

2018-2028 WATER SUPPLY ASSET MANAGEMENT PLAN
He Rautaki Whakahaere Rawa mō Te Wai Whakarato

GENERAL VOLUME

HE PUKAPUKA MATUA



Mountain to Sea
Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

DOCUMENT CONTROL

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AC	Asbestos Cement	KI	Kilo-litres
ADWF	Average Dry Weather Flow (sewage)	KPI	Key Performance Indicator
AM	Asset Management	LGA	Local Government Act
AMP	Asset Management Plan	LIM	Land Information Memoranda
AMS	Asset Management System	LOS	Level of Service
ANZCO	ANZCO Foods Limited	LTP	Long-Term Plan
AP	Annual Plan	MANN	Mannesmann Steel
AS/NZS	Australian/New Zealand Standards	MAV	Maximum Allowable Value
BAC	Biologically Activated Carbon trial	MCC	Main Control Cabinet
BOD	Biochemical Oxygen Demand	MfE	Ministry for Environment
Capex	Capital Expenditure	MI	Mega-litres (1 ML = 1,000,000 litres)
CDEM Act	Civil Defence and Emergency Management Act	MIS	Management Information System (water and wastewater)
CI	Cast Iron	MoH	Ministry of Health
City Care Ltd	Water and Wastewater reticulation maintenance contractor	NAMS	National Asset Management Strategy
CLDI	Concrete Ductile Iron	NB	Nominal Bore
Communitrak	Annual Communitrak survey performed by National Research Bureau	NPDC	New Plymouth District Council
CONC	Concrete	NPV	Net Present Value
COP	Code of Practice	NPWTP	New Plymouth Water Treatment Plant
COPP	Copper	NPWWTP	New Plymouth Wastewater Treatment Plant
CV	Corporate Vision	NRB	National Research Bureau
DI	Ductile Iron	NTU	Turbidity units
DISP	Decline in Service Potential	NZWWA	New Zealand Water and Wastes Association
DWS	Drinking Water Standards (or the latest edition thereof)	ODM	Optimised Decision Making
EColi	Bacterium Escherichia coli that produces a toxin and can cause severe illness	ODRC	Optimised Depreciated Replacement Cost
FAC	Free Available Chlorine	OTH	Other
GCRC	Gross Current Replacement Cost	Opex	Operational Expenditure
GL	General Ledger	PIM	Project Information Memorandum
HUE	Household Unit Equivalent	PHRMP	Public Health Risk Management Plan
I&E	Instrumentation and Electrical	POLY-H	Polyethylene high density
IRP	Incident Response Plan	POLY-L	Polyethylene low density
IWWF	Instantaneous Wet Weather Flow (sewage)	POLY-M	Polyethylene medium density
		PRV	Pressure Reducing Valve

GLOSSARY

PWC	Price Waterhouse Coopers
PWWF	Peak Wet Weather Flow (sewage)
SCADA	Supervisory Control and Data Acquisition system
SDC	Stratford District Council
ST	Steel
ST-CL	Cast Iron Steel Tube
ST-GTS	Galvanised Steel Tube
ST-SWS	Stain/Steel Spiral Welded Seam
STDC	South Taranaki District Council
SWAMP	Stormwater Asset Management Plan
TDF	Thermal Drying Facility
TDHB	Taranaki District Health Board
TLA's	Territorial Local Authorities
TNZ	Transit New Zealand
TRC	Taranaki Regional Council
UAC	Uniform Annual Charge
UFW	Unaccounted-For-Water (also known as Non-Revenue Water)
UNKN	Unknown
UPVC	Un-plasticised PVC
UV	Ultra Violet disinfection treatment
VFR	Visiting friends and relations
WAMP	Water Asset Management Plan
WAP	Water Augmentation Project
WBM	Water by Meter
WINZ	Water Industry New Zealand
WOMB	Waitara Outfall Management Board
WTP	Water Treatment Plant
WWAMP	Wastewater Asset Management Plan
WWTP	Wastewater Treatment Plant
WWWTP	Waitara Wastewater Treatment Plant



1. EXECUTIVE SUMMARY

This general Water Supply Asset Management Plan outlines how we will contribute to the community outcomes and priorities identified in the 2018-2028 Long Term Plan (LTP).

Amongst other things, our water supply activities involve operating, maintaining and developing water collection, water treatment and water distribution facilities. This includes groundwater bores/headworks, treatment plants, storage facilities, pump stations and underground pipe networks. We provide approximately 28m litres of water per day to just under 28,000 households and businesses in defined urban and rural areas. Our key objectives for this service are:

- To provide a safe, healthy and efficient service at an affordable cost.
- To minimise the impact of high density human populations on the environment.
- To ensure infrastructure can meet both current and future demand within our defined levels of service.
- To comply with the Drinking Water Standards for New Zealand 2008 (DWSNZ).
- To protect public health and the environment.
- Provide an acceptable level of resilience in emergency situations.

Managing and maintaining the water network is resource intensive. As at 30 June 2016, the certified fair value of our water assets was \$150m, excluding land and buildings. The gross current replacement cost (GCRC) of these assets was assessed at \$284m, excluding land and buildings.

To sustain current levels of service, water supply assets will require Opex of \$105.7m over the next 10 years. A further \$135.1m of Capex is planned for the next 10 years to provide for asset renewals, to meet forecast growth in demand and to deliver some improvements to levels of service.

Specific details about each of the asset categories in the water supply network can be found in the Water Supply AMP volumes.

Note: All financial forecasts are shown in inflation adjusted dollar values.

1.1 Purpose of the Plan

The AMP is an overview of water supply services in the New Plymouth District. It contains the information required for effective decision making and underpins the Long Term Plan and the Annual Plan before those documents go to the community for consultation.

The main purpose of the AMP is to:

- Provide the long-term strategy for our management of water assets.
- Provide the basis for compliance with the relevant sections of the Local Government Act.
- Improve understanding of service level standards and options, while improving consumer satisfaction and growth demand.
- Demonstrate that water supply demands are managed in a cost effective and sustainable manner.
- Optimise life cycle activities to achieve savings.
- Assess key performance indicators for water assets.
- Ensure long term sustainability of our water supply services.
- Ensure we identify and utilise opportunities for improvement.

The AMP is not an authorisation to commit budgets to the programmes it describes. Such authorisation is made through our LTP and Annual Plan (AP) processes.

1.2 Asset Description

Our water assets operate as four separate water supply schemes, New Plymouth, Okato, Oakura and Inglewood, which are fed from both surface and ground water sources. Table 1 shows an overview of all water supply assets included in these schemes. More details about each asset category can be found in the water supply AMP volumes.

Table 1 Asset summary

Asset Category	Number	AMP Volume
Intakes	9 No	Volume 1
Treatment Plants	4 No	Volume 2
Pumping Stations	5 No	Volume 3
Reticulation Network	144 km Trunk Mains	Volume 4
	650 km Dist. & Rider Mains	
	14 No. pipe bridges	
	5,782 No. valves	
	23 No. manholes	
	3,613 No. hydrants	
	28,037 No. service connections	
	459 No. backflow preventers	
3,252 No. meters		
Storage	16 No	Volume 5

1.3 Levels of Service

Our overall Water Supply service objective is:

'To deliver water services that protect and promote public health, meet legislative standards, while endeavouring to meet community expectations, in a safe, efficient and affordable manner, today and for the future.'

This objective reflects the legislative requirements we have to improve promote and protect public health by providing clean, safe drinking water. It also links to our community outcomes in the following ways:

- A reliable water supply is critical to many business operations and supports a diverse range of industry in the district. Our continued investment in resilient water supply infrastructure supports industry and development, contributing to Supporting a prosperous community - Awhi mai, awhi atu, tātou katoa.
- Providing connected properties with a safe, reliable and affordable water supply, and ensuring an adequate supply for urban firefighting contributes to our vision of Putting people first – Aroha ki te Tangata.
- Complying with resource consents for water takes and managing our water resources more sustainably for future generations contributes to Caring for our place – Manaaki whenua, manaaki tangata, haere whakamua.

To support our service objective and the community outcomes, we have defined the following levels of service that identify key measures and targets for our water supply service. Further details can be found in Section 3.

- We provide water that is safe to drink.
- We maintain the reticulated water network in good condition.
- We respond to faults and unplanned interruptions to the water supply network in a timely manner.
- Customers are satisfied with our water supply service.
- We manage demand to minimise the impact of water supply activities on the environment.

1.4 Future Demand

There are some issues in the existing water supply network relating to supply and demand. In 2016, we developed a Water Supply Master Plan (ECM#7136169) to investigate ways to manage these issues and service expected growth in the district. The Water Master Plan outlines a 30 year work programme for augmentation of water supply assets, including investing in trunk mains, storage, reticulation, source agreements, lake storage and alternative water sources. The timing of proposed investment will be determined by the effectiveness of demand management tools, our metering policy and the actual rate of population growth in the district.

In 2016, Council endorsed an investment option estimated at \$70.6m over the next 30 years (ECM#7196020). A summary of the specific projects planned can be found in Section 4 – Future Demand. Specific expenditure forecasts for each asset category are included in the AMP volumes.

1.5 Lifecycle Management Plan

The lifecycle of an asset has four main stages:

- Creation (plan, design, procure, construct);
- Operation and maintenance;
- Renewal or rehabilitation; and
- Disposal.

General descriptions of the asset management practices, processes and system we use throughout the life cycle of our assets are included in Section 4 of our Asset Management Strategy. Particular details of how we manage the lifecycle of each asset category can be found in the asset category volumes 1-5, including how we optimise costs over a lifecycle. For example, it may be more cost efficient for us to choose a more expensive valve that costs less to maintain over the course of its life, than to choose a cheaper valve that will require a lot of maintenance.

1.6 Risk Management Plan

Our Corporate Risk Management Framework is used to identify, record, manage and mitigate key risks to the water supply network. As the Water Master Plan is implemented we will investigate and assess opportunities to enhance asset resilience where appropriate.

All reticulation assets have been assigned criticality ratings, which are used to prioritise maintenance and renewal planning. We are also working to complete a full criticality assessment for water supply plant and equipment assets.

Further details about risk management are included in Section 6 and in the asset category volumes 1-5.

1.7 Financial Summary

Table 2 summarises the total expenditure forecast for water supply assets, as detailed in the individual asset category volumes.

Table 2 Expenditure forecast summary

Water Supply Expenditure Forecast (\$000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
Personnel Costs	-16	188	225	254	259	348	355	363	370	378	2,725
General Operating Expenditure	1,002	972	996	1,025	1,050	1,077	1,104	1,132	1,162	1,193	10,713
Direct Cost of Activities	2,925	2,994	3,082	3,150	3,219	3,293	3,311	3,391	3,475	3,562	32,401
Shared Services (Overhead)	4,418	4,724	5,001	5,436	5,998	6,305	6,623	6,457	7,125	7,816	59,903
Opex Total	8,329	8,878	9,304	9,865	10,526	11,023	11,393	11,343	12,132	12,949	105,742
Renewals	3,320	3,518	4,380	5,114	5,578	5,046	5,121	5,424	5,992	7,669	51,162
Service Level	3,644	4,569	4,162	7,120	1,305	435	216	221	13,514	13,864	49,050
Growth	4,000	3,876	4,253	3,543	4,928	6,892	7,116	77	78	81	34,844
Capex Total	10,964	11,963	12,795	15,777	11,811	12,373	12,453	5,722	19,584	21,614	135,056
Overall Total	19,293	20,840	22,099	25,642	22,337	23,395	23,846	17,065	31,717	34,564	240,798

1.8 Improvement and Monitoring Plan

Details about our general asset management maturity improvement programme can be found in the Asset Management Strategy. General identified improvements are included in Section 8 of this general volume. Specific identified improvements are included in each asset category volume.

2.1 Background

Under the Health Act 1956 and the Health (Drinking Water) Amendment Act 2007, we have a duty to improve, promote and protect public health within the district. We do this first and foremost by providing safe drinking water. Our water supply must comply with the current version of the Drinking Water Standards for New Zealand (DWSNZ) and we must provide a reliable supply in emergency situations. We also manage the District's water supply because:

- It aligns with our strategic objectives to safeguard public health and the environment, and supports economic growth of the community.
- We can provide a specified level of service in a cost-effective manner.
- The Local Government Act 2002 (section 130) requires us to continue to provide water services and maintain our capacity to do so.
- The community has indicated its support of our management of the water supply.

Purpose of Plan

This plan has been developed in accordance with the requirements of the LGA 2002. It covers the forecast activities and expenditure for a thirty year planning period, with an emphasis on the 10 year period from 1 July 2018 to 30 June 2028. The main purpose of the plan is detailed in Section 1.1. In addition, the plan's purpose is to:

- Provide safe, affordable and reliable drinking quality water to all residential, commercial and industrial customers within designated urban and rural water supply areas
- Provide firefighting water supply reticulation and capacity that meets the NZ Fire Code of Practice, within designated urban water supply areas
- Operate and maintain an untreated raw water supply to specific industry within Waitara.
- Encourage water conservation and minimise potable water waste.
- Ensure we meet our customer service standards.
- Ensure water supply demands are managed in a cost effective and sustainable manner.
- Provide well substantiated financial forecasts and projections.
- Identify and utilise opportunities for improvement.

Relationships with Other Documents

The relationships between AMPs and other Council-wide planning documents are detailed in our Asset Management Strategy. Other documents specific to water supply planning include:

- **Water Services Management System and Contracts:** The service levels, strategies, and information requirements described in the AMP are incorporated within our contract specification, Key Performance Indicator (KPIs) and reporting documentation.
- **NPDC Bylaw:** The Water, Wastewater and Stormwater services bylaw (2008, Part 9) addresses the issues associated with the terms and conditions for the supply of water and the protection of our customers and the residents of New Plymouth District.
- **Water and Sanitary Assessment (2009):** This document provides an assessment of water services as required by the 2002 LGA.

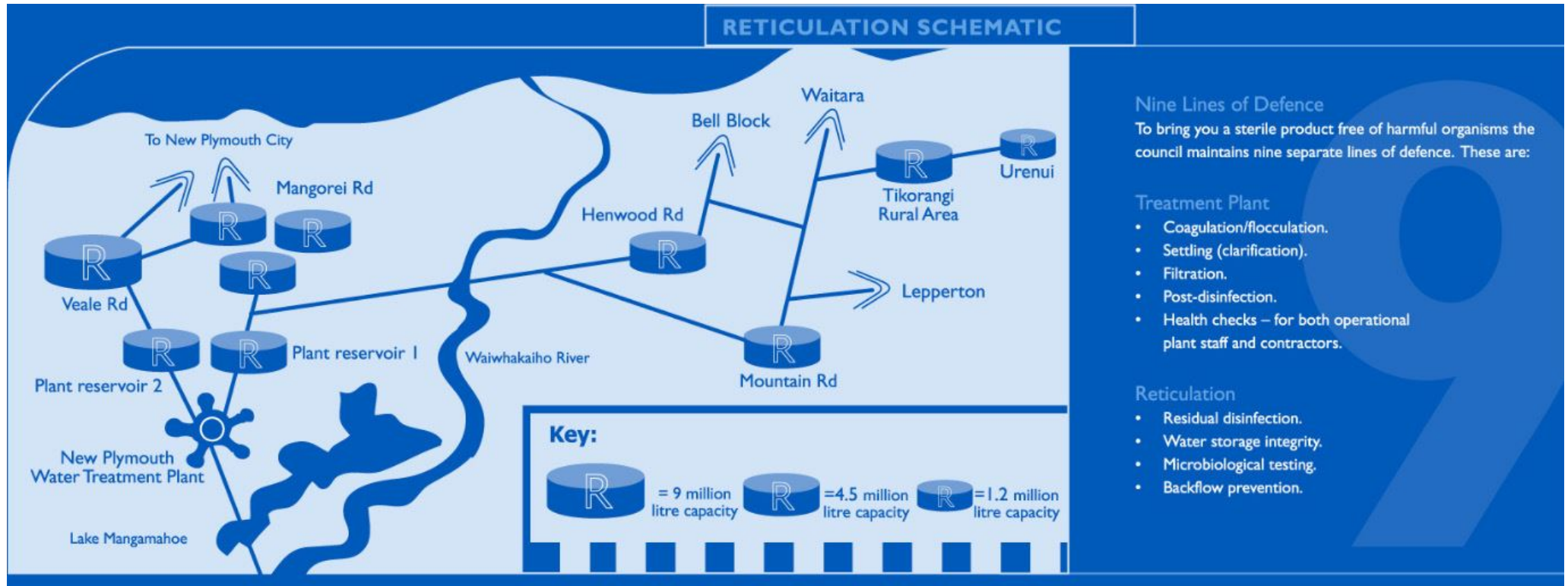
2.2 Assets Included in the Plan

Our water reticulation system is designed to meet the day to day requirements of residential, commercial and industrial customers and firefighting requirements in defined urban areas. The components of the reticulation network assets include headworks/intakes, treatment plants, reservoirs, trunk mains, distribution mains, hydrants, pressure reducing valves, backflow preventers, valves, manifold assembly and toby and/or meters or restrictors at the customer point of supply.

These assets make up four separate water supply schemes in the district, as shown in Figures 1, 2, 3 and 4.

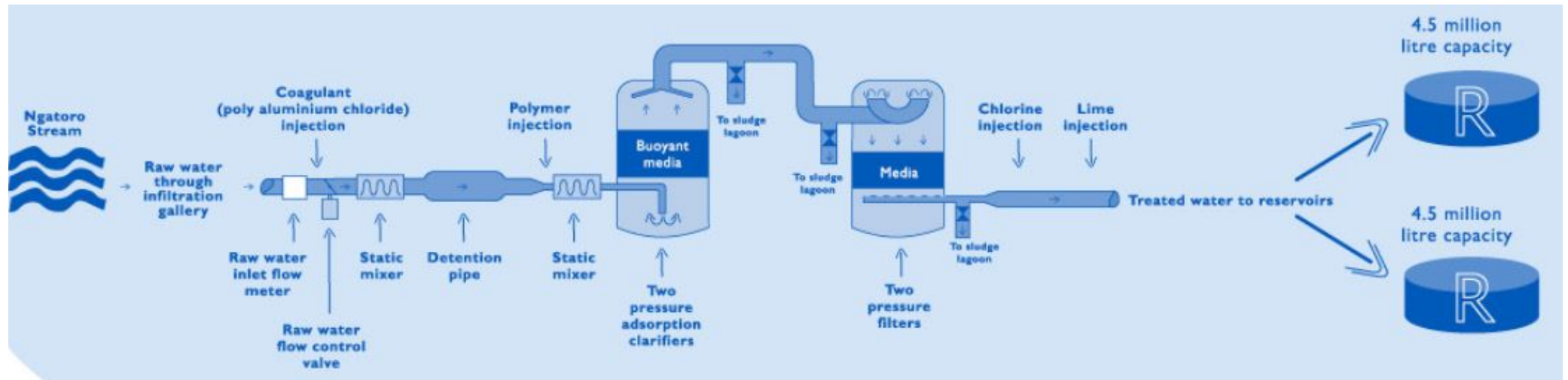
2. INTRODUCTION

Figure 1 New Plymouth water supply scheme



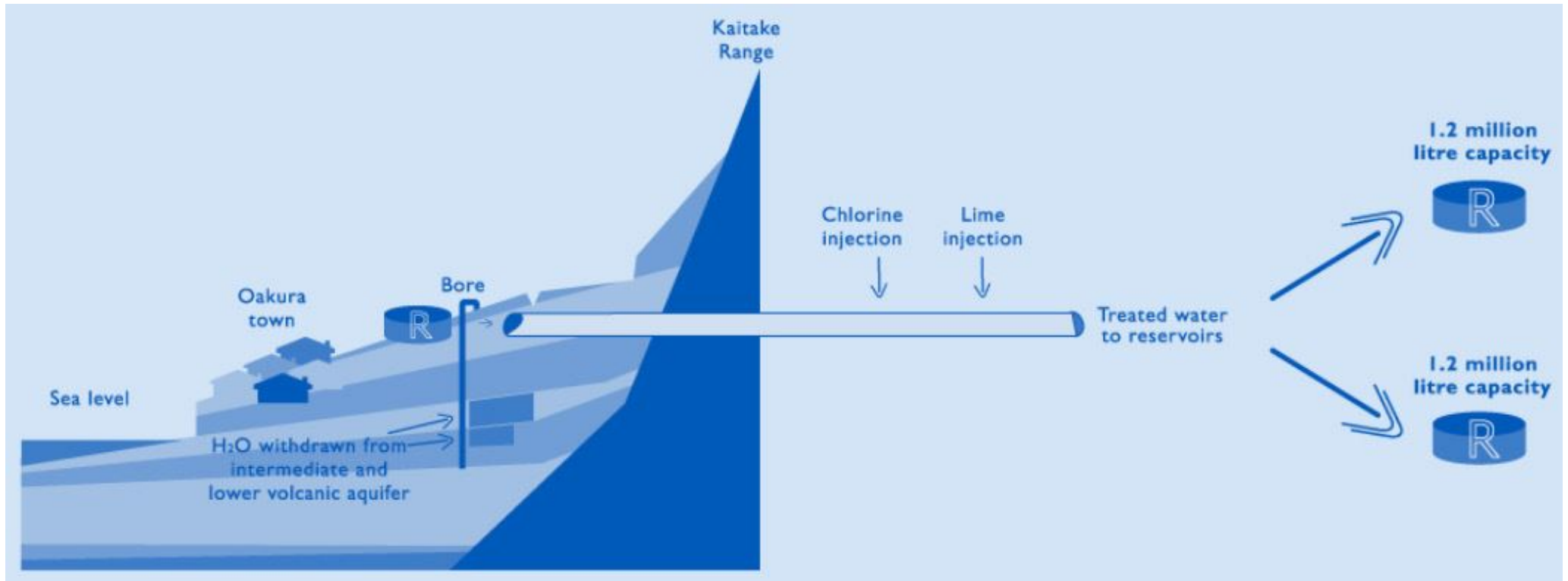
2. INTRODUCTION

Figure 2 Inglewood water supply scheme



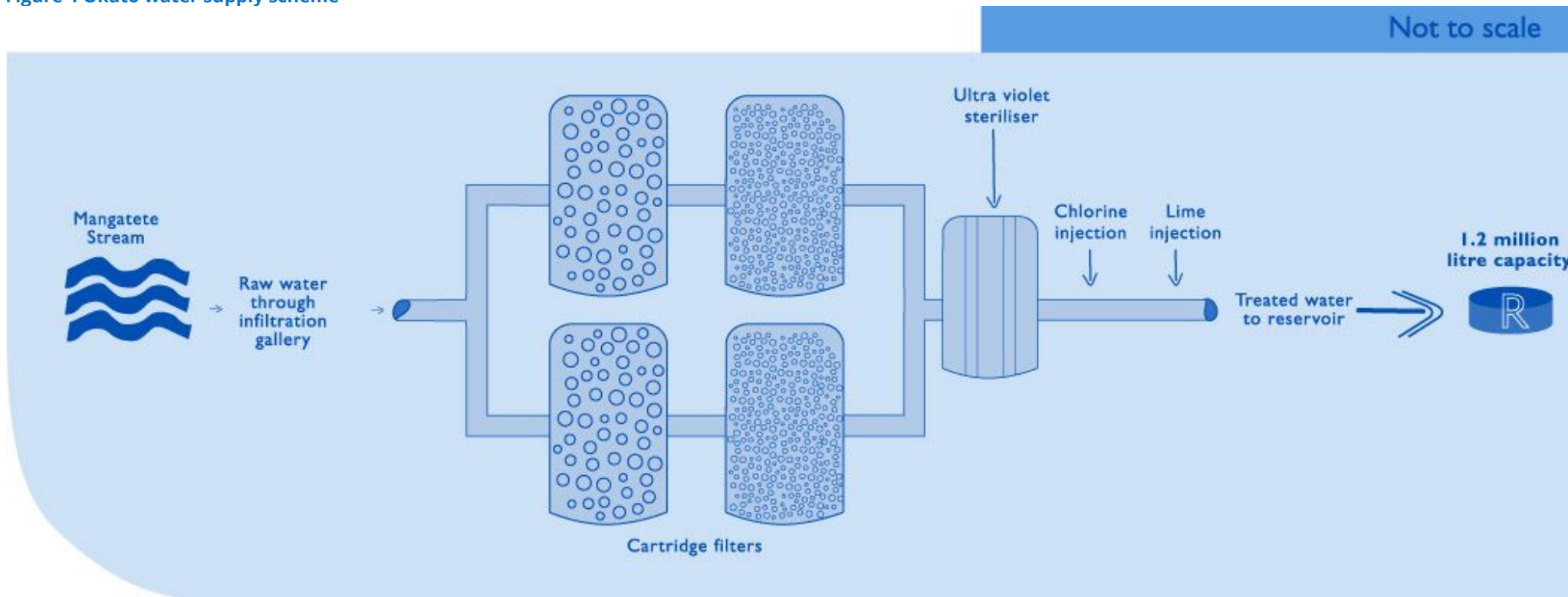
2. INTRODUCTION

Figure 3 Oakura water supply scheme



2. INTRODUCTION

Figure 4 Okato water supply scheme



2. INTRODUCTION

Asset Valuation

The value of our water supply assets (excluding land and buildings) is summarised in Table 3.

Table 3 Asset valuation

Asset Category	Gross Current Replacement Cost (\$)	Annual Depreciation (\$)	Optimised Depreciated Replacement Cost (\$)
Intakes	6,269,323	121,375	3,371,900
Treatment Plant	32,654,966	803,524	16,776,900
Pump Stations	623,474	21,955	179,400
Reticulation Network	214,874,404	2,892,253	108,541,486
Reservoirs	30,995,792	576,919	20,598,800
Total	285,417,959	4,416,026	149,468,486

Assets are valued at optimised depreciated replacement cost (ODRC). To calculate the ODRC we first establish the gross current replacement cost (GCRC) of an asset by applying unit rates to quantifiable asset attributes (length, width, depth, etc.). We then deduct an estimate of the asset's accumulated depreciation from its GCRC. Accumulated depreciation is calculated on a straight line basis, using estimates of useful lives and remaining useful lives.



2.3 Organisational Structure

A range of our staff are involved in preparing and delivering the AMP and providing support services for asset management. How these responsibilities are allocated, managed and delivered are shown in the hierarchical diagram in Table 4.

