835	$ 538,208	$ 29,616
HAVELOCK Total		**$ 1,503,330**	**$ 998,705**	**$ 40,340**
PICTON	Pump Station	$ 406,967	$ 298,848	$ 9,699
PICTON	Retic. Fittings	$ 62,130	$ 17,574	$ 5,070
PICTON	Source	$ 7,520,182	$ 2,798,342	$ 90,184
PICTON	Storage	$ 8,598,889	$ 7,098,172	$ 132,172
PICTON	Treatment Plant	$ 10,187,122	$ 6,361,852	$ 273,443
PICTON	Unknown	$ 10,844	$ 2,178	$ 728
PICTON Total		**$ 26,786,134**	**$ 16,576,965**	**$ 511,296**
RENWICK	Retic. Fittings	$ 23,004	$ 14,901	$ 1,764
RENWICK	Source	$ 219,171	$ 156,024	$ 5,173
RENWICK	Storage	$ 33,870	$ 18,571	$ 859
RENWICK	Treatment Plant	$ 2,809,094	$ 524,487	$ 85,491
RENWICK Total		**$ 3,085,139**	**$ 713,983**	**$ 93,287**
RIVERLDS	Pump Station	$ 659	$ 329	$ 66
RIVERLDS	Retic. Fittings	$ 79,061	$ 39,473	$ 5,990
RIVERLDS	Source	$ 500,833	$ 122,822	$ 15,828
RIVERLDS	Storage	$ 3,618,653	$ 2,087,928	$ 46,883
RIVERLDS	Treatment Plant	$ 6,232	$ 6,232	$ 415
RIVERLDS Total		**$ 4,205,438**	**$ 2,256,784**	**$ 69,182**
SEDDON	Retic. Fittings	$ 51,646	$ 9,323	$ 4,986
SEDDON	Treatment Plant	$ 329	$ 33	$ 33
SEDDON Total		**$ 51,976**	**$ 9,356**	**$ 5,019**
SPRINGCK	Retic. Fittings	$ 659	$ 313	$ 66
SPRINGCK	Unknown	$ 165	$ 99	$ 16
SPRINGCK Total		**$ 823**	**$ 412**	**$ 82**
WAIRAUV	Retic. Fittings	$ 61,868	$ 18,066	$ 2,456
WAIRAUV	Source	$ 11,281	$ 5,550	$ 220
WAIRAUV Total		**$ 73,149**	**$ 23,616**	**$ 2,677**
Grand Total		**$ 73,214,343**	**$ 47,650,340**	**$ 1,619,602**

Appendix 5: Valuation Details

Plant Assets

Reticulation Assets

Area	ORC	ODRC	DISP	Pipe Length (m)
AWATERE	$ 22,298,682	$ 6,701,626	$ 330,159	152,102
BLENHEIM	$ 70,948,331	$ 45,070,379	$ 789,712	261,228
HAVELOCK	$ 2,895,875	$ 2,079,705	$ 33,444	11,897
PICTON	$ 21,891,654	$ 12,054,161	$ 263,355	76,493
RENWICK	$ 5,825,519	$ 2,542,746	$ 73,651	23,650
RIVERLDS	$ 4,224,224	$ 3,090,816	$ 45,215	11,976
SEDDON	$ 2,251,673	$ 1,069,039	$ 31,161	11,159
WAIRAUV	$ 942,376	$ 686,849	$ 9,501	3,854
Grand Total	**$ 131,278,332**	**$ 73,295,321**	**$ 1,576,199**	**552,359**