December **2011**

Watercare Services Limited

Asset Management Plan

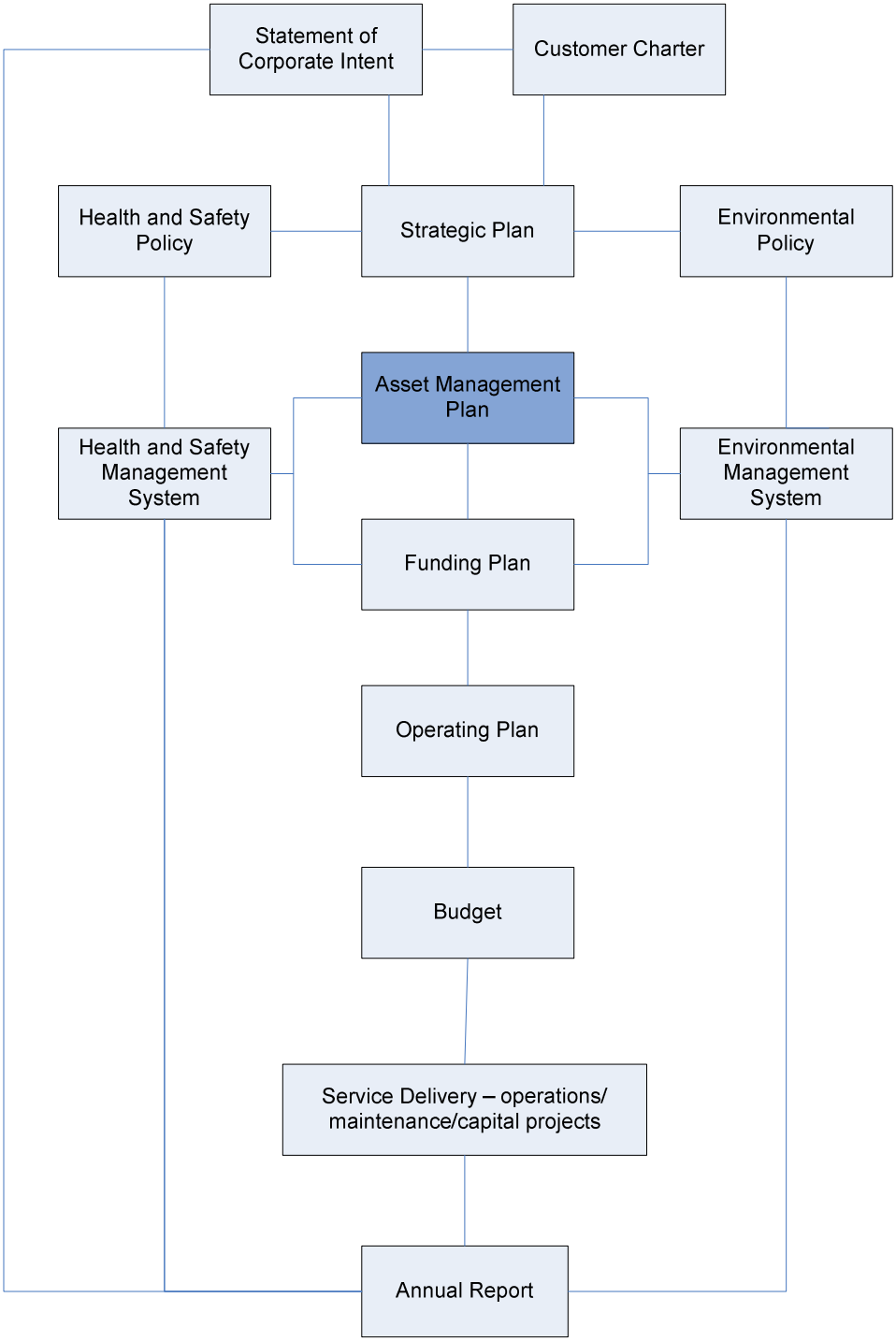
For the period: 1 July 2012 to 30 June 2022

water Care services limited

Cover image: Progress is made on a new wastewater storage tank being built in Henderson. The tank, which will have a 13-million-litre capacity, will provide for growth and reduce the frequency and volume of wastewater overflows into the Waitemata Harbour.

ABOUT THIS PLAN

The Asset Management Plan (AMP) is Watercare's tactical plan for managing the company's infrastructure cost-effectively to achieve long-term strategic goals. The relationship between the AMP and other company documents is shown below.



GLOSSARY

AC	Asbestos Cement
AEE	Assessment of Environmental Effects
AELG	Auckland Engineering Lifelines Group
AMIS	Asset Management Information System
AMP	Asset Management Plan
CAPEX	Capital Expediture
CCO	Council Controlled Organisation
CCTV	Closed Circuit Television
CO	Council Organisation
DCS	Distributed Control Systems
DWNZS	Drinking Water standards for New Zealand
ECS	Energy and Control Systems
EMS	Environmental Management System
I & I	Inflow and Infiltration
IMP	Incident Management Plan
ISMM	Integrated Source Management Model
kPa	kilopascal
LTCCP	Long Term Council Community Plan
LTP	Long Term Plan
m^3	cubic metre
	1 cubic metre = 1000 litres
MLd	megalitre/day
	1 megalitre = 1 million litres
	1 megalitre = 1000 cubic metres
mm	millimetre
NZIAS	New Zealand Equivalent to International Accounting Standards
OPEX	Operational Expenditure
PAS	Publicly Available Specification
PDM	Project Delivery Manual
PE	Polyethylene
PHRMP	Public Health Risk Management Plan
PLC	Programmable Logic Controllers
PRV	Pressure Reducing Valve
PVC	Polyvinyl Chloride
PWC	Pressurised Water System
RCM	Reliability-Centred Maintenance
RMA	Resource Management Act
SCADA	Supervisory Control and Data Acquisition
SCI	Statement of Corporate Intent
SNZ	Standards New Zealand
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

Financial Summary

The expenditure forecasts in this asset management plan are presented in both real and nominal dollars. Discussions in the narrative are based on nominal dollars. The following table summarises the 10-year expenditure forecast in nominal dollars ($ millions).

Expenditure Type	Business Area	10-Year Total
Operations	Water	634.3
	Wastewater	924.8
	Shared Services	910.4
	Total	**2,469.5**
Capital	Water	2,270.3
	Wastewater	2,438.1
	Shared Services	153.0
	Total	**4,861.4**

Capital Expenditure Forecast

The forecast capital expenditure for the 10-year period (excluding capitalised interest) is $3.7 billion in real terms and $4.8 billion in nominal terms.

About 42% of the forecast expenditure can be attributed to meeting the requirements for growth.

Over the 10-year period, the investment in water and wastewater (in nominal terms) are at similar levels of $2.27 billion and $2.44 billion respectively. However, the investment mix between the two business areas, on an annual basis during the 10-year period, is variable.

There is also forecast capital expenditure of $0.15 billion associated with shared services which are the business functions that support the delivery of water and wastewater services such as infrastructure planning, project delivery, customer services, property, finance, procurement, information systems, human resources, statutory planning, risk management, communications and internal audit.

Operational Expenditure Forecast

The total forecast operational expenditure for the 10-year period (excluding depreciation and interest) is $2.06 billion in real terms and $2.47 billion in nominal terms.

Operational expenditure forecasts have been based on indexation, for inflation and increased demand, of the 2011/12 operational expenditure budget. They do not include consequential expenditure arising from operations and maintenance of new assets, cyclical maintenance costs or increased maintenance costs due to deferral of capital projects. Operating and maintenance costs are based on the existing asset base. Consequential costs of any new infrastructure and cyclical maintenance costs are factored into the budget, for the year in which the assets are commissioned or when cyclical maintenance is due, when the annual budget is prepared.

Labour costs make up 20% of the total operational costs while maintenance contributes to 22%. The remaining 58% is attributable to other asset operating costs (including energy and chemicals).

Over the 10-year period, the operational expenditure in water and wastewater (in nominal terms) are $634 million and $925 million respectively. The mix between the two business areas, on an annual basis during the 10-year period, is consistent.

There is also forecast operational expenditure of $910 million associated with shared services.

Service Overview

Watercare Services Ltd (Watercare) has been the provider of bulk water and wastewater services to the Auckland region since 1991. On 1 November 2010, as a result of Auckland regional governance reforms, the company took over ownership and management of all the public water and wastewater assets within the Auckland Council region and began retailing services directly to the people of Auckland. The exception was the Papakura district where retail services are managed via a franchise agreement with United Water International Pty Ltd.

The integrated Watercare now has assets with a replacement value of around $11.8 billion and annual revenue of $466 million. The integrated company's main services include:

- The collection, treatment, and distribution of drinking water from 12 dams, 14 bores and springs and 3 river sources. A total of 140 billion litres of water is treated annually at 21 plants and distributed over 8,825 kilometres of water pipes through 84 reservoirs and 90 pump stations to 425,550 households.

- The collection, treatment, and disposal of wastewater at 20 treatment plants. The two main wastewater plants servicing the majority of the region are located at Mangere on the Manukau Harbour and Rosedale on the North Shore. Wastewater is conveyed through 7,693 kilometres of sewers before treatment. The regional network includes 537 wastewater pump stations and 162,500 manholes.

- The transfer, treatment, and disposal of trade waste. Watercare works with approximately 1,700 customers in administering the trade waste bylaw to protect the wastewater network and assist in ensuring that wastewater treatment plant discharges meet consent- requirements. As the regulator, Watercare is also responsible for enforcing trade waste compliance.

- The provision of commercial laboratory services in support of the business. The independently accredited laboratory provides a full range of testing and sampling services for water, wastewater, biota and air quality and also works with a wide customer base across a range of industries to provide first-class laboratory analysis and sampling services.

Watercare continues to work closely with planning, strategic, operational and regulatory sections of Auckland Council and has been participating in regional planning processes to ensure the infrastructure requirements of the region are well understood and appropriately integrated into regional plans. The importance of the Auckland Council Long-Term Plan to the successful delivery of regional outcomes is recognised and Watercare is committed to running its business consistent with the Auckland Council Annual Plan and the Auckland Plan (spatial plan). The outcome will ensure that the current and future social economic and environmental needs of the regional community can be met in cost-effective ways.

Managing Performance

Watercare's business drivers are:

- The Statement of Corporate Intent
- Legislative requirements, e.g. Resource Consents
- Industry standards and guidelines, e.g. the Drinking-water Standards for new Zealand
- The needs of the wider community

Watercare's performance targets aim to:

- Improve water quality in areas of poor performance
- Reduce wastewater overflows following rain
- Improve wastewater effluent quality over time

Currently the levels of service being provided differ across the region. Watercare will review these differences to consider whether service levels should be more consistently applied and/or where they need improving to align better with the strategic objectives. Any decisions made to change levels of service or performance targets will need to take into account:

- How much it will cost
- Whether this will result in a price rise for customers
- Whether customers are willing to pay for the changes.

This asset management plan provides for the gradual improvement in levels of service by improving water quality and wastewater discharges in non-metropolitan areas, maintaining existing levels of service to existing metropolitan customers and providing for forecast increases in demand.

Managing Growth and Demand

Growth Forecast

Watercare has adopted the Auckland Council's medium growth population scenario (issued 9 May 2011) for its long-term strategic planning purposes. This scenario forecasts a population increase across the Auckland region from 1.48 million people to 1.75 million by 2022 and 1.95 million by 2031.

The Auckland Plan will determine the distribution of growth across the Auckland region. However, it is likely that much of this growth will occur in the Rodney and Franklin wards, where most of the city's urban expansion will occur in the form of green-field development. Some urban expansion is also projected for other areas such as Flatbush and Massey North/Westgate, but the rest of the forecast growth is expected to occur through intensification of existing urban areas.

To forecast future demand for the metropolitan supply area Auckland Council population growth forecasts have been combined with the target reduction in demand per capita that was adopted in Watercare's June 2011 Regional Demand Management Plan. This target is for gross per capita consumption to reduce to around 255l/person/day by 2025. Average water demand, which includes domestic, commercial, industrial, wastewater treatment plant use and network losses is projected to be about 475,000 cubic metres per day or 173 million m^3/annum by the year ending 2031.

Water Supply Assets

The metropolitan water supply system can meet current average day and peak water demands. The Waikato Water Treatment Plant is currently being upgraded (completion expected 2012) to a capacity of 125,000 m^3/day which is expected to meet projected demand until 2019, subject to demand management targets being achieved. Three further capacity increments to the Waikato Treatment Plant are being planned for 2021 (25,000 m^3/day), 2025 (75,000 m^3/day) and 2033 (75,000 m^3/day), to meet growing demand for drinking water.

The capacity of some non-metropolitan supplies is currently limited by current or expected future resource consent constraints. Future consents for surface water supplies are expected to include requirements to maintain a minimum residual flow in rivers and streams. In summer, when flow is low and demand is high, this can result in the need for water restrictions in some schemes. Demand management and/or new bore supplies will be used to accommodate these constraints within the planned level of service.

Wastewater Assets

The metropolitan wastewater treatment works of Mangere, Rosedale and Army Bay can meet current peak daily flows and 95th percentile maximum loads. Complying with the discharge consents at the Mangere works in the medium term will require upgrades at the plant. Similarly, there are some hydraulic constraints at the Army Bay works that will need to be addressed to meet future growth.

The non-metropolitan wastewater treatment plants have varying capacity limitations. Many of the plants have capacity upgrades identified and programmed for this plan period, which will be carried out alongside other upgrades required to comply with resource consent limits. The discharge from some of the non-metropolitan wastewater treatment plants inherited by Watercare exceeds volumetric consent limits. Investment is required to ensure that these plants operate within appropriate consent requirements.

Demand Management

Watercare promotes and facilitates the view that demand management through the long term will enable sustainable, efficient and wise use of the region's water resources. A key initiative in support of this aim was the publication in June 2011 of a new Auckland Regional Water Demand Management plan. The water demand savings target adopted in this document is for a 15% reduction in gross per capita consumption compared with 2004 levels by 2025.

Gross per capita consumption in 2010 is about 7% less than in 2004. Although gross per capita consumption varies year on year, a downward trend is evident.

The plan recognises the benefits that a reduction in per capita use provides in delaying the significant water infrastructure investment required to meet the growing population's future water needs. In adopting the new target, investment in a new water treatment plant and pipeline from the Waikato River will be delayed by around 7 years

Asset Lifecycle Management

The following key strategies are adopted to meet the intended Levels of Service over the asset lifecycle:

Capital Works

- Asset creation to provide improved levels of service or provide for increasing demand for services
- Renewal to replace ageing or non-performing assets in order to maintain existing levels of service

Asset Operation

In addition to the cost of labour, the predominant operating costs for both water and wastewater are energy (power and gas) and chemicals. Operational strategies therefore tend to be specifically directed at reducing these costs.

Asset Maintenance

- Reactive maintenance (repair or replace as needed) can be applied to non-critical assets where consequences of asset failure are small.
- Proactive maintenance (regular preventative maintenance) is applied to critical assets where consequences of asset failure are great. Tools such as Reliability Centred Maintenance (RCM) and asset condition assessments are used to inform the optimal maintenance programme for individual assets.
- Adjusting the mix of reactive and proactive maintenance to minimise maintenance costs.

Asset Disposal

Disposal is the retirement or sale of assets that have become surplus to requirements due to obsolescence or poor condition. Watercare has a programme of work to ensure that abandoned assets (taken out of service but not removed) remain safe and secure so that they do not pose a risk to the public.

Infrastructure Sustainability

A sustainable water supply and wastewater system or process must:

- Not exceed its limits (it must be based upon a resource that will not be exhausted)
- Understand interconnections between economy, society, people and environment
- Focus on the equitable distribution of resources and opportunities
- Not generate unacceptable waste
- Not cause pollution

The importance of including sustainability planning within asset management planning is that Watercare will ensure, over the long term, that its infrastructure services facilitate the achievement of community wellbeings: social, cultural, environmental and economic.

Examples of sustainability initiatives:

- Upgrading of non-metropolitan treatment plants or connection of non-metropolitan supplies to the metropolitan scheme to improve water quality and availability
- Working with Auckland Council to define location, sequencing and timing for staged, cost-effective infrastructure development
- Trialling of screens on overflow structures to remove solid material from wastewater discharges
- Inflow & Infiltration reduction programmes
- Establishment of a region-wide Biosolids Strategy
- Disposal of biosolids from the Mangere treatment plant on Puketutu Island
- Upgrades of non-metropolitan wastewater treatment plants
- Environmental monitoring and sampling programmes for wastewater quality
- Investigation of potential land areas for disposal of effluent for irrigation
- Wetland treatment or land disposal of wastewater effluent
- Continually seek ways to reduce energy costs
- Leak detection programmes
- Water demand management
- Hydro power generation at dams for water treatment plant operation
- Use of biogas for power generation at wastewater treatment plants and implementation of software to maximise power generation revenue
- Reuse of treated effluent at wastewater treatment plants for engine cooling and primary tanks sprays
- Management of power factor, peak demand and maximisation of off-peak power usage

Asset Value Management

Standards New Zealand define Value Management as a structured and analytical process that seeks to achieve value for money by providing all the necessary functions at the lowest total cost consistent with the required levels of quality and performance (NZS 4183:1994).

At the corporate level, Watercare has adopted a number of processes that align with value management principles:

- Project prioritisation framework
- Project management framework
- Procurement strategy
- Project Improve
- Maintenance Optimisation Design
- Energy Focus
- Zero Waste
- Continuous improvement

Watercare, as the integrated water supply company for Auckland, is now able to explore further opportunities for value management by taking a regional approach to:

- planning of infrastructure projects
- information systems
- business processes and process innovation
- prioritised regional maintenance and renewal programmes
- Public Health Risk Management Plans
- hydraulic and catchments modelling
- flow / pressure monitoring and management
- water source management
- demand analysis
- energy management
- levels of service

Asset Management Practices

Watercare currently uses the following asset management practices and processes for the successful delivery of the water and wastewater services:

- Demand forecasting and management
- Environmental management
- Network modelling and long-term planning
- Real-time operational control
- Operations and maintenance programmes
- Condition assessment and renewal programmes
- Capital works planning
- Emergency management
- Health and safety
- Risk management

Watercare's main management information systems are SAP (assets management, finance), Hansen (asset management, finance, customer), ESRI (geographic information), SCADA (supervisory control and data acquisition) and control systems.

Risk Management

Watercare takes an enterprise wide approach to managing risks and opportunities through a formal enterprise risk management framework and supporting processes which align with AS/NZS ISO 31000:2009 Standard (Risk management – Principles and guidelines).

Risk management is a key input to the prioritisation of projects in the AMP, i.e. higher risks are afforded priority in the AMP. In addition, the AMP is regularly reassessed to ensure that any new risks and significant changes to existing risks are considered and where required, the AMP is reprioritised accordingly.

Table of Contents

Figure 1 : Watercare Water Supply Network Coverage

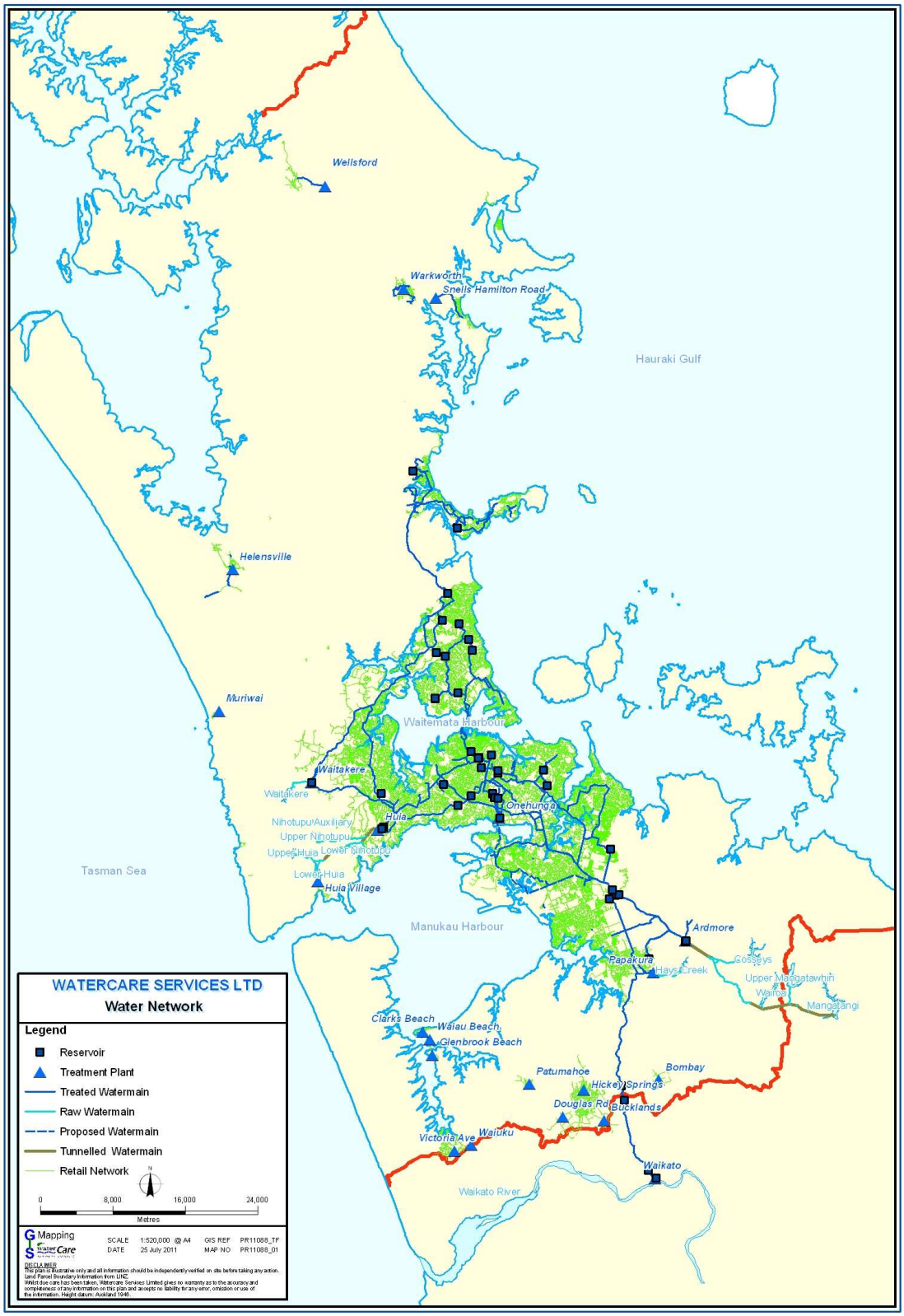
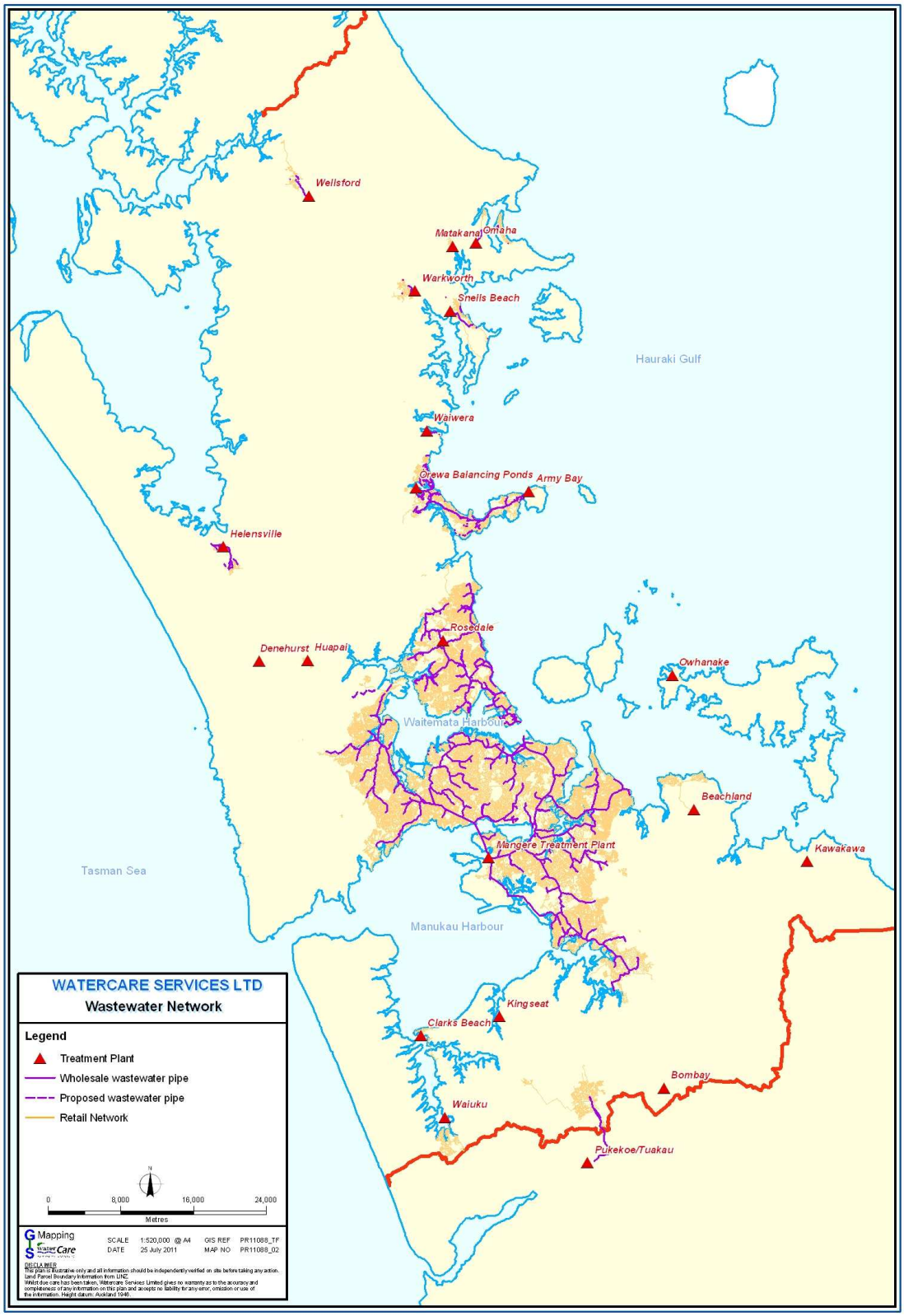


Figure 2 : Watercare Wastewater Network Coverage



1 SERVICE OVERVIEW

1.1 The Services Provided

Watercare Services Ltd (Watercare) has been the provider of bulk water and wastewater services to the Auckland region since 1991. On 1 November 2010, as a result of Auckland regional governance reforms, the company took over ownership and management of all the public water and wastewater assets within the Auckland Council region and began retailing services directly to the people of Auckland. The exception was the Papakura district where retail services are managed via a franchise agreement with United Water International Pty Ltd.

The integrated Watercare now has assets with a replacement value of around $11.8 billion and annual revenue of $466 million. Figure 1 and Figure 2 on the previous pages shows the location of assets and extent of Watercare's regional coverage. The integrated company's main services include:

- The collection, treatment, and distribution of drinking water from 12 dams, 14 bores and springs and 3 river sources. A total of 140 billion litres of water is treated annually at 21 plants and distributed over 8,825 kilometres of water pipes through 84 reservoirs and 90 pump stations to 425,550 households.

- The collection, treatment, and disposal of wastewater at 20 treatment plants. The two main wastewater plants servicing the majority of the region are located at Mangere on the Manukau Harbour and Rosedale on the North Shore. Wastewater is conveyed through 7,693 kilometres of sewers before treatment. The regional network includes 537 wastewater pump stations and 162,500 manholes.

- The transfer, treatment, and disposal of trade waste. Watercare works with approximately 1,700 customers in administering the trade waste bylaw to protect the wastewater network and assist in ensuring that wastewater treatment plant discharges meet consent-requirements. As the regulator, Watercare is also responsible for enforcing trade waste compliance.

- The provision of commercial laboratory services in support of the business. The independently accredited laboratory provides a full range of testing and sampling services for water, wastewater, biota and air quality and also works with a wide customer base across a range of industries to provide first-class laboratory analysis and sampling services.

1.2 Watercare's Vision

"Outstanding and affordable water services for all the people of Auckland."

"Outstanding" means Watercare will provide safe drinking water, promote efficient water use, and protect waterways and the environment through the effective transport and treatment of wastewater.

"Affordable" water services means that Watercare will run an efficient business and keep the overall costs of services to customers (collectively), at minimum levels.

KEY GOALS

Watercare has six main goals and focus areas that reflect the expanded responsibilities and new challenges of the integrated company. These are:

i. Safe and Reliable Water Supply: To manage water resources to provide a safe and reliable water supply.

ii. Healthy Waterways: To manage wastewater discharges to maintain or improve the health of the environment.

iii. Sound Financial Management: To meet business objectives at the lowest cost.

iv. Effective Asset Management: To maximise the use of existing assets while optimising the scope, timing and costs of new investments.

v. Engaged People: To have a skilled, motivated and empowered workforce.

vi. Satisfied Customers and Stakeholders: To provide great service and great value.

These goals represent the main focus areas of Watercare's business activities. Success in all these areas combined is required to deliver high quality water and wastewater services to the people of Auckland.

CONTRIBUTION TO AUCKLAND COUNCIL OBJECTIVES

Watercare's role as the regional provider of water and wastewater services requires ongoing collaboration with the Auckland Council and other stakeholders to ensure community-focused outcomes are achieved.Watercare recognises Auckland Council's vision for Auckland to be the most liveable city, characterised by its:

- cohesive, resilient communities
- excellent transport system
- productive, high-value economy and
- quality, urban-rural environments

Watercare continues to work closely with planning, strategic, operational and regulatory sections of Auckland Council and has been participating in regional planning processes to ensure the infrastructure requirements of the region are well understood and appropriately integrated into regional plans. The importance of the Auckland Council Long-Term Plan to the successful delivery of regional outcomes is recognised and Watercare is committed to running its business consistent with the Auckland Council Annual Plan and the future Spatial Plan. The outcome will ensure that the current and future social economic and environmental needs of the regional community can be met in cost-effective ways.

Watercare primarily contributes to the following Auckland Council strategies:

Outstanding natural environment – Watercare contributes to enhancing Auckland's unique natural environment, including its world-class harbours, waterways and beaches through the effective transport and treatment of wastewater.

Strong communities – Watercare contributes to safe communities by providing safe drinking water, promoting efficient water use, and protecting waterways and the environment. Watercare also directly contributes to the delivery of the following council group of activities:

Water supply and wastewater – Watercare is responsible for providing safe, healthy drinking water and high-quality wastewater services that are economically viable, environmentally sound, sustainable and responsive to customer needs.

1.3 Watercare's Responsibilities and Obligations

Watercare's responsibilities for the supply of drinking water and treatment and disposal of wastewater mean the company is a major contributor to the health, prosperity, and well-being of the regional community. The company has a sound record as a good corporate citizen, committed to the delivery of high quality cost effective services.

As a local government-owned utility, Watercare is obliged to provide a high level of transparency in reporting. In line with the focus on sustainability, the company has been recognised for its

commitment to transparent and accountable reporting and as an integrated provider of water and wastewater services these commitments will continue.

Watercare is a Council Organisation (CO)[1] and has a single shareholder the Auckland Council. The company's obligations to deliver water and wastewater services for Auckland, are established under Part 5 section 57(1) of the Local Government (Auckland Council) Act 2010 which stipulates that an Auckland water organisation:

(a) must manage its operations efficiently with a view to keeping the overall costs of water supply and wastewater services to its customers (collectively) at the minimum levels consistent with the effective conduct of its undertakings and the maintenance of the long-term integrity of its assets; and

(b) must not pay any dividend or distribute any surplus in any way, directly or indirectly, to any owner or shareholder; and

(c) is not required to comply with section 68(b) of the Local Government Act 2002;and

(d) must have regard for public safety (for example, the safety of children in urban areas) in relation to its structures.

1.4 Water and Wastewater Assets

The water and wastewater schemes are defined as either:

- **Metropolitan** – the schemes in the former Auckland, Waitakere, North Shore and Manukau cities which were serviced by the bulk Watercare networks and treatment plants prior to 1 November 2010; or
- **Non-metropolitan** – geographically isolated schemes servicing townships in the Rodney and Franklin wards (that were not serviced by Watercare prior to 1 November 2010). These communities draw water from local sources (rivers or springs); they have locally situated water and wastewater treatment plants, and isolated pipe networks.

There are 17 individual water supply schemes (1 metropolitan and 16 non-metropolitan) and 19 wastewater schemes (3 metropolitan and 16 non-metropolitan).

The network assets are further defined as either bulk network assets (the former wholesale network plus, for wastewater only, the trunk wastewater assets feeding into the Rosedale and Army Bay treatment plants) or local distribution network (the former retail networks).

The total numbers of assets and their indicative gross replacement values are shown in Table 1 following.

[1] Watercare will become a council controlled organisation (CCO) on 1 July 2012, under section 113(2) of the Local Government (Auckland Transitional Provisions) Act 2010

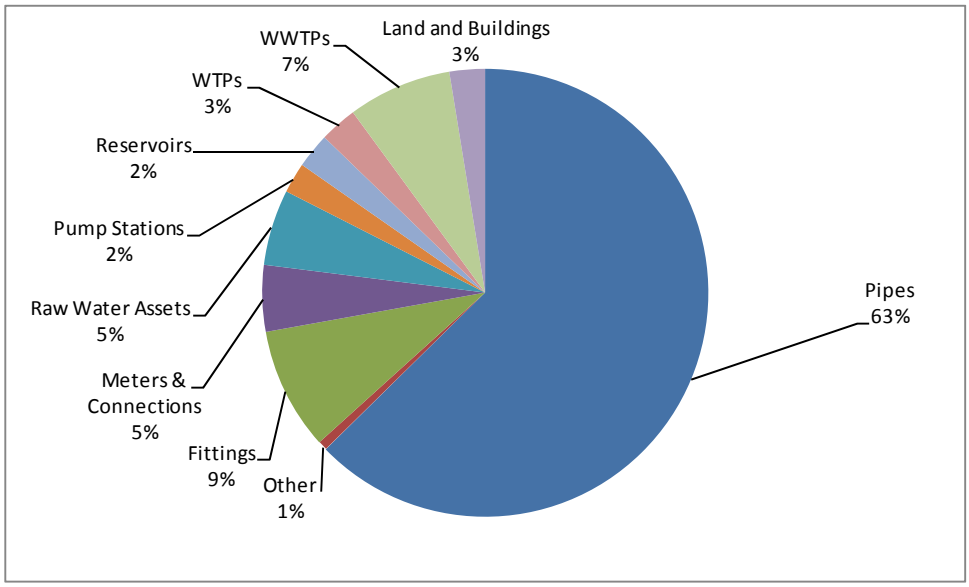
Table 1: Watercare Key Infrastructure Assets (30 June 2011)

Asset Class	Quantity	Gross Replacement Cost ($ millions)[1]
Water Supply Assets		
Raw Water (pipes, dams, headworks)		649
Water Treatment Plants	21	319
Treated Watermains (pipes)	8,825 km	2,817
Water Pump Stations	90	28
Water Reservoirs	84	299
Valves	83,900	150
Hydrants	50,100	100
Meters & Service Connections	425,550	381
Other		28
TOTAL WATER ASSETS		**4,771**
Wastewater Assets		
Wastewater Service Connections	198,900	187
Sewer Mains (pipes)	7,693 km	4,580
Manholes	162,500	797
Wastewater Pump Stations	537	232
Wastewater Treatment Plants	20	887
TOTAL WASTEWATER ASSETS		**6,683**
Other Assets		
Land		117
Buildings (non-operations and operations)		186
Other		51
TOTAL OTHER ASSETS		**354**
TOTAL KEY INFRASTRUCTURE ASSETS		**11,808**

[1] Replacement cost values and asset quantities are current as at the 30 June 2011 valuation

The water and wastewater infrastructure assets represent an investment of over $11 billion, with the pipe assets accounting for over 60% of this total, as shown in Figure 3.

Figure 3: Indicative Proportion of Asset Value



2 MANAGING PERFORMANCE

2.1 Overview

This section defines the asset-related levels of service that Watercare is attempting to achieve in relation to the provision of the water and wastewater services.

2.2 Shareholders

Watercare's sole shareholder is Auckland Council.

The accountability relationship between Watercare and Auckland Council is expressed through the Statement of Corporate Intent which can be viewed on Watercare's website www.watercare.co.nz.

2.3 Customers

Watercare has three main customer groups:

- **Consumers** – residential, commercial and industrial customers
- **Key accounts** – customers that use more than 100,000 kilolitres of water per year
- **Care accounts** – those customers for whom interruption of water supply can have unacceptable consequences, i.e. hospitals, rest homes and home dialysis patients

Watercare's relationship with these customer groups and their specific expectations of Watercare are explained in Table 2.

Table 2: Key Customers

Customer Groups	Relationship	Service delivery needs / expectations
Consumers	Watercare provides safe and reliable water and wastewater services to all customers connected to the networks	That safe and reliable services will be provided at an affordable price
Key Accounts	Watercare provides a specialised account service to key account customers	That Watercare will provide a professional specialist service and keep customers well informed of any potential change to service delivery or service interruption
Care Accounts	Watercare provides specialised services to reduce the risk of unnecessary interruption of services to these customers	That Watercare will provide professional specialist services and information, and will minimise interruption to services

2.4 Stakeholders and Business Partners

Watercare's stakeholders are people, agencies or community groups that can be affected by the decisions and actions of Watercare. Watercare aims to be responsive to stakeholder requirements.

Watercare's key stakeholders include, but are not limited to:

- The Connected Community
- Tangata Whenua
- Auckland Council, Councillors, Local Boards
- Ministry of Health, Ministry of the Environment and other government departments

- New Zealand Fire Service
- Business Partners (consultants and contractors)
- New Zealand Transport Agency and Auckland Transport
- Vector, Counties Power, Transpower, and other utility companies

2.5 Legislative Requirements

Legislation governs where and how water and wastewater services are delivered. Auckland Council has an obligation under the Local Government Act 2002 to continue serving the communities of Auckland with water and wastewater networks, where they already exist. Further legislation prescribes how the water and wastewater networks are managed, to ensure that public health and the environment is protected.

Table 3 lists the Acts of Parliament that affect the delivery of the water and wastewater services and provides a summary of the specific requirements under these Acts.

Further locality-specific requirements are found under other legislation, bylaws and plans such as the Auckland Regional Council Trade Wastes By-law 1991 and the Auckland Region Air, Land and Water Plan.

2.5.1. Resource Consents

Resource consents are a legislative requirement for many water supply and wastewater works due to their potential impact on the environment.

Watercare holds consents for permission to draw water from each of the water source points. Typically these consents regulate the volume of water that may be drawn, so as not to leave rivers or aquifers depleted.

Watercare also holds consents for each of the wastewater treatment plants for permission to discharge the treated effluent into nearby waterways, or pipe it out to sea or spray it onto land for irrigation. These consents regulate the quality and volume of the discharge to ensure it will not cause pollution of the air (in the form of offensive odour) or its receiving environment.

The consents stipulate monitoring conditions and require Watercare to report on the compliance with those conditions.

Watercare must also hold network consents to allow wastewater overflows from pump stations to be discharged into the environment during emergencies.

The detailed information for each resource consent currently held by Watercare is contained in the Environmental Management System (EMS).

An Assessment of Environmental Effects (AEE) is required to support the resource consent applications when seeking approval to implement projects. The positive effect of providing water and wastewater services to the community needs to be balanced against the adverse effects identified in the Assessment of Environmental Effects.

Table 3: Legislative Requirements

Legislation	Requirement
Local Government Act 2002	• Obligation to maintain public water services, unless that service supplies water to 200 or fewer persons • Obligation for Council to adopt a significance policy setting out (among other requirements) a list of assets Council considers to be 'strategic assets'. Strategic assets are those assets vital for delivery of Council's services to the community. As such, Council has determined the water and wastewater network to be 'strategic assets'. • Undertake assessments of water and sanitary services • Not use the water services assets as security, or divest ownership to a non-local government organisation, lose control of, sell, or otherwise dispose of the significant infrastructure for providing water services • Not restrict or stop water supply to a property unless all criteria under the Act are met
Local Government Act 1974	• Obligation to provide fire hydrants in the public water supply networks
Auckland Local Government Act 2009	• Local activities must be identified in the Long Term Plan • Manage water & wastewater operations efficiently to keep costs to customers at a minimum while maintaining effective management and maintenance of the long-term integrity of its assets • Must not pay any dividend or distribute any surplus in any way, directly or indirectly, to any owner or shareholder • Give written notice for road opening (unless for emergency work) • Must have regard for public safety in relation to its structures
Health Act 1956	• Improve, promote and protect public health • Provide adequate supply and monitoring
Health (Drinking Water) Amendment Act 2007	• Develop and implement public health risk management plans • Take all practicable steps to comply with the Drinking Water Standards for New Zealand
Building Act 1991	• Enforce the provisions of the Building Code in relation to safe and adequate water supplies
Resource Management Act 1991	• Promote sustainable management of natural and physical resources • That the taking of water and the discharge of wastewater to the natural environment are done in compliance with resource consent conditions
Civil Defence Emergency Management Act 2002	• Requires lifeline utilities to ensure they are able to function to the fullest possible extent, and have plans in place, to cope during an emergency • Participate in/provide information for Civil Defence Emergency Management strategy and plans

2.6 Industry Standards and Guidelines

The management of Auckland's water supply systems follows the Guidelines provided in the Drinking Water Standards for New Zealand (DWSNZ). The Drinking Water Standards for New Zealand provide minimum standards for water quality to ensure it is safe to drink i.e. free of disease-causing bacteria or other harmful microbiological organisms, such that public health is protected.

Public water supplies are also relied on to provide pressurised water to fight fires.

Table 4 lists the standards and guidelines that influence how Watercare delivers the water and wastewater services.

Table 4: Industry Standards and Guidelines

Standard / Guideline	Description
Drinking-water Standards for New Zealand 2005 (Revised 2008)	The Drinking-water Standards for New Zealand governs the quality of the water that Watercare provides. It sets: • Microbiological and chemical guidelines for drinking water supplies • Compliance criteria and reporting requirements • Remedial actions
NZ Fire Fighting Water Supplies Code of Practice 2008 (SNZ PAS 4509:2008)	Sets guidelines such as minimum hydrant pressure/flow, hydrant spacing, etc. Guidelines vary depending on area classification (eg: industrial or residential)
National Environmental Standard for Sources of Human Drinking Water (2007)	This standard is a regulation under the Resource Management Act (RMA) 1991, intended to reduce the risk of contaminating drinking-water sources. It regulates activities in drinking-water supply catchments through resource consents, to protect water sources.
Accounting/Financial Reporting Standards (NZIAS 16)	Sets out the requirements for revaluation of infrastructure assets to fair value at least every five years (or more often if required to ensure the book value reflects the fair value of the assets).
Backflow Code of Practice for Water Suppliers	Prescribes industry "good practice" for the protection of water supplies from contamination by the use of boundary protection.

2.7 Community Engagement

The following section outlines the ways in which Watercare engages with the community.

2.7.1. Local Board Liaison

Watercare recognises the important role of local boards in local representation and decision making and has been proactively working to build new relationships based on transparent communication of its activities. Watercare has appointed a Principal Advisor to the local boards who helps to facilitate the relationship and maintain information flows.

2.7.2. Public meetings

Watercare has an independent board of directors. Watercare's constitution requires the directors to manage the company in line with the annual Statement of Corporate Intent (SCI). Through the SCI, the directors are accountable to the owner, who is in turn accountable to the residents and ratepayers of the Auckland region. Watercare ensures that it holds Board meetings that are open to members of the public consistent with the guidelines for public meetings provided by the Mayor. Watercare also meets the public meeting requirements for Council Organistions (COs) and Council Controlled Organisations (CCOs) pursuant to Section 96 of the Local Government (Auckland Council) Act 2009 which requires two public meetings to be open to the members of the public. One meeting must be held before 30 June each year for the purpose of considering comments from shareholders on the organistion's draft statement of corporate intent for the following year. The other meeting must be held after 1 July each year for the purpose of considering the organisation's performance under its statement of corporate intent in the previous financial year. Board meetings are notified by way of a Public Notice in the New Zealand Herald and on the Watercare website.

2.7.3. Engagement with Tangata Whenua

Watercare has always had a close relationship with Māori recognising the importance of water to tangata whenua and acting in accordance with the purpose and principles of the Treaty of Waitangi. The company also undertakes consultation on company decisions that are likely to impact on Māori views and values

Watercare retains the services of its Māori Advisory Group which plays an important role in the company's understanding of Māori values and the implications and potential impacts of its decisions. Local mana whenua are also consulted directly as part of the process for gaining consents for Watercare projects.

2.7.4. Environmental Advisory Group

Watercare consults with an Environmental Advisory Group to guide decisions around capital projects that impact on the environment.

2.7.5. Project consultation

Watercare consults with the community on the planning of major projects as part of the resource consenting process.

Major projects are appointed a project liaison group which produces communication plans specific to the project to ensure the public is kept well informed during the construction process.

Watercare has an excellent track record of community engagement during large programmes of work such as Project Manukau, Project Hobson, the Puketutu Island Biosolids Rehabilitation Project and the Hunua No. 4 Watermain Project.

2.7.6. Customer charter

Watercare has published a customer charter entitled 'Working with you' which outlines the levels of service customers can expect from Watercare.

2.7.7. Complaints monitoring

Watercare records all customer complaints in the asset management system and from analysis of geographic concentrations of complaints, is able to identify problem areas for investigation and improvement works.

2.7.8. The Watercare Hardship Scheme

Watercare has developed policies and procedures for dealing with customer financial hardship (The Watercare Hardship Scheme). Hardship assistance decisions will be made by the Water Utility Consumer Assistance Trust independent of Watercare.

2.8 Service Level Summary

Watercare has set the following service levels and performance targets by combining the common elements of the levels of service developed by each of the former councils and incorporating the local concerns raised by the community during consultation (as detailed in the previous section). Overall, the interim performance targets aim to:

- Improve water quality in areas of poor performance
- Reduce wastewater overflows following rain
- Improve wastewater effluent quality over time.

Currently the levels of service being provided differ across the region. Watercare will review these differences to consider whether service levels should be more consistently applied and/or where they need improving to align better with the strategic objectives. Any decisions made to change levels of service or performance targets will need to take into account:

- How much it will cost

- Whether this will result in a price rise for customers
- Whether customers are willing to pay for the changes

A further factor that will impact future decisions around levels of service changes is the move to uniform pricing across the region, as this may be followed by an expectation of uniform performance targets.

The following tables, Table 5, Table 6 and Table 7, demonstrate how Watercare will provide the current levels of service, at least cost to Watercare's customers.

Table 5: Safe and Reliable Water Supply

Safe and Reliable Water Supply	
Service Level Statements	• Manage water resources to provide a safe and reliable water supply • Protect public health • Maintain network integrity and performance • Provide for growth
Links to Community Outcomes	• Contribute to social, cultural and economic wellbeing
Links to Strategic Priorities	• Strong communities, quality rural and urban environments
Link to Strategies and Policies	• Three-Waters Strategic Plan, 2008
Who are Watercare's customers	• Residential, commercial, industrial property owners of Auckland with connections to the public water supply networks • NZ Fire Service
Core Customer Values	Quality, Safety, Sustainability
Key Performance Measures and Targets	• *Compliance with DWSNZ 2005 (revised 2008)* • *Maintain or improve Ministry of Health Gradings, Aa in metropolitan areas, 50% of non-metropolitan plants and networks Aa by 2015, 100% of non-metropolitan plants and networks Aa by 2020* [3] • *Compliance with NZ Fire Fighting Code of Practice by 2025* • *Reduction in gross per capita consumption to a sustainable level, 255 L per capita by 2025*
Assets that contribute to these levels of service	Water networks, reservoirs, pump stations and treatment plants

[3] **Public Health Grading** – All public water supplies are graded by the Ministry of Health. Separate grades are issued for the source water and treatment processes (A1 to E), and the distribution network (a1 to e). The grading is based on the risk of contamination to the water supply. It is not a measure of the actual water quality.

<table>
<tr><th colspan="4">Safe and Reliable Water Supply</th></tr>
<tr><td>How Watercare will achieve Levels of Service</td><td colspan="3">• Source / treatment plant upgrades of non-metropolitan schemes
• Review water schemes' compliance with DWSNZ
• Improvements to water quality management such as backflow prevention
• Programme for developing Public Health Risk Management Plans (PHRMPs) for all schemes by 2012
• Network upgrade programmes
• On-going leak detection and management
• Ongoing demand management programmes</td></tr>
<tr><td rowspan="4">How much will it cost to achieve these Levels of Service</td><td colspan="3">Costs are presented in millions of dollar and expressed in nominal dollar terms.

Total capital expenditure is $2,270.30 million (nominal dollars) over the next ten years on water supply. This includes $554.55 million of service level improvement capex.</td></tr>
<tr><td>Key Projects</td><td>Cost</td><td>Year</td></tr>
<tr><td>Huia Treatment Plant Upgrade</td><td>$242.21</td><td>2012-2023</td></tr>
<tr><td>Ardmore Treated Water Integrated Solution</td><td>$16.5</td><td>2016-2018</td></tr>
</table>

Table 6: Healthy Waterways

Healthy Waterways	
Service Level Statements	• Manage wastewater discharges to maintain or improve the health of the environment • Protect public health • Maintain network integrity and performance • Provide for growth
Links to Community Outcomes	• Contribute to cultural, environmental and economic wellbeing
Links to Strategic Priorities	• Strong communities, Outstanding natural environment
Link to Strategies and Policies	• Comply with resource consents
Who are Watercare's customers	• Residential, commercial, industrial property owners of Auckland with connections to the public wastewater networks • Trade waste customers
Core Customer Values	Quality, Safety, Sustainability
Key Performance Measures and Targets	• *≤ 15 dry weather sewer overflows per 100km of wastewater pipe lengths each year* [1] • *100% of metropolitan plants compliant with wastewater treatment plant discharge consents* • *65% of non-metropolitan plants compliant with wastewater treatment plant discharge consents by 2015; 100% by 2020* • *< 10 sewer breaks and chokes (unplanned interruptions) per 1000 properties*
Assets that contribute to these levels of service	Wastewater networks, pump stations and treatment plants
How Watercare will achieve Levels of Service	• Project Care (legacy North Shore City) • Central Interceptor • Other inflow/infiltration reduction programmes • Non-metropolitan treatment plant upgrades
How much will it cost to achieve these Levels of Service	*Costs are presented in millions of dollar and expressed in nominal dollar terms.* Total capital expenditure is $2,438.07 million (nominal dollars) over the next ten years. This includes $657.35 million of service level improvement capex.

Key Projects	Cost	Year
Central Interceptor Spine	$829.7	2013-2024
Rosedale Diversion	$148.19	2013-2020

[1] **Dry weather overflows** are defined as overflows of untreated wastewater from pipes, manholes or pump stations during dry weather. They tend to result from blockages in the pipes or power outages at the pump stations and therefore provide an indication of how well the network is performing. They are different from wet weather overflows which result from stormwater entering and overwhelming the network. Wet weather overflows are permitted under network discharge consents.

Table 7: Satisfied Customers and Stakeholders

Satisfied Customers and Stakeholders	
Service Level Statements	• Provide customers and stakeholders with great service and great value • Provide for growth
Links to Community Outcomes	• Contribute to economic wellbeing
Links to Strategic Priorities	• Strong communities
Link to Strategies and Policies	• Watercare's Vision: "Outstanding and affordable water services for all the people of Auckland"
Who are Watercare's customers	• Residential, commercial, industrial property owners of Auckland with connections to the public water and/or wastewater networks • Trade waste customers
Core Customer Values	Quality, Reliability, Accessibility, Sustainability
Key Performance Measures and Targets	• *< 5 water quality complaints (taste, odour, appearance) per 1000 connections per year* • *Water pressure ≥ 200 kilopascals (kPa) at the outlet of a 15mm residential water meter* • *Water flow ≥ 25 litres per minute at the outlet of a residential water meter* • *Unplanned interruption to water supply service responded to within one hour* • *96% of unplanned interruptions to water supply service restored within five hours* • *Demand in Metropolitan supply areas can be met in a drought with a 1% probability of occurrence leaving 15% residual capacity in its reservoirs* • *Demand in Non-metropolitan supply areas can be met in a drought with a 1% probability of occurrence by 2025* • *Maintain 1 day's average demand in reservoir storage available to each separate supply zone* • *Service growth and development in the region by giving effect to the Long Term Plan and acting consistently with other specified plans and strategies of Auckland Council driven by strategic priorities*
Assets that contribute to these levels of service	All water and wastewater assets and shared services assets such as telemetry to sites used for process monitoring.
How Watercare will achieve Levels of Service	• Source upgrades at Franklin to address discoloured water • Auckland City Water Quality Strategy • Source /treatment plant upgrades to maintain security of supply • Additional reservoirs in growth areas • Kumeu-Huapai scheme • Demand management programmes • Build redundancy into the networks to promote operational flexibility • Power supply reinforcements and emergency generators for at-risk sites
How much will it cost to achieve these Levels of Service	*Costs are presented in millions of dollar and expressed in nominal dollar terms.* Total capital expenditure is $2,270.30 million over the next ten years on water supply. This includes $554.55 million of service level improvement capex and $911.78 million of growth related capex.

Satisfied Customers and Stakeholders			
	Key Projects	**Cost**	**Year**
	North Harbour Watermain Duplication	$208.00	2013-2023
	Hunua No. 4	$339.12	2012-2020

2.9 Strategies for Achieving Service Levels

The strategic approach for achieving service levels is aligned closely with the Capital Works Planning process (see Section 8.2.5) and the Network Modelling and Long Term Planning process (Section 8.2.1).

A range of strategic options are employed as detailed previously in this section to consult and communicate service levels with stakeholders. There is also a need to manage expectations, especially when service levels currently differ across the region.

Table 8 describes the planned projects primarily aimed at improving levels of service.

Table 8: Levels of Service Planned Projects

Project Name	Description	Levels of Service Improvement
Control Systems Upgrade	Compliance upgrade project – new instrumentation and monitoring	Verification of compliance with drinking-water standards.
Hunua No. 4	Construct a new 35km trunk watermain between the Redoubt North complex and the Khyber Pass Reservoirs in central Auckland.	Maintains network integrity and performance
North Harbour Watermain Duplication	Duplicate the North Harbour Watermain from a new Titirangi No 3 Reservoir to the Albany Reservoir.	Provides network efficiency and growth and meets customer charter requirements.
Huia Treatment Plant Upgrade	Replace the whole treatment plant – assets and process – with a new treatment process which will ensure the quality of treated water produced, provide additional capacity, and improve operational efficiency	Provides for growth and operational efficiency.
Ardmore Treated Water Integrated Solution	A package of upgrades to the process flow downstream of the sand filters and prior to the treated water mains.	Compliance with the drinking water standards
Central Interceptor Spine	Construct a new interceptor from Western Springs to the Mangere WWTP	Reduce wet weather overflows
North Shore Trunk Sewer Upgrades	Construct additional trunk sewer and storage capacity in eastern and western suburbs of the North Shore	Reduce wet weather overflows.

3 MANAGING GROWTH AND DEMAND

3.1 Overview

This section provides an analysis of how projected growth and anticipated trends in demand patterns will affect future demand for assets and asset-related services. It also explains the strategic asset management response for addressing these growth and demand pressures.

Knowing where and how the Auckland region and its people are going to change is a critical factor in the effective management of infrastructure and community assets. The relationship between assets and growth is complicated because the development of new assets facilitates growth, and growth influences the demand for new assets.

In addition to growth-related pressures, changes in demand may also be influenced by economic, demographic and market trends, the rise of new technologies and changing priorities and social norms.

The Auckland Plan provides a blueprint for building the Auckland region over the next 30 years that, amongst other things, addresses:

- How Auckland might develop, including the sequence of growth and provision of infrastructure
- Land use patterns (residential, business, rural production and industrial use)
- Location of critical infrastructure
- Identification of nationally and regionally significant:
  - Ecology areas that should be protected from development
  - Environmental constraints on development (such as unstable land)
  - Landscapes, areas of heritage, and natural features that will influence development.

Watercare's asset management plan contributes to the achievement of the relevant 30-year outcomes set out in the Auckland Plan and are based on the same underlying growth assumptions as the Auckland Plan.

The strategic asset management response to growth and demand management outlined in this section aims to:

- Identify strategies to manage the gap between anticipated demand and current asset capacity
- Enable staged development of new assets to meet future demand over time
- Optimise utilisation of resources by considering demand management strategies and other non-asset based solutions.

3.2 Growth Forecast

Although the focus of this AMP is on the next 10 years from 1 July 2012 to 30 June 2022, it is important to look as far ahead as possible to ensure that short and medium term decisions are well informed. Wherever possible, this plan makes reference to projections covering different end dates (2021, 2031, 2051, etc) to give the reader a sense of the trends which may not be apparent if the timeframe focused solely on 30 June 2022 as the end date.

Watercare has adopted the Auckland Council's medium growth population scenario (issued 9 May 2011) for its long-term strategic planning purposes. This scenario forecasts a population increase across the Auckland region from 1.48 million people to 1.75 million by 2022 and 1.95 million by 2031.

The Auckland Council Spatial Plan will determine the distribution of growth across the Auckland region. However, it is likely that much of this growth will occur in the Rodney and Franklin wards,

where most of the city's urban expansion will occur in the form of greenfield development. Some urban expansion is also projected for other areas such as Flatbush and Massey North/Westgate, but the rest of the forecast growth is expected to occur through intensification of existing urban areas.

This asset management plan sets out how Watercare will meet the rising demand for water and wastewater services in the metropolitan and currently serviced non-metropolitan areas of Auckland.

3.2.1. Metropolitan water and wastewater systems

There are around 1.32 million people connected to Watercare's metropolitan water supply system. This is forecast to grow to 1.61 million people by 2021 due to new development within areas already serviced with water and wastewater networks or from extension of the existing networks.

In the Franklin Local Board area Watercare's existing non-metropolitan customers in the Pukekohe and Buckland communities will be connected to the metropolitan network as part of Watercare's commitment to improve the quality of water supply to these people. Some other smaller communities in the Franklin Local Board area may be connected to the metropolitan system by 2021 as Watercare seeks to equalise the level of service experienced by all of its customers.

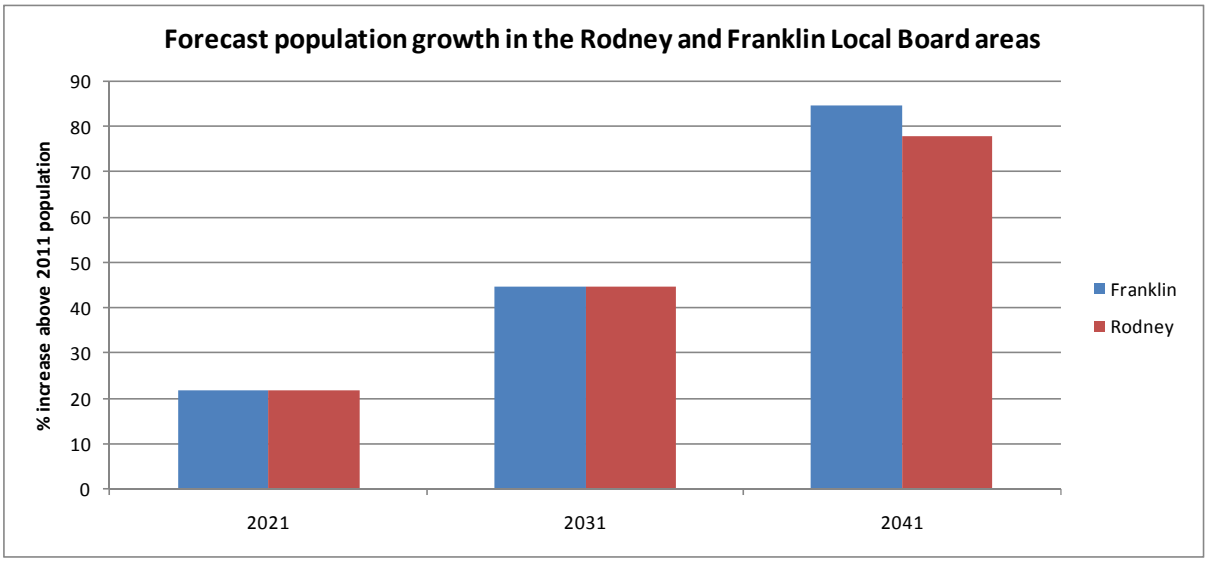
There are around 1.26 million people connected to Watercare's metropolitan wastewater system, served by the Mangere, Rosedale and Army Bay wastewater treatment plants. This is forecast to grow to 1.65 million people by 2031. The water and wastewater metropolitan population projections differ as some communities will be serviced with local wastewater systems but their water supply will be from the metropolitan network.

In the Rodney Local Board area, new customers will be connected to the Watercare metropolitan water and wastewater networks from the existing communities of Kumeu-Huapai and Riverhead, who currently use rainwater and septic tanks for water supply and wastewater disposal respectively.

3.2.2. Non-metropolitan water and wastewater systems

Significant growth is forecast for many of the communities that Watercare provides water and wastewater services to, outside the metropolitan area. For example, the population of Warkworth is forecast to grow from around 3,800 people at present to over 11,000 people by 2051 and the population of Helensville is forecast to more than double over the same period. Auckland Council currently forecasts an increase in population of 45% by 2031 in each of the Franklin and Rodney Local Board areas Figure 4, where Watercare's non-metropolitan schemes are located. By 2051 the population of these areas is forecast to nearly double compared with 2011.

Figure 4: Forecast population growth in the Rodney and Franklin Local Board areas



3.3 Demand Trends

Table 9 outlines the main drivers that affect the demand for water and wastewater services. Many of the drivers affect demand on both services as most water supplied for domestic, commercial or industrial purposes is subsequently discharged into the wastewater system.

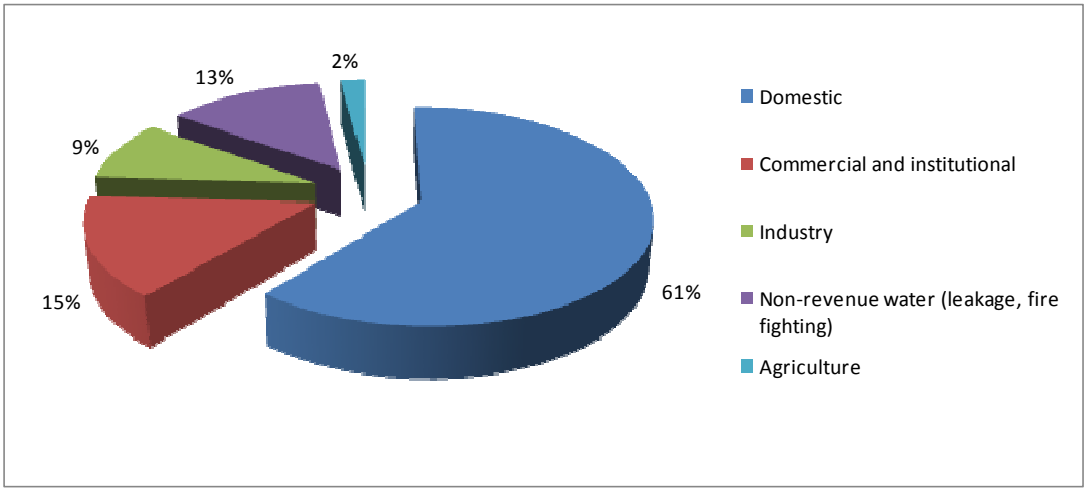
Table 9: Demand Trends

Demand driver	Service affected		Impact on demand	
	Water	Wastewater	Increase	Decrease
Population growth	✓	✓	Auckland's forecast population growth will increase demand for water and increase wastewater volumes. Reduced occupancy rates could see the per capita consumption of water increase.	
Spatial planning	✓	✓	A more dispersed urban form, with larger section sizes, will result in higher water use demands.	Intensification of growth within existing areas could result in a reduction in per capita water use due to lower outdoor water use requirements. Growth within existing serviced areas puts pressure on existing network infrastructure.
Economic factors	✓	✓	Economic recovery would likely increase water demand and wastewater disposal volumes.	Economic downturns decrease commercial and industrial water consumption and hence wastewater and trade waste volumes.
Climate change	✓	✓	Increase in water use for garden irrigation during droughts and hotter, drier summers. Reduction in rainfall volumes available for water supply during droughts and drier summers. Increased pipe bursts and hence leakage during dry periods.	Decreased water demand during prolonged periods of wet weather. Increased sewer infiltration may result from increased rainfall.
Changes in water usage patterns	✓	✓	The shift of 'wet' industries from Auckland Central to Manukau central, East Tamaki around the Auckland airport or to the Drury area will move the location of these significant demands.	
Volumetric charging for wastewater or metering of water supply in non-metered areas	✓	✓	Lower tariffs may result in increased demands.	Introduction of user charges typically reduces demand initially.

Demand driver	Service affected		Impact on demand	
	Water	Wastewater	Increase	Decrease
Water loss	✓		Leaking pipes that go undetected, increased losses from ageing assets, illegally taken water and meter under-registration all contribute to increasing demand.	Active leakage control and pressure management reduce water demand, target levels should be economic.
Infiltration/inflow of stormwater into wastewater networks		✓	Infiltration and stormwater runoff into combined sewers increases loads on the wastewater networks and treatment plants.	Sewer renewal or relining can reduce infiltration, retrofitting separate sewer and stormwater systems can reduce stormwater inflows. Activity levels should be economic.
Water tankers top up household rain tanks.	✓		Increase demand in dry periods.	
Septic tank disposal by tanker at treatment plants		✓	Increases the load on the treatment plants	
Extensions to the networks to areas currently on rainwater and septic tanks	✓	✓	Connection of existing communities to the network is not accounted for under population growth but ultimately increases overall demand.	
Technology changes	✓	✓		Smart metering could decrease demand due to enhanced visibility of consumption.

Currently the majority of water usage is by residential customers (61%), with commercial, industrial and agricultural customers using a combined total of 26%, as shown in Figure 5 below. The remaining water is lost through undetected leaks in the pipes, illegal connections, or fire-fighting use. As the population grows, there may be changes in the proportions of customer types. Further work is underway to understand current and future demand trends for non-residential customers. This information will then inform Watercare's demand planning processes.

Figure 5: Water Consumption by Customer Type

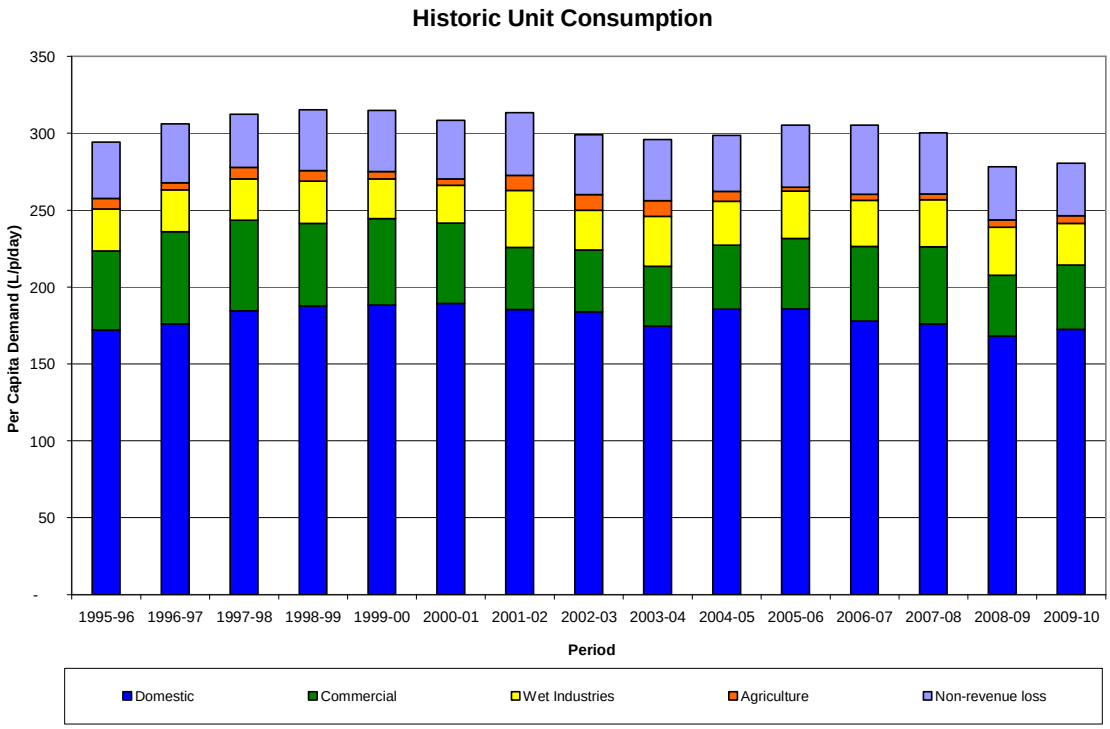


3.4 Demand Forecast

3.4.1. Metropolitan water demand

Over the last five years water demand per capita has been decreasing and in 2008/09 and 2009/10 it was lower than any year since 1995/96, as shown in Figure 6.

Figure 6: Historic Water Demand by Customer Type



The decrease in demand in recent years has been attributed to the impact of several of the drivers described in Table 9 including the effect of the economic downturn on commercial and industrial consumption; prolonged rainfall; price increases in Auckland City; volumetric wastewater charging for

commercial and industrial customers introduced in the former Manukau City in 2006; and substantial efforts to reduce leakage and non-revenue water.

Non revenue water (NRW) is water that has been produced and is "lost" before it reaches the customer. Losses can be real (unaccounted for) losses e.g. leaks on pipes, or apparent losses e.g. fire fighting use or illegal use. Internationally acceptable levels of real losses are typically between 10% and 15% dependant on the economic level of losses specific to each water supply system.

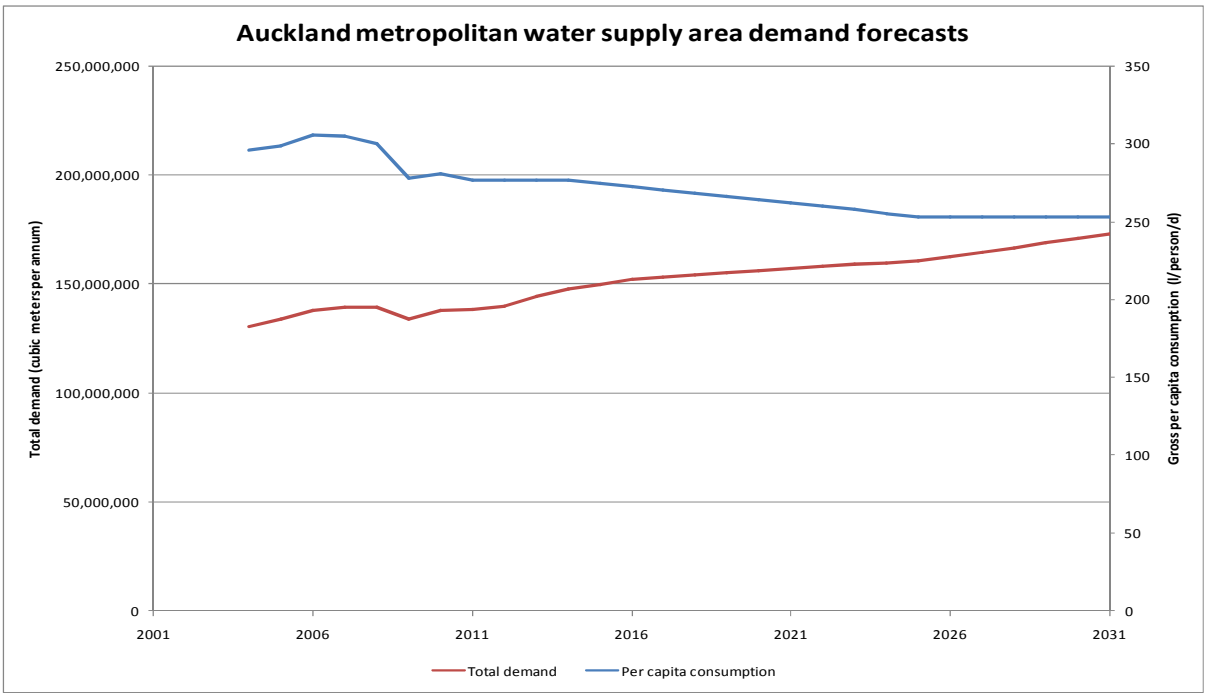
Water demand management initiatives have resulted in current demand being significantly less per person in 2010 compared with 1980. The financial benefits of these savings in terms of deferred investment are considerable. If per capita consumption had remained at high levels observed in the late eighties, the cost of providing new treatment works and other infrastructure to meet this demand would have been over $400 million in today's prices. It is important to recognise that demand management does not replace the need for new infrastructure and water resources, but it can defer when these will be required.

To forecast future demand for the metropolitan supply area Auckland Council population growth forecasts have been combined with the target reduction in demand per capita that was adopted in Watercare's June 2011 Regional Demand Management Plan. This target is for gross per capita consumption to reduce to around 255l/person/day by 2025. Average water demand, which includes domestic, commercial, industrial, wastewater treatment plant use and network losses is projected to be about 475,000 cubic metres per day or 173 million m^3/annum by the year ending 2031.

Figure 7 illustrates the demand projected for the following 20 years, used as a basis for this asset management plan.

As the domestic sector is the largest user of water, total demand is and will continue to be strongly influenced by population growth. Demand in the commercial, industrial and agricultural sectors, which comprise over a quarter of the water supplied, is influenced by economic factors but is assumed to grow in line with population growth for the purposes of this forecast.

Figure 7: Projected Water Demand for the Metropolitan Scheme



The ability to supply water during peak times is a key driver in the sizing of water treatment and network assets. Watercare must design and build assets to meet peak demands and not just average demand, otherwise people will run out of water at critical times. Based on analysis of historical data of

peak-day (highest) versus average-day demand Watercare has determined that a peaking factor (the ratio of peak demand to average demand) of 1.45, with a 95% probability that peak demand will not be exceeded, is appropriate for determining the design capacity / sizing of water treatment assets.

3.4.2. Metropolitan wastewater demand

Wastewater flows and loads are influenced both by population and also by industrial growth, with trade wastes in particular impacting on the chemical and nutrient loads at wastewater treatment plants. Infiltration of stormwater also has a significant impact on the volume of water being treated.

Watercare has used the Auckland Council's medium population forecast, along with standard industry flow and load assumptions, for its metropolitan wastewater planning.

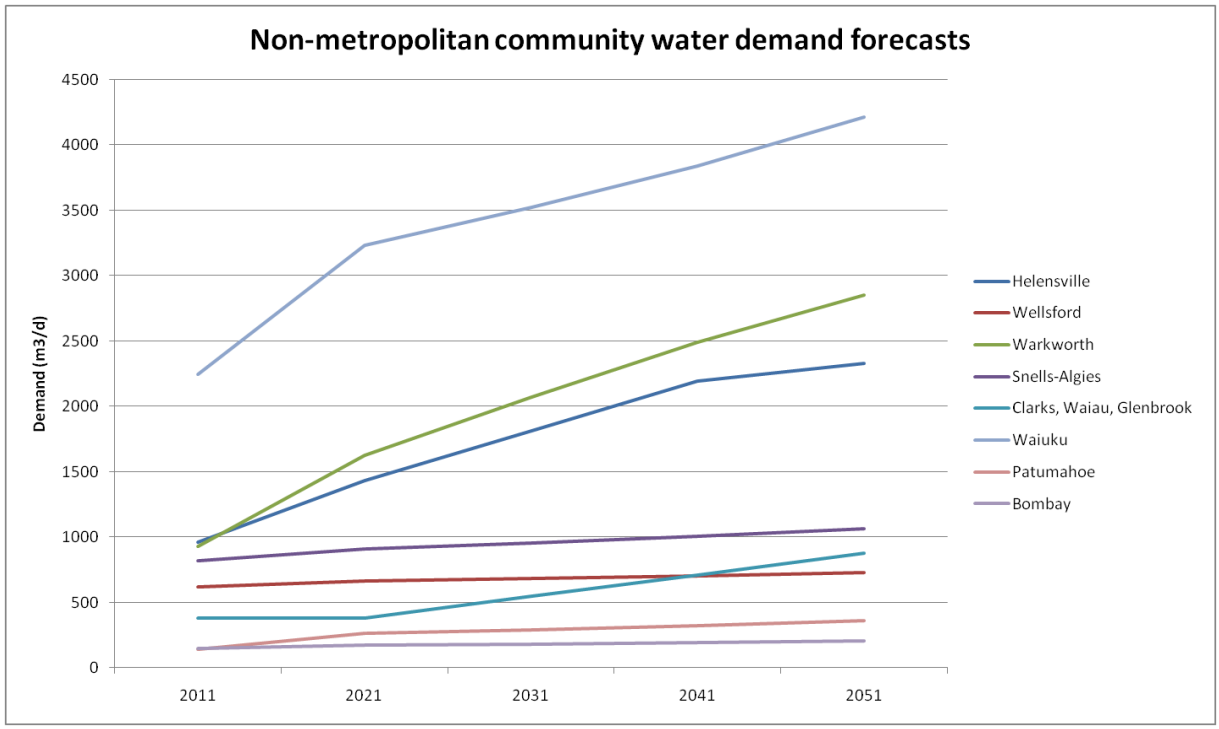
Experience of water demand management programmes in Australia has shown that a reduction in dry weather wastewater volumes, although not loads, may arise if demand drops significantly. These impacts have not been incorporated into the wastewater demand forecast at this time, as investment is primarily driven by peak volume and load capacity.

3.4.3. Non-metropolitan water demand and wastewater projections

The latest published population data for the individual non-metropolitan communities serviced by Watercare were used to develop the water and wastewater demand projections for the non-metropolitan communities, Figure 8. This information was taken from the Franklin Long Term Council Community Plan (LTCCP) and the population projections developed by Rodney District Council and published on its website.

For most communities the water demand forecasts prepared by the former Franklin and Rodney District Councils have formed the basis of this Plan. These will be reviewed with time.

Figure 8: Projected Water Demand for the Non-metropolitan Communities



For the wastewater service the same underlying populations have underpinned the planning process, although wastewater treatment plant catchments and consent boundaries also influence planning.

3.5 Current Asset Capacity

3.5.1. Water supply assets

The metropolitan water supply system can meet current average day and peak water demands. The Waikato Water Treatment Plant is currently being upgraded (completion expected 2012) to a capacity of 125,000 m^3/day which is expected to meet projected demand until 2019, subject to demand management targets being achieved. Three further capacity increments to the Waikato Treatment Plant are being planned for 2021 (25,000 m^3/day), 2025 (75,000 m^3/day) and 2033 (75,000 m^3/day), to meet growing demand for drinking water, Figure 9.

The capacity of some non-metropolitan supplies is currently limited by current or expected future resource consent constraints. Future consents for surface water supplies are expected to include requirements to maintain a minimum residual flow in rivers and streams. In summer, when flow is low and demand is high, this can result in the need for water restrictions in some schemes. Demand management and/or new bore supplies will be used to accommodate these constraints within the planned level of service.

3.5.2. Wastewater treatment assets

The metropolitan wastewater treatment works of Mangere, Rosedale and Army Bay can meet current peak daily flows and 95th percentile maximum loads. Complying with the discharge consents at the Mangere works in the medium term will require upgrades at the plant. Similarly, there are some hydraulic constraints at the Army Bay works that will need to be addressed to meet future growth.

The discharge from some of the non-metropolitan wastewater treatment plants inherited by Watercare exceeds volumetric consent limits. Investment is required to ensure that these plants operate within appropriate consent requirements.

3.6 Strategies for Managing Growth and Demand

3.6.1. Water demand management

Watercare promotes and facilitates the view that demand management through the long term will enable sustainable, efficient and wise use of the region's water resources. A key initiative in support of this aim was the publication in June 2011 of a new Auckland Regional Water Demand Management plan. The water demand savings target adopted in this document is for a 15% reduction in gross per capita consumption compared with 2004 levels by 2025 as proposed in the Three Waters Final Strategic Plan 2008. The target marks a significant commitment beyond the 5% per capita reduction target set in the 2004 region-wide water management plan, From the Sky to the Sea adopted by the previous local Councils.

Gross per capita consumption in 2010 is about 7% less than in 2004. Although gross per capita consumption varies year on year, a downward trend is evident.

The plan recognises the benefits that a reduction in per capita use provides in delaying the significant water infrastructure investment required to meet the growing population's future water needs. In adopting the new target, investment in a new water treatment plant and pipeline from the Waikato River will be delayed by around 7 years.

The domestic and gross per capita consumption of the non-metropolitan communities is more variable than the Auckland metropolitan average. An integrated regional approach to demand management is based on best practice where there are benefits of an inclusive approach such as consistent and shared communication messages. Localised approaches can be implemented where specific water efficiency benefits are identified.

The demand management programme identifies a range of short, medium and long term initiatives to deliver the required savings as shown in Table 10:

Demand management will delay investment in new water sources, treatment and network infrastructure but will not completely remove the need for this investment as the total demand across the region will continue to increase as the population grows.

Table 10: Water demand management programme

Programme title	Description
Schools' water use	Continue existing education programmes and continue working with schools to reduce high water use
Indoor water use	Work with government to investigate how to implement new guidelines to minimise water use in new homes
Large water users	Continue working with Housing New Zealand to meet targets for reduced consumption and continue to pilot options with other large water users for example tertiary education providers, health providers, manufacturers and hotel/restaurants/accommodation providers
Non-revenue losses	Meet targets to minimise non-revenue losses (fire fighting, operational use, water main bursts and leaks)
Auckland Council	Work with Council to reduce the water used for irrigation of parks and the water used in public buildings
Promotion of devices	Continue to promote water efficient devices to customers using existing national standards
Domestic customers	Investigate how domestic customers use water outside in the summer and identify options to reduce this demand
Commercial water use	Continue supporting a national study to investigate how water is used in commercial buildings and identify options for improving water efficiency
Metering	Maintain universal metering across the Auckland region
Council Controlled Organisations	Develop pilot studies to reduce the water used in operations and promote water efficient messages to staff
Price	Continue to provide affordable water in accordance with the Statement of Corporate Intent
Communications	Continue to communicate with customers through Watercare's website and other communication channels while also promoting water efficiency on customer bills

3.6.2. Metropolitan water source and treatment augmentation options

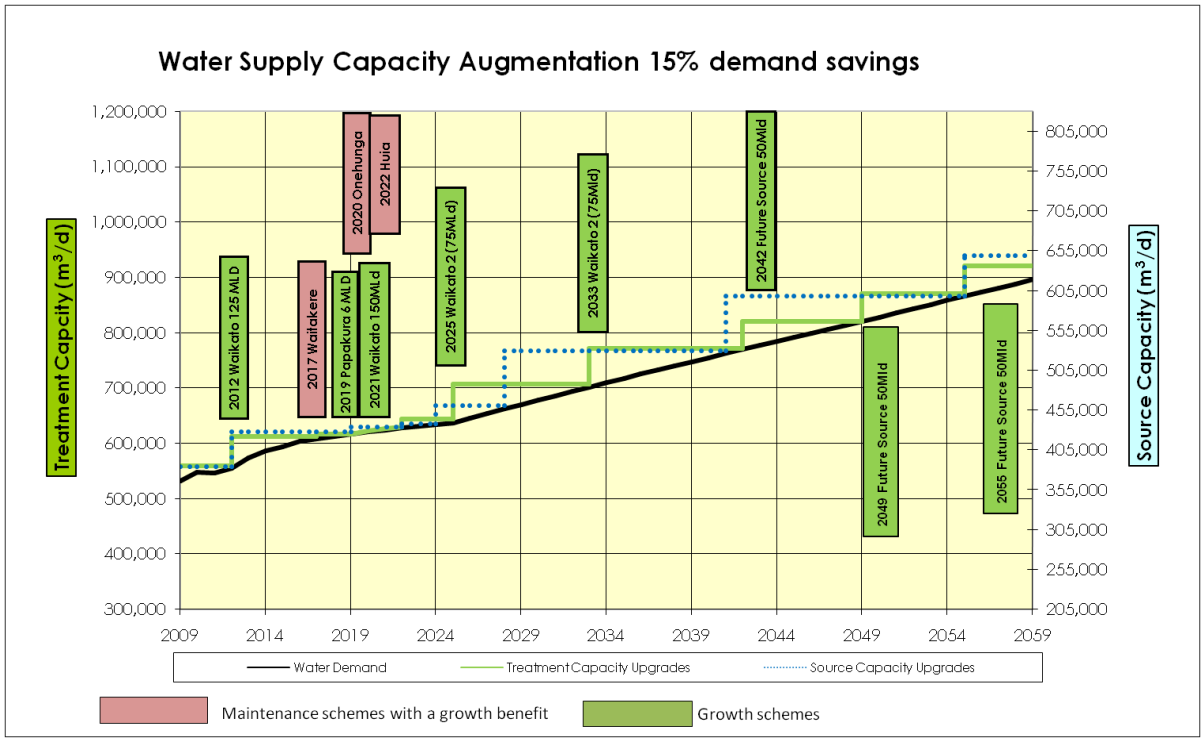
To meet the water demand needs of Auckland's growing population and to ensure levels of service are maintained, water source and treatment augmentation solutions have been identified.

The 2008 Three Water's Strategic Plan identified the Waikato River as the next preferred future source option. New consents will need to be applied for and granted by Environment Waikato to abstract additional volumes from the river to treat water at a new Waikato treatment plant.

Figure 9 shows the water source and water treatment plant capacity upgrades that will be required to meet growth over the next 50 years to ensure that the metropolitan Auckland drought security standard and the peak day levels of service can be met. The profile assumes that water demand savings targets will be met. These upgrades have been included in the capital expenditure programme.

Watercare's investment profile is currently driven by peak demand and opportunities to manage or reduce this peak demand will be explored further through demand management.

Figure 9: Metropolitan Auckland water supply augmentation options



Note: m3/d = cubic metre per day, MLd = megalitre per day, 1 megalitre (ML) = 1000 cubic metres (m^3)

3.6.3. Metropolitan wastewater treatment augmentation options

The Mangere and Rosedale wastewater treatment plants are calculated to have sufficient capacity to service the Auckland metropolitan scheme, including Drury, the Hingaia Peninsula and the Waitakere City areas of Westgate and Whenuapai until at least 2027 with several upgrades undertaken to increase capacity, when required, to provide for growth. The upgrades will defer the need to build any additional plants during the next twenty years. However, provision has been made for the purchase of additional land to accommodate a potential future plant.

Figure 10 and Figure 11 illustrates how the staged upgrades will increase the current capacity to meet the forecast increase in demand. The design capacity for full treatment is based on the 95th percentile of all days (solid line), while the excess above this is based on the maximum flow under stormy conditions (dashed line). In both plants, there are independent processes to treat the water (liquid process) the waste matter (solids process) and the excess storm flow (storm process).

Figure 10: Mangere Wastewater Treatment Plant Capacity Upgrades

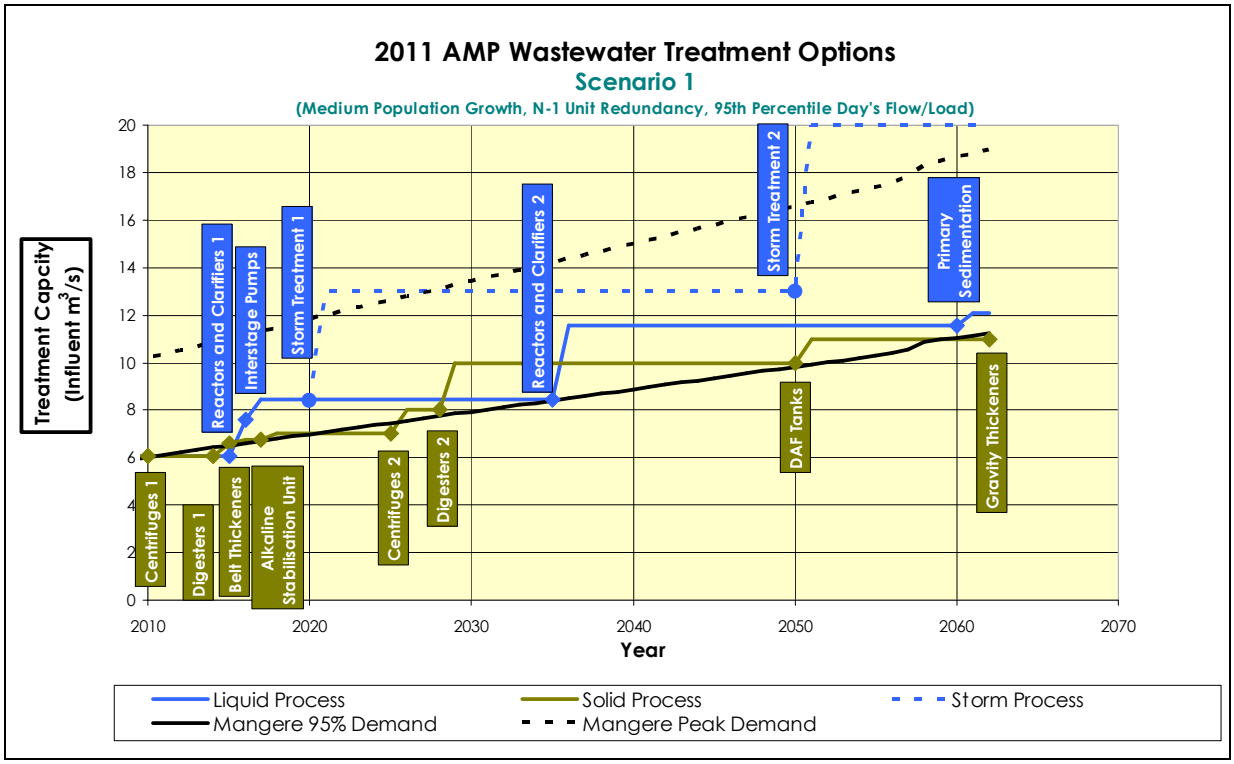
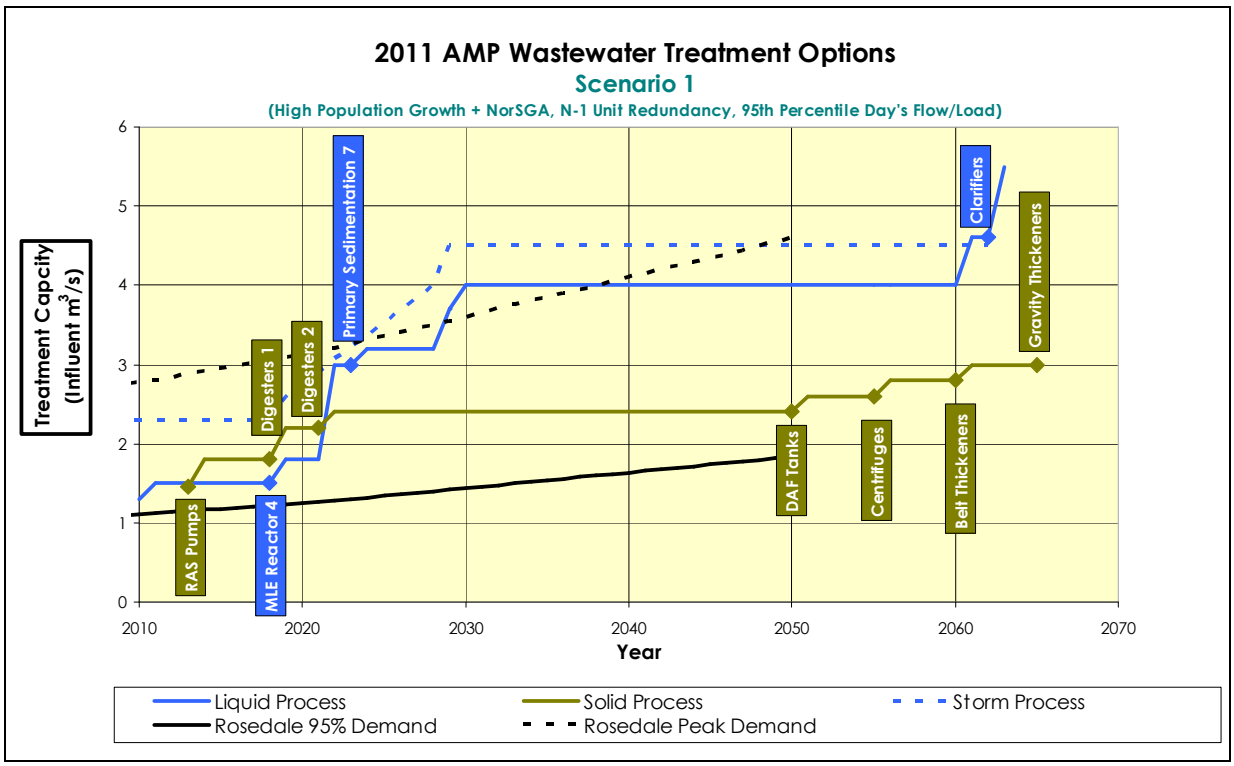


Figure 11: Rosedale Wastewater Treatment Plant Capacity Upgrades



3.6.4. Non-metropolitan water source and treatment augmentation options

To meet the water demand of the significant forecast population growth in the Rodney and Franklin areas Watercare has developed an investment strategy for its non-metropolitan water sources and treatment works. Investment options typically include connecting communities to the metropolitan water supply and investigating new groundwater sources. Table 11 illustrates some of the options and timing being considered.

Table 11: Non-metropolitan water supply augmentation options

Supply area	Source and treatment works options to meet growth	Programme
Warkworth	Develop groundwater source and new treatment works	By 2016
Wellsford	Develop groundwater source and new treatment works	By 2016
Helensville	Seek groundwater source or improve existing surface water sources.	By 2016
Snells & Algies Beaches	No investment within this Asset Management Plan	-
Muriwai	No new connections permitted.	-
Clarks Beach, Waiau Beach, Glenbrook	Connection to the metropolitan supply or new groundwater source with new treatment works.	2016
Waiuku	New groundwater source and augmented treatment works or connection to the metropolitan supply.	2020
Patumahoe	Connection to the metropolitan supply or new groundwater source with new treatment works.	2016
Bombay	Connection to the metropolitan supply or upgraded treatment works.	2018

3.6.5. Non-metropolitan wastewater treatment plant augmentation

The non-metropolitan wastewater treatment plants have varying capacity limitations. Many of the plants have capacity upgrades identified and programmed for this plan period, which will be carried out alongside other upgrades required to comply with resource consent limits. Table 12 illustrates some of the options and timing being considered.

Table 12: Non-metropolitan wastewater treatment augmentation options

Scheme area	Treatment works options to meet growth	Programme
Pukekohe	Process upgrades	By 2017
Waiuku, Clark's Beach and Kingseat	Connection to Pukekohe or upgraded treatment works.	2016
Beachlands	No investment within this Asset Management Plan	-
Warkworth & Snells Algies	Process upgrades	By 2016
Helensville	Process upgrades	By 2014
Omaha	Process upgrades	By 2013
Wellsford	Process upgrades	By 2015
Kawakawa Bay	No investment within this Asset Management Plan	-
Waiwera	Process upgrades	By 2017
Huapai, Matakana	Connection to the metropolitan scheme	By 2013
Denehurst, Owhanake and Bombay	No investment within this Asset Management Plan	-

4 ASSET LIFECYCLE MANAGEMENT

4.1 Overview

This section demonstrates how Watercare uses appropriate monitoring of the performance of its assets to inform decision-making for asset renewal, replacement, upgrade and disposal.

Specifically, this section describes what Watercare are planning to do to keep its assets operating at the agreed levels of service (defined in Section 2) to provide for anticipated service demand (described in Section 3) through the sequential phases of an asset's lifecycle.

Life cycle planning is a key asset management tool that takes into account the whole of-life implications of acquiring, operating, maintaining and disposing of an asset. It establishes a sound basis on which decisions are made by evaluating the total costs of an investment or operational decision, rather than only considering the short-term gains or initial capital costs.

Effective lifecycle planning is about making the right investment at the right time to ensure that the asset delivers the desired level of service over its full expected life, at the minimum total cost. The useful life of an asset may be different from its original design life. A number of factors relating to operational issues and physical issues can influence this difference. Decisions made in one phase of an asset's life will affect its performance in others. For example, a preventive maintenance program may affect the operating and maintenance costs, downtime, and longevity of an asset.

This section therefore outlines the tactical plans for managing assets at agreed levels of service over their life cycle while optimising the whole of life cost. It explains Watercare's tactics for:

- Providing new or upgraded assets to improve service levels and provide for growth and demand
- Operating and maintaining assets
- Renewing or replacing assets
- Disposing of assets at the end of their useful life.

Figure 12 below, shows the generic stages of asset lifecycle from identifying a need, asset creation, through asset operation, to rehabilitation, renewal and disposal. The capital project phase (which applies to both asset creation and renewal projects) has three main stages: Definition, Development and Delivery. Once the project has been completed, and the asset is commissioned, the new asset is handed over to the Operations team to operate and maintain for the duration of its life. At the end of its life, the asset is programmed for rehabilitation, renewal or disposal as appropriate.

Capital works are undertaken according to the Project Delivery Manual (PDM), which provides information and guidance to ensure that projects are completed:

- To the required quality standards
- Within the approved capital expenditure
- In a timely manner

The Project Delivery Manual covers:

- Company policy regarding delivery of capital projects
- Process overviews for how project delivery should be managed, from project identification through the delivery stages of a project to the post implementation audit
- Standards for use in project delivery
- Roles and responsibilities of those involved in capital expenditure

The Project Delivery Manual is published on the Watercare intranet and is available to all staff.

Figure 12: Asset Lifecycle Activities

Detailed discussion of the lifecycle methodologies is provided in Section 8.

4.2 Asset Information

4.2.1. Water Supply

History

Auckland's public water network dates back to 1866 with a supply from underground springs in the Auckland Domain and a further additional supply from Western Springs. Water from Lake Pupuke supplied areas of the North Shore from 1884 until 1957. Dams built in the first half of last century, in the Waitakere and Hunua Ranges, replaced these early water sources for the metropolitan areas. Further dams were subsequently built in the Hunua Ranges to cater for growth and in 1997, following a period of drought, a supplementary supply was commissioned from the Waikato River.

Public reticulated water supplies in non-metropolitan areas date back to the early 1900s when the Helensville network was first installed. As rural townships grew throughout the second half of last century, public water systems were built to accommodate them, where funding was available. Most of these towns still have many of the original pipes and their water sources remain the same as when they were originally commissioned.

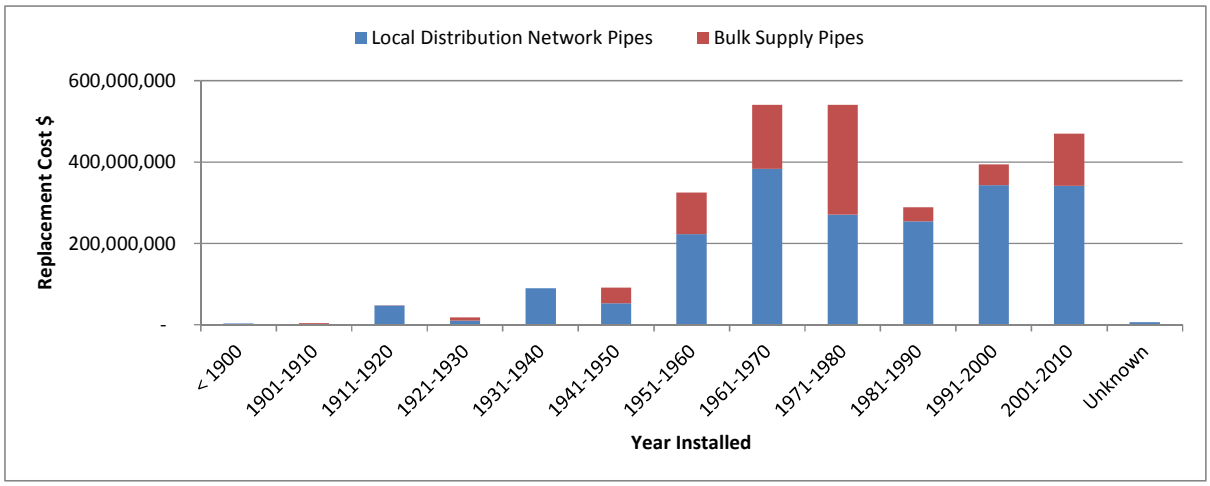
Figure 13 illustrates the sequential development of the water supply networks over the last century, and the cost (in today's terms). The sharp increase observed in the 1950s and 1960s was due to an explosion in demand on the North Shore following the opening of the Harbour Bridge.

Water supply schemes today

Today Watercare operates one metropolitan scheme servicing a population of around 1.32 million in the former cities of Auckland, as far north as the Hibiscus Coast; and 16 non-metropolitan schemes servicing around 46,000 people in the rural townships of Franklin and Rodney.

Water for the metropolitan scheme is sourced from nine dams in the Waitakere and Hunua Ranges, the Waikato River and an aquifer in Onehunga and treated at five treatment plants. A sixth plant, in Papakura, is currently out of service, but will be rebuilt in this AMP period.

Figure 13: Cost of Developing the Water Supply Networks



Water for the non-metropolitan schemes is sourced as listed in Table 15 at the end of this section. The high cost of developing new township schemes means that very few new schemes have been developed in recent years. Although no new schemes are planned for the next 10 years, Watercare will be extending the metropolitan supply network to Kumeu, Huapai and Riverhead, in the north of the region, while in the south, the Waikato treated water supply network will be extended to replace the existing under-performing scheme in the Pukekohe area.

Water supply assets

Watercare is responsible for all the assets of each scheme from the water source to the water meters, that is:

• Dams	• Pipes
• Headworks	• Valves
• Treatment plants	• Fire hydrants
• Reservoirs	• Meters
• Pump stations	

The only exception is in Papakura where, as discussed in Section 1, Watercare is only responsible for the bulk water network assets.

The pipe assets account for 61% of the total value of the water networks (Section 1). Most of the pipes are between 50 and 200 mm in diameter and are predominantly made from asbestos cement (AC), polyvinyl chloride (PVC), polyethylene (PE) and iron including cast Iron (CI) ductile iron (DI) and galvalnised iron (GI). While the majority of the larger diameter, bulk supply pipes are made of steel as seen in Figure 14 and Figure 15.

Figure 14: Water Pipe Lengths by Diameter

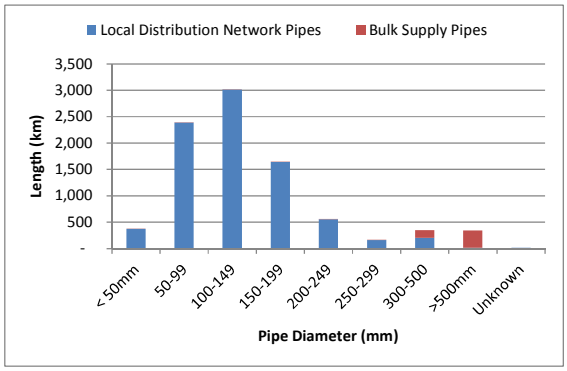
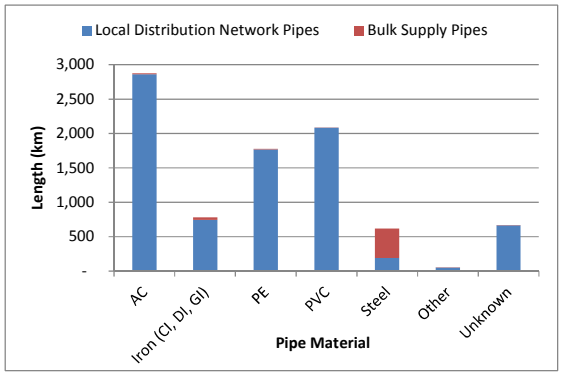


Figure 15: Water Pipe Lengths by Material



Critical assets

Critical assets are those assets that cannot be allowed to fail, as their failure would have unacceptable consequences.

Varying criteria has been applied across the bulk network and many of the local distribution networks to identify critical water assets, though as yet there is no consistent approach to identifying criticality across the region.

The approach to identifying critical assets include consideration of:

- The number of properties affected
- Types of properties affected (eg: hospitals, schools, industry)
- Potential traffic disruption and road hierarchy (eg. Arterial routes vs suburban streets)
- Specific asset types such as zone valves, reservoirs.

Assigning criticality to an asset affects how it is maintained, as discussed in Section 4.4.

Asset functionality

Water supply schemes generally operate in a similar way. In each scheme raw water is gravity fed from storage dams or pumped from bores or river sources via pipes to the water treatment plant for treatment, then transported via a network of pipes, reservoir and pump stations to the end user.

The dams are large concrete or earth filled structures which allow water collected from the surrounding native bush or forestry catchments to be stored in lakes. The lakes provide considerable storage capacity for raw water to ensure demand can be met throughout the year.

The treatment plants vary in size and treatment processes adopted, providing treatment appropriate to the quality of the raw water and the networks they supply. Table 15 at the end of this water supply assets section lists the different processes for treatment used at each of the treatment plants.

After treatment water is gravity fed or pumped to reservoirs located at high elevations. The reservoirs provide extra supply into the networks during peak demand times and in emergency situations. They also provide “head” or pressure for the water to flow to lower elevations in the networks by gravity. Most of the pipe networks function by gravity with pumping only required to push water to the few properties at higher elevations than the reservoirs.

The metropolitan scheme is divided into zones to maintain pressure across the widely variable topography. Pressure reducing valves (PRVs) are installed to reduce pressures to lower areas of the zones and maintain water levels in reservoirs.

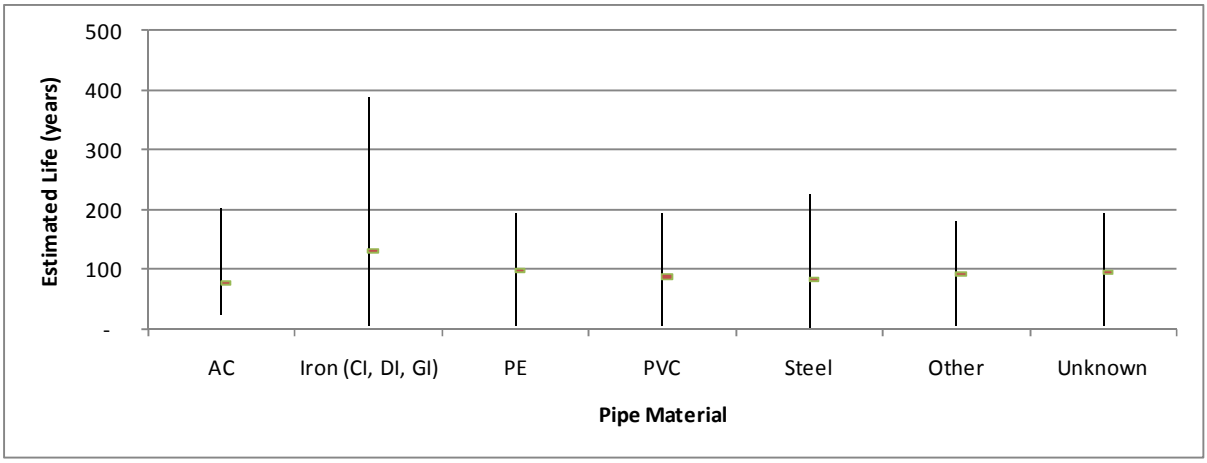
Hydrants are installed on all the pipe networks (except the bulk system) for fire fighting and operational purposes such as flushing and draining pipes. The networks are regularly tested by Watercare and the NZ Fire Service to ensure sufficient water pressure and flow is available from the hydrants to fight fires.

Meters to record water use are installed on all metropolitan scheme connections and non-metropolitan schemes. Meters are not usually installed on fire sprinkler connections. Bulk meters record the volumes moving from the bulk supply network into the metropolitan scheme zones.

Asset age and life expectancy

The networks are comprised of pipes of various materials. The useful life of the pipes has been estimated across the different networks from industry standards, local knowledge and pipe deterioration modelling. Figure 16 illustrates the variance in estimated pipe lives showing lowest, highest and average life for each pipe material. Over time these will be rationalised to produce more uniform estimates across the region. This will allow more accuracy in planning for asset renewal (see Section 4.5).

Figure 16: Water Pipes Estimated Life Expectancy
(lowest to highest range and weighted average)



Pipes are typically some of the longer-life assets in the networks. Estimated lives for meters, pumps, instrumentation or electrical assets tend to be considerably shorter and therefore require replacement earlier and more frequently.

Figure 17: Estimated Water Pipe Replacement Dates and Costs

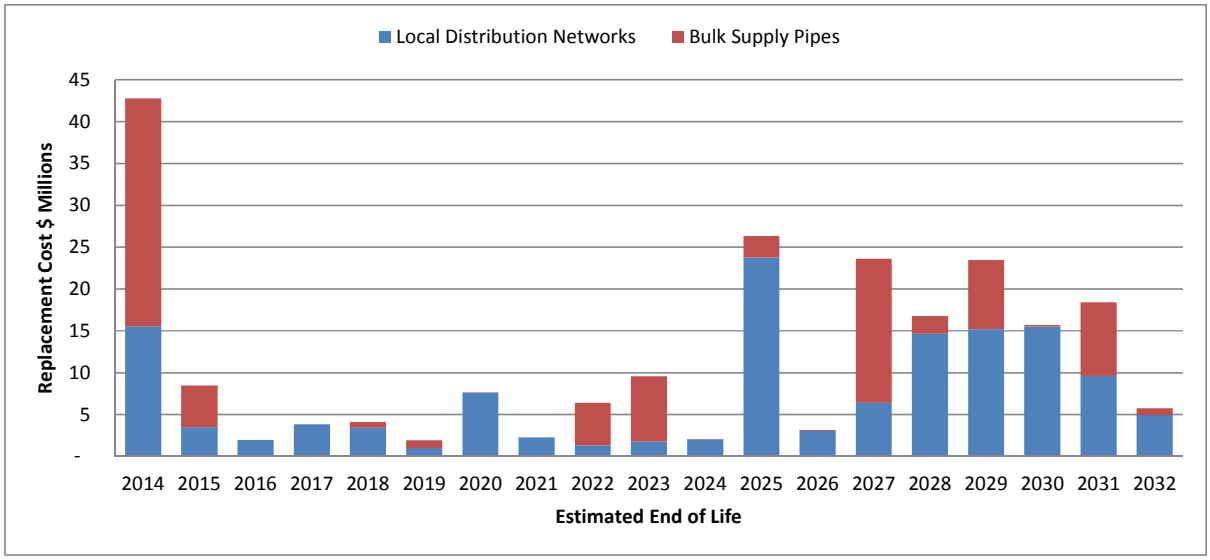


Figure 17 plots the estimated life-end dates for the water supply pipes against the 2011 replacement costs. A total of 110 km (1.2% of the total length of the combined networks) have reached or are past their financial dead dates but are still in use. In these cases the end of their estimated useful lives is assumed to be in 2014. This indicates a need for significant expenditure on pipe renewal after this date.

Asset condition

Pipe assets account for approximately 61% of the total value of the water supply assets, and as such considerable emphasis is placed on understanding the condition of these assets.

Watercare undertakes an ongoing comprehensive condition assessment programme for all the bulk supply network pipes and consequently has collected reliable condition data for these pipes (data shown in Table 13 and Figure 18).

The assessment of condition of the inherited local distribution pipe networks, was historically approached in different ways and with differing consistency across the region (refer to Section 8.2.4 for discussion of the different practices). Consequently no uniform comparable condition data is currently available, however the majority of the local distribution pipe networks are judged to be in good to excellent condition based on the condition data that does exist and due to their relatively young age (compared to their life expectancy).

In the absence of consistent region-wide pipe condition data, Watercare has attributed a condition grading for pipes based on percentage of life remaining for the local distribution pipe networks using a 1 – 5 scale, where 1 is very good and 5 is very poor (Table 13). Figure 19 illustrates the results of this desktop analysis which estimates that less than 20% of the local distribution pipes are in poor or very poor condition.

Table 13: Water Pipe Assets Condition Grading

Condition Grade	Description	Bulk Supply Pipes * (Condition based on physical assessment)	Local Distribution Network Pipes (Condition based on age)	Age Based Criteria
1	Very Good	283 km	2,599 km	> 80% of useful life remaining
2	Good	199 km	1,811 km	60-79% of useful life remaining
3	Fair	66 km	2,513 km	40-59% of useful life remaining
4	Poor	2 km	1,150 km	20-39% of useful life remaining
5	Very Poor	1 km	201 km	< 20% of useful life remaining
	Total Lengths	**551 km**	**8,274 km**	

Figure 18: Bulk Water Pipes Condition by length

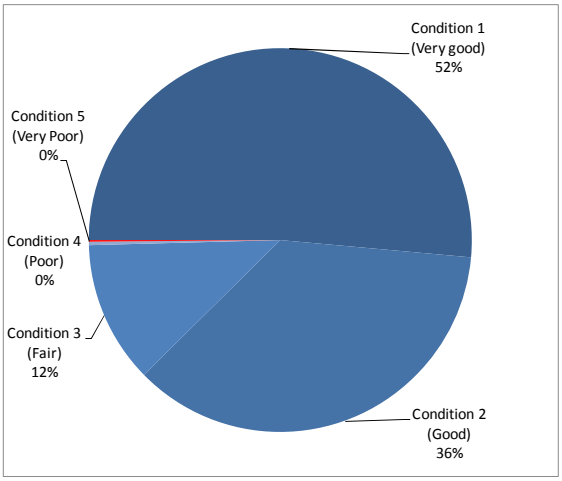
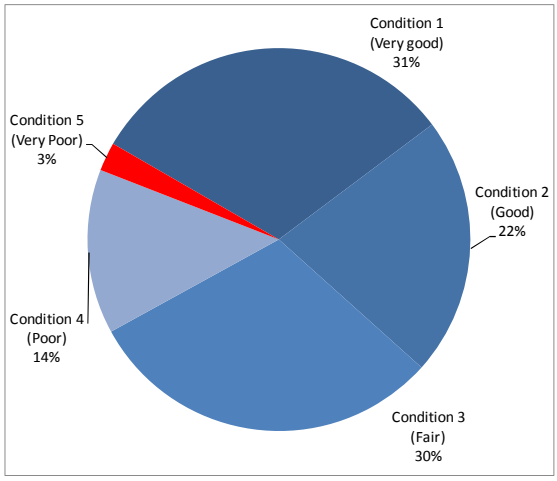


Figure 19: Local Water Pipes Condition by length



Pipe materials known to cause condition and performance problems throughout all the networks include cast iron (CI) and asbestos cement (AC) pipes.

The dams are in generally stable condition, with the exception of the Lower Huia Dam and Mangakura No. 1 Dam which may require stabilisation and are being closely monitored. The Lower Nihotupu valve tower and Mangatangi spillway may require strengthening against seismic movement. The pipes/tunnels carrying the raw water to the treatment plants are mostly in good condition with only minor rehabilitation required.

The treatment plants are aging and, although most have had upgrades over time, some of the older concrete structures are showing signs of deterioration. The exception is the Waikato plant which is relatively new and in good condition.

Many of the pump stations and reservoirs are in good condition due to regular inspection, refurbishment and a maintenance programme. Some of the smaller non-metropolitan treatment plants and pump stations will be upgraded over time to increase their reliability and useful life.

Meters are known to deteriorate in performance as they age, causing under-recording of water volumes, and consequently meter replacement programmes are in place across the metropolitan scheme.

Asset performance

The performance of the water supply assets is assessed, to a large degree, on the quality of the water delivered to customers, the risk of contamination and the reliability/age relationship of the asset.

The Ministry of Health grades the source water, treatment plant, and the distribution network to determine the risk of contamination to the water supply and the schemes are operated according to the Drinking-water Standards for New Zealand (DWSNZ).

The water quality that the plants are able to achieve varies across the schemes. The metropolitan scheme plants (Ardmore, Huia, Waikato, Onehunga and Waitakere) all achieve an “A” grading from the Ministry of Health, which is defined as ”completely satisfactory, very low level of risk”. All rural plants are currently ungraded and some do not meet Drinking-water Standards for New Zealand (DWSNZ).

Improvement works are programmed for this plan period to improve the performance of the former Rodney and Franklin District treatment plants.

Water and Sanitary Services Assessments

In 2004/05, Water and Sanitary Services Assessments (WASSA) were undertaken for all the water and wastewater schemes across the region, as a requirement of the Local Government Act 2002. The assessments identified key issues and risks pertaining to each scheme, which were used to guide maintenance programmes and long-term planning.

Watercare is currently working with the relevant departments of Auckland Council to coordinate and undertake a full statutory region-wide WASSA assessment by 2015. The analysis work will be completed after 2012, following the adoption of the spatial plan and the development and implementation of region-wide policies. The results will be available to guide the capital works planning and budgets for the 2015-25 Long Term Plan (LTP).

Asset capacity

Table 14 shows the current ability of the water supply schemes' capacity to meet demand.

Table 14: Current Water Supply Capacity