Table 4 Organisational structure

	Elected Members (Council)		
	Approval of key resolutions, policy, LTP, AP and AMPs to ensure Council's responsibilities to the community are being met in an effective and efficient way.		
Tier 1	Chief Executive		
	Overall management of the organisation's activities to ensure Council objectives are met.		
Tier 2	Chief Operating Officer Manages delivery the services and plans defined in the asset management plans.	Group Strategy Manager Manages production of our LTP, 30-year Blueprint and District Plan.	Chief Financial Officer Manages our information technology services, legal services, records management, property assets, payroll, accounts, rates, procurement and risk management.
Tier 3	Infrastructure Manager Oversees day-to-day operations, maintenance, renewal and augmentation of the water supply system in accordance with the LTP, AP and AMP. Overall management of resources to achieve plans including balance of internal and contract resources. Providing advice and guidance on tactical infrastructure asset management to the COO and CE.	Infrastructure Planning Lead Preparation of strategic asset management plans, asset management objectives, levels of service and the Infrastructure Strategy.	Information Services Manager Support and solutions development for asset management software and systems.
			Business Services Manager Preparation and monitoring of financial budgets and targets related to asset management planning.
Tier 4	Asset Operations Planning Lead Preparation of the tactical aspects of the AMPs, maintaining the asset inventory and asset records, developing annual work programmes, conducting asset condition assessments and asset valuations.		
	Manager Three Waters Manages delivery of day-to-day operations, maintenance and minor renewals of the water supply network. Management of internal and contract resources.		
	Manager Infrastructure Projects Delivery of major projects and technical investigations for the renewal and augmentation of the water supply network.		

2.4 Document Structure

A high level description of how this plan links to our vision, mission, goals and objectives can be found in our overarching LTP, with more specific detail in the Infrastructure Strategy and Council Services sections.

Asset management planning content is split between our Asset Management Strategy, a General Asset Management Plan for each asset class, and a volume for each specific asset category within that class. This Water Supply AMP includes a General volume and five specific asset category volumes:

- Volume 1 – Intakes/Headworks
- Volume 2 – Treatment Plants
- Volume 3 – Pump Stations
- Volume 4 – Reticulation Network
- Volume 5 – Reservoirs

The framework and key elements of the overall asset management plan are outlined in Table 5.

Table 5 Asset management document structure

No.	Document Name	Key Document Contents
1	Long Term Plan (LTP)	Infrastructure Strategy <ul style="list-style-type: none"> • Strategic Framework • Guiding Themes • High Level Information for Each Asset Class Council Services <ul style="list-style-type: none"> • High Level Information • Levels of Service • Financial Plan
2	Asset Management Strategy	General Asset Management Principles and Overview
3	Asset Class General Volumes	General Information and Glossary about each asset class <ul style="list-style-type: none"> • Executive Summary • Introduction • Levels of Service • Future Demand • Risk Management Plan • Financial Summary • Plan Improvement and Monitoring
4	Asset Category Lifecycle Management Volumes	Asset Life Cycle Management for each asset category within each asset class <ul style="list-style-type: none"> • Description • Condition • Remaining Lives • Valuation • Operations & Maintenance • Renewals • Acquisition and Augmentation • Disposals • Annual Work Plan • Risk Management • Financial Summary • Improvement Plan

2. INTRODUCTION

2.5 Asset Information and Data

We store and manage information and data about water supply assets in various systems, including the following:

- Enterprise Asset Management (EAM) system (Technology 1) for document management, financial management, customer information & requests, asset inventory, asset history, work order management and maintenance scheduling;
- ARCGIS for spatial records with general GIS viewer MILES;
- Drawing Management System in SharePoint on intranet and drawing files stored on server;
- Water Outlook for gathering and managing SCADA and process data;
- Water Online for reporting compliance data to the Ministry of Health; and
- Infoworks for pipe network modelling.



3. LEVELS OF SERVICE

Our levels of service are driven by our overall service objectives, customer expectations, and legislative and technical requirements. The Capex and Opex investment programmes included in this plan are based on effective asset management practices that deliver on these objectives, expectations and requirements.

3.1 Customer Levels of Service

The customer levels of service included in the LTP, together with target levels and a snapshot of past performance are show in Table 6.

Table 6 Customer levels of service

What you can expect	How we measure performance	Actual 2016/17	Target 2018/19	Target 2019/20	Target 2020/12	Target By 2027/28
We provide water that is safe to drink.	Our level of compliance with Part 4 of the Drinking-water Standards (bacteria compliance criteria).	Full compliance	Full compliance	Full compliance	Full compliance	Full compliance
	Our level of compliance with Part 5 of the Drinking-water Standards (protozoal compliance criteria).	Full compliance	Full compliance	Full compliance	Full compliance	Full compliance
We maintain the reticulated water network in good condition.	The percentage of real water loss from our networked reticulation system.2	28.70%	25% or less	25% or less	25% or less	25% or less

3. LEVELS OF SERVICE

Table 6 Customer levels of service (continued)

What you can expect (continued)	How we measure performance	Actual 2016/17	Target 2018/19	Target 2019/20	Target 2020/12	Target By 2027/28
We respond to faults and unplanned interruptions to the water supply network in a timely manner.	The median response time to urgent callouts (from the time that we receive notification to the time that service personnel reach the site).	0.36	one hour or less	one hour or less	one hour or less	one hour or less
	The median resolution time for urgent callouts (from the time we receive notification, to the time that service personnel confirm resolution of the fault or interruption).	1.87	four hours or less for mains	four hours or less for mains	four hours or less for mains	four hours or less for mains
		No call outs	< 250 dia	< 250 dia	< 250 dia	< 250 dia
			> 250 dia	> 250 dia	> 250 dia	> 250 dia
	The median response time to non-urgent callouts (from the time we receive notification to the time that service personnel reach the site).	18.79	42 hours or less	42 hours or less	42 hours or less	42 hours or less
The median resolution time for non-urgent callouts (from the time we receive notification to the time that service personnel confirm resolution of the fault or interruption).	26.3	66 hours or less	66 hours or less	66 hours or less	66 hours or less	
Customers are satisfied with our water supply service.	The total number of complaints (per 1,000 connections) received about any of the following: <ul style="list-style-type: none"> • drinking water clarity, taste, or odour; • drinking water pressure or flow; • continuity of supply; and • our response to any of these issues. 	7.8	10 or less	10 or less	10 or less	10 or less

3. LEVELS OF SERVICE

3.2 Legislative Requirements

In addition to Customer Levels of Service, there are a number of technical and operational parameters required by various legislation including:

- Local Government Act 2002 and 2010 Amendments
- Health (Drinking Water) Amendment Act 2007
- New Zealand Drinking Water Standards (NZDWS 2005 – 2008 revision)
- Health and Safety At Work (Hazardous Substances) Regulations 2017
- Resource Management Act 1991 including Amendments from the Legislation Act 2012
- Fire Act 1975
- Local Government (Rating) Act 2002
- Civil Defence Emergency Management Act 2002
- Health and Safety at Work Act 2015
- Building Act 2004
- Public Works Act 1981
- Climate Change Response Act 2002
- Regional Fresh Water Plan (2001)
- Guidelines for Earthworks (2006)
- NZ Standards – Technical Specifications for water renewals and construction

3.3 Technical Levels of Service

To meet legislative requirements, we also apply and monitor the following technical levels of service:

- The New Zealand Fire Service (NZFS) Water Supplies Code of Practice SNZ PAS 4509:2008 governs the minimum required flows and pressures for firefighting. In accordance with this standards, NPDC's targeted level of service is currently fire water classification FW3. However this is to be reviewed collaboratively with the Fire Service to ensure practical and suitable levels of service are provided across different areas.
- The maximum desirable working pressure for water supply is 900 kPa. This is being progressively achieved as pressure zone and demand management procedures are implemented. Some zones at higher elevations (typically on the outskirts of the city) will have pressure sustaining valves to ensure minimum pressures stay above the minimum level of service (300 kPa for urban properties and 200 kPa for rural properties) wherever possible.



3. LEVELS OF SERVICE

3.4 Levels of Service Projects

We have identified a number of projects to improve and maintain levels of service. Details are included in the asset category volumes 1-5. Table 7 summarises how the total expenditure of \$49.05m will be spent across the different asset categories over the 10 year period of the AMP.

Table 7 Level of service expenditure forecast

Water Supply Capex Forecast (\$000) – Levels of Service											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
Intakes	-	-	-	-	-	-	-	-	-	-	-
Treatment Plants	757	1,544	473	3,225	-	-	-	-	13,287	13,632	32,918
Pump Stations	-	-	237	-	-	-	-	-	-	-	237
Reticulation Network	198	205	208	213	217	210	216	221	227	232	2,147
Reservoirs	-	-	210	-	-	-	-	-	-	-	210
Water Resilience*	2,689	2,820	3,034	3,682	1,088	225	-	-	-	-	13,538
Total Levels of Service	3,644	4,569	4,162	7,120	1,305	435	216	221	13,514	13,864	49,050

*See section 6.3 for details of Water Resilience investment plan.

4. FUTURE DEMAND

The New Plymouth water network area consists of three distinct trunk feeder zones: Western, Central and Eastern.

We have identified some existing problems with the water supply network. We currently apply conservation measures during peak demand and use measures such as changing the operational set points of service reservoirs manually to optimise the supply capacity of the trunk main system. Modelling confirms that under current operations, there are problems with filling the key reservoirs along the eastern trunk feeder because of head losses in the mains to the Henwood and Mountain Road reservoirs. This has potential to impact approximately 3,000 customers, including rest homes and commercial users, with a cascading impact on customers in Tikorangi and Urenui.

Using medium population growth projections, we anticipate the New Plymouth area to grow by 19% by 2045, to a population of just under 88,000 people. Analysis using network modelling, current known issues and future demand projections shows that without any infrastructure investment, the number of properties affected by reduced levels of service on high demand days will increase from 3,000 (current) to approximately 14,600 by 2045.

The New Plymouth Water Master Plan (ECM#7136169) includes a 30 year work program for the New Plymouth water trunk main and reservoir system based on medium population growth projections. Our approach in preparing the work program is summarised as follows:

- Use the existing network model with current demand. Establish future growth in the area by using the medium growth demand forecast and Council Blueprint
- Develop and formulate additional demand and add these demands to the network and assess the impact of these additional demands on the network infrastructure
- On identifying the network deficiencies, formulate solutions to remove these deficiencies, check the impact of these solutions with universal metering.
- Discuss the resilience of the network and impact on resilience with the solutions developed.

The program considers universal water metering and its impact on network resilience as a water conservation measure. It also considers tools such as pressure reduction, leakage and losses reduction, rainwater tanks and pricing policies.

These measures should reduce water consumption per person per day. However, in the long term, population growth will continue to increase the peak demand placed on the water supply system. The anticipated population growth and the impact of this additional demand to the existing network infrastructure is significant and will require capital and operational investment in a number of capital improvement projects.

Projects endorsed by Council in August 2016 (ECM#7196020) require a total estimated investment of \$70.6m over the next 30 years and are summarised in Table 8. Further details and expenditure forecasts for each asset category are included in the corresponding AMP volumes.

4. FUTURE DEMAND

Table 8 Water master plan components summary

Project	Timing	Description
Dredging of lake Mangamahoe	2024-2026	Currently there is an LTP project to undertake maintenance dredging of Lake Mangamahoe. It is proposed to increase the scope of this to include deepening the lake in order to enlarge the storage capacity. In advance of this work, more detailed feasibility and investigation work is required to confirm that this is practicable and cost effective. In addition, it will be subject to gaining permission from Powerco as the owner of the lake.
Identify and commission a new water source	2031-2034	As population growth is realised in the future the total water demand will continue to grow, notwithstanding any reductions to individual usage per person per day from demand management. As such, at some point the demand on the current water source will exceed its supply capabilities and a new water source will be required. Further investigation work is required to identify a suitable water source, which could possibly consist of solutions such as bore holes or another river supply.
Water Treatment Plant Filter upgrade	2018-2019	Review of the filters at the water treatment plant will overcome the issues of algae clogging the existing filters and forcing them into the backwash self-cleaning mode.
Mountain Road Reservoir	2017-2018	Mountain Road reservoir is currently operating at 78% of ADD and needs to have its storage capacity increased to accommodate current demand as well as future growth. This project is for the construction of an additional reservoir at the existing site.
Henwood Road Reservoir	2018-2019	Henwood Road reservoir is currently operating at 90% of ADD and needs to have its storage capacity increased to accommodate current demand as well as future growth. This project is for the construction of an additional reservoir at the existing site.
Duplicate the New Plymouth Water Treatment Plant Outlet pipe	2019-2020	The current outlet pipe from the water treatment plant is undersized for future growth related demand. Duplication of the outlet will allow a greater rate of water distribution via the reticulation network so that input into reservoirs meets/exceeds the rate water is drawn out of them.
Smart Road Reservoir & Trunk Main	2026-2028	This reservoir and trunk main are currently identified as developer led projects. It is proposed that these becomes Council led projects, with development contributions collected retrospectively. This will allow the timing of these projects to be controlled so that this strategic infrastructure is in place at the most optimal time.
<ul style="list-style-type: none"> • Western Feeder Stage 1 • Western Feeder Stage 2 • Central & Eastern Feeder Stage 1 • Eastern Feeder Stage 2 	2028-2030 2045-2046 2019-2024 2044-2045	The existing feeder mains are undersized and unable to accommodate future growth. As a result the reticulation network is not able to supply treated water at a sufficient rate to keep key reservoirs sufficiently stocked. An assessment of replacing the existing reticulation with larger diameter pipes has been undertaken. It is considered more cost effective to duplicate the main with a second pipe providing the required additional capacity. This approach also improves the resilience of the reticulation system, in particular with regard to future planned and emergency maintenance shutdowns of parts of the system.
Installation of universal water meters	2020-2022	Installation of water meters at all connection points, whether commercial or residential. It is estimated that universal water metering could reduce total water demand by 18% compared to current consumption. This is critical to being able to defer the other planned capex expenditure.
Renewal of water meters	2022 onwards	Water meters have a finite life. As they reach the end of their expected lifespan their accuracy diminishes and their periodic replacement becomes necessary.

4. FUTURE DEMAND

The exact timing of each project will depend on the success of the water conservation measures and the actual rate of population growth against forecasts. It is important to note that over time and as each component is assessed in more detail, we may identify other feasible options. This could result in changes to the plan and expenditure categories within the total expenditure forecast.

Modelling tools are assets in their own right and require renewal on a regular basis. Many of our current water supply hydraulic models are in need of updating to facilitate more reliable planning for growth, renewals, system management and operations. We also require a plan to ensure models remain up to date in the future. **This is recorded as Action 1 in Section 8 – Improvement and Monitoring Plan.**

Growth projects included in the Water Master Plan and planned for delivery over the 10 year period of the AMP total \$34.8m. The total values of the projects are summarised in Table 9. Details can be found in the corresponding asset category volumes 1-5.

Table 9 Growth expenditure forecast

Water Supply Capex Forecast (\$000) - Growth											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
Intakes	-	-	-	-	-	-	-	-	-	-	-
Treatment Plants	-	-	-	-	-	-	-	-	-	-	-
Pump Stations	-	309	-	-	-	-	-	-	-	-	309
Reticulation Network	65	68	4,253	3,543	4,928	6,892	7,116	77	78	81	27,101
Reservoirs	3,935	3,499	-	-	-	-	-	-	-	-	7,434
Total Growth	4,000	3,876	4,253	3,543	4,928	6,892	7,116	77	78	81	34,844

5. LIFECYCLE MANAGEMENT PLAN

The lifecycle of an asset has four stages:

- Creation (plan, design, procure, construct);
- Operation and maintenance;
- Renewal or rehabilitation; and
- Disposal.

A general overview of how we manage these stages is included in the Asset Management Strategy. Detailed lifecycle management is covered in each of the asset category volumes 1-5.

5.1 Operations and maintenance

Our general asset operation and maintenance approach can be found in Section 4.2 of the Asset Management Strategy. Specific operations and maintenance activities are detailed in each of the asset category volumes 1-5. Identified improvement areas that apply to all asset categories are outlined in the general volume. Improvement areas related to a particular asset category are included in the corresponding asset category volume.

We do not currently have a Maintenance Management Plan detailing how we identify, record, measure, analyse and optimise/improve maintenance activity and performance. This has resulted in high levels of reactive maintenance and the associated higher levels of risk and cost. **This is an asset management improvement issue and is recorded as Action 2 in Section 8 – Improvement and Monitoring Plan.**

There are large discrepancies between the asset inventory of our plant and equipment (P&E) assets and the physical assets that exist on site. This has resulted in undervaluation of P&E assets and in unrecorded assets having no defined scheduled maintenance. **This is an asset management improvement issue and is recorded as Action 3 in Section 8 – Improvement and Monitoring Plan.**

Many of our mechanical plant and equipment assets do not have any scheduled maintenance activities assigned to them. This has resulted in high levels of reactive maintenance and the associated higher levels of risk and cost. It has also resulted in poor reliability. **This is an asset management improvement issue and is recorded Action 4 in Section 8 – Improvement and Monitoring Plan.**

We record and schedule most maintenance tasks using T1. However, Instrumentation and Electrical maintenance is not scheduled in T1, which makes it difficult to monitor and measure performance. **This is an asset data integrity issue and is recorded as Action 5 in Section 8 – Improvement and Monitoring Plan.**

A significant number of our P&E assets are not tagged with P&ID reference numbers. This is not consistent with good engineering practice and makes it difficult to identify equipment on-site. **This is an asset management improvement issue and is recorded Action 6 in Section 8 – Improvement and Monitoring Plan.**

Many of our Piping and Instrumentation Drawings (P&IDs) and layout drawings for P&E are inaccurate, incomplete, or out of date. This causes delays and additional costs during project planning, and creates potential safety issues when operating equipment. **This is an asset management improvement issue and is recorded Action 7 in Section 8 – Improvement and Monitoring Plan.**

5. LIFECYCLE MANAGEMENT PLAN

Table 10 shows the overall 10 year Opex forecast for the activities included in the water supply asset category volumes 1-5:

Table 10 Opex forecast

Water Supply Opex Forecast (\$000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
Personnel Costs	-16	188	225	254	259	348	355	363	370	378	2,725
General Operating Expenditure	1,002	972	996	1,025	1,050	1,077	1,104	1,132	1,162	1,193	10,713
Direct Cost of Activities	2,925	2,994	3,082	3,150	3,219	3,293	3,311	3,391	3,475	3,562	32,401
Shared Services (Overhead)	4,418	4,724	5,001	5,436	5,998	6,305	6,623	6,457	7,125	7,816	59,903
Total	8,329	8,877	9,304	9,865	10,526	11,022	11,393	11,343	12,133	12,950	105,742

Personnel costs include salaries and wages and other personnel expenses, including training and recruitment. General operating expenditure includes occupancy and utility costs, insurance costs, property maintenance and legal and professional fees. Direct costs of activities includes contractor's costs, materials and services. Shared Services (Overhead) includes internal charges for support services e.g. Executive Leadership Team, HR, labour costing expenses and internal goods and services charges.

5.2 Renewals

Our general approach to asset renewal is included in Section 4.3 of the Asset Management Strategy. Specific renewal activities and programmes are included in each of the asset category volumes 1-5. The overall Capex forecast for water supply renewals over the next ten years is \$51.1m, as summarised in Table 11.

Table 11 Renewals expenditure forecast

Water Supply Capex Forecast (\$000) - Renewals											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
Intakes	310	-	-	-	-	-	-	-	-	-	310
Treatment Plants	705	541	1,025	1,316	1,345	1,377	1,410	1,443	1,480	1,518	12,160
Pump Stations	-	-	-	-	-	-	-	-	-	-	-
Reticulation Network	2,615	2,667	3,355	3,798	4,233	3,669	3,711	3,981	4,512	6,151	38,692
Reservoirs	-	-	-	-	-	-	-	-	-	-	-
Total Renewals	3,630	3,208	4,380	5,114	5,578	5,046	5,121	5,424	5,992	7,669	51,162

6. RISK MANAGEMENT PLAN

6.1 Critical assets

We assess the criticality scores for water supply reticulation mains using the process and scoring system detailed in ECM#988741 - Water, Wastewater and Stormwater Mains Criticality and Renewals Prioritisation Process. These scores are converted into criticality ratings and recorded in the T1 asset inventory to assist us with asset maintenance and renewal planning.

We recently commenced a programme to assess and record criticality ratings for plant and equipment assets in the T1 asset inventory. This process is only partially complete and is recorded as an improvement action in the corresponding asset category volumes.

6.2 Risk Assessment

Our risk assessments are conducted, recorded, managed, escalated and monitored in accordance with ECM#1479536 - Corporate Risk Management Framework: Policy & Process. A summary of how the policy and process operate and a list of the current key risks relevant to our assets is included in Section 7 of the Asset Management Strategy. The list includes risks that are applicable across all asset categories and those particular to Water Supply.



6.3 Infrastructure Resilience Approach

Following on from ex-cyclone Gita which damaged one of our trunk mains crossing a pipe-bridge in February 2018 and the Havelock North Water Inquiry; the importance of our water network has been highlighted. This has caused us to consider the resilience of our water assets based on cost versus risk assessments. As a result we plan to invest more on the general resilience of our drinking water supply system to enhance security and integrity and increase performance against our levels of service. The items we have identified that we will invest in over the period of the AMP include the following.

- More inspections and preventative maintenance of our critical assets
- More back-up spare parts for our critical equipment such as spare pipes, valves and pumps.
- Increasing the number of backflow preventers on high risk commercial/industrial properties.
- Enhancing scenario based planning and mitigation for weather events.
- Investigation of options to improve the resilience of our water treatment plants.
- Upgrading our critical pipe bridges.
- Upgrading our water pump stations to include back up power supplies and warning alarm systems.
- Designing back up options for parts of our water supply network supplied by a single pipe.

The planned capex investment for these items is shown in Table 12.

Table 12 Level of service resilience expenditure forecast

General Level of Service Expenditure Forecast (\$000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
WA2028 - Water Resilience	2,689	2,820	3,034	3,682	1,088	225	-	-	-	-	13,538
Total	2,689	2,820	3,034	3,682	1,088	225	-	-	-	-	13,538

These resilience improvement plans will also result in an increase in opex investment to deliver and sustain improvements. The additional opex required is included in the overall opex forecast included in section 5.1.

During development of the Water Master Plan we investigated opportunities to assess and enhance asset resilience and allocated investment where appropriate. An example of this is the Eastern Feeder Trunk Mains Stage 2 project, which includes plans to install a parallel trunk main to provide additional capacity, rather than replace the existing trunk main with larger sized pipe. This parallel pipe will provide the additional capacity required and will also enhance resilience by allowing for uninterrupted supply in the case of an emergency event or scheduled maintenance.

7.1 Financial Statements and Projections

The 10-year expenditure forecast for the water supply assets is shown in Table 13. Forecasts and expenditure items for each asset category are included in the individual volumes.

Table 13 Expenditure forecast summary

Water Supply Expenditure Forecast (\$000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
Personnel Costs	-16	188	225	254	259	348	355	363	370	378	2,725
General Operating Expenditure	1,002	972	996	1,025	1,050	1,077	1,104	1,132	1,162	1,193	10,713
Direct Cost of Activities	2,925	2,994	3,082	3,150	3,219	3,293	3,311	3,391	3,475	3,562	32,401
Shared Services (Overhead)	4,418	4,724	5,001	5,436	5,998	6,305	6,623	6,457	7,125	7,816	59,903
Opex Total	8,329	8,878	9,304	9,865	10,526	11,023	11,393	11,343	12,132	12,949	105,742
Renewals	3,320	3,518	4,380	5,114	5,578	5,046	5,121	5,424	5,992	7,669	51,162
Service Level	3,644	4,569	4,162	7,120	1,305	435	216	221	13,514	13,864	49,050
Growth	4,000	3,876	4,253	3,543	4,928	6,892	7,116	77	78	81	34,844
Capex Total	10,964	11,963	12,795	15,777	11,811	12,373	12,453	5,722	19,584	21,614	135,056
Overall Total	19,293	20,840	22,099	25,642	22,337	23,395	23,846	17,065	31,717	34,564	240,798

The Water Master Plan includes options and cost estimates for level of service projects that extend beyond the 10 year period of the AMP.

7.2 Funding Strategy

Water supply assets are funded through a uniform annual charge (UAC), by water meter charges and by restricted flow tariffs. Capital improvements are funded by loans, while the renewal and replacement of assets is funded from renewal reserves. The replacement value of assets is \$294m (including land and buildings).

7.3 Valuation Forecasts

The last 3-yearly statutory valuation of fixed assets was conducted in 2016. Details can be found in the Infrastructure Fixed Asset Final 2016 Certified Valuation Report ECM#7164171. This includes the valuation methodology and a summary of the gross current replacement cost (GCRC), Optimised Depreciated Replacement Cost (ODRC or fair value) and annual depreciation for all asset categories.

The unit rates for water reticulation mains were critically reviewed during the 2016 valuation. This resulted in a GCRC increase of approximately \$75m, which compared favourably with equivalent sized district councils around New Zealand. No future significant variation in valuation forecasts is anticipated.

8. IMPROVEMENT AND MONITORING PLAN

Our general Asset Management Maturity Improvement Plan is included in the Asset Management Strategy.

General improvements to water supply assets are shown in Table 14. Specific areas of improvement identified for different asset categories can be found in the individual volumes.

Table 14 Improvement summary

No	Improvement Area	Owner	Start Date	End Date
1	Produce Modelling Management Plan and up to date validated water supply models.	Asset Operations Planning Lead	Mar 2018	Jun 2020
2	Produce and implement Maintenance Management Plan	Manager Three Waters	Jul 2018	Jun 2020
3	Survey all plant and equipment and match inventory to on-site status	Asset Operations Planning Lead	Mar 2018	Jun 2020
4	Produce full set of scheduled maintenance and check sheets for mechanical plant and equipment and record/ implement schedule in T1.	Manager Three Waters	Jul 2018	Jun 2020
5	Record and manage I&E scheduled maintenance tasks in T1.	Manager Three Waters	Jul 2018	Jun 2020
6	Check and install tagging to all plant and equipment	Manager Three Waters	Jul 2018	Jun 2020
7	Following survey in item 2, update P&IDs and layout drawings	Asset Operations Planning Lead	Mar 2018	Jun 2020



2018-2028 WATER SUPPLY ASSET MANAGEMENT PLAN

He Rautaki Whakahaere Rawa mō Te Wai Whakarato

GENERAL VOLUME

HE PUKAPUKA MATUA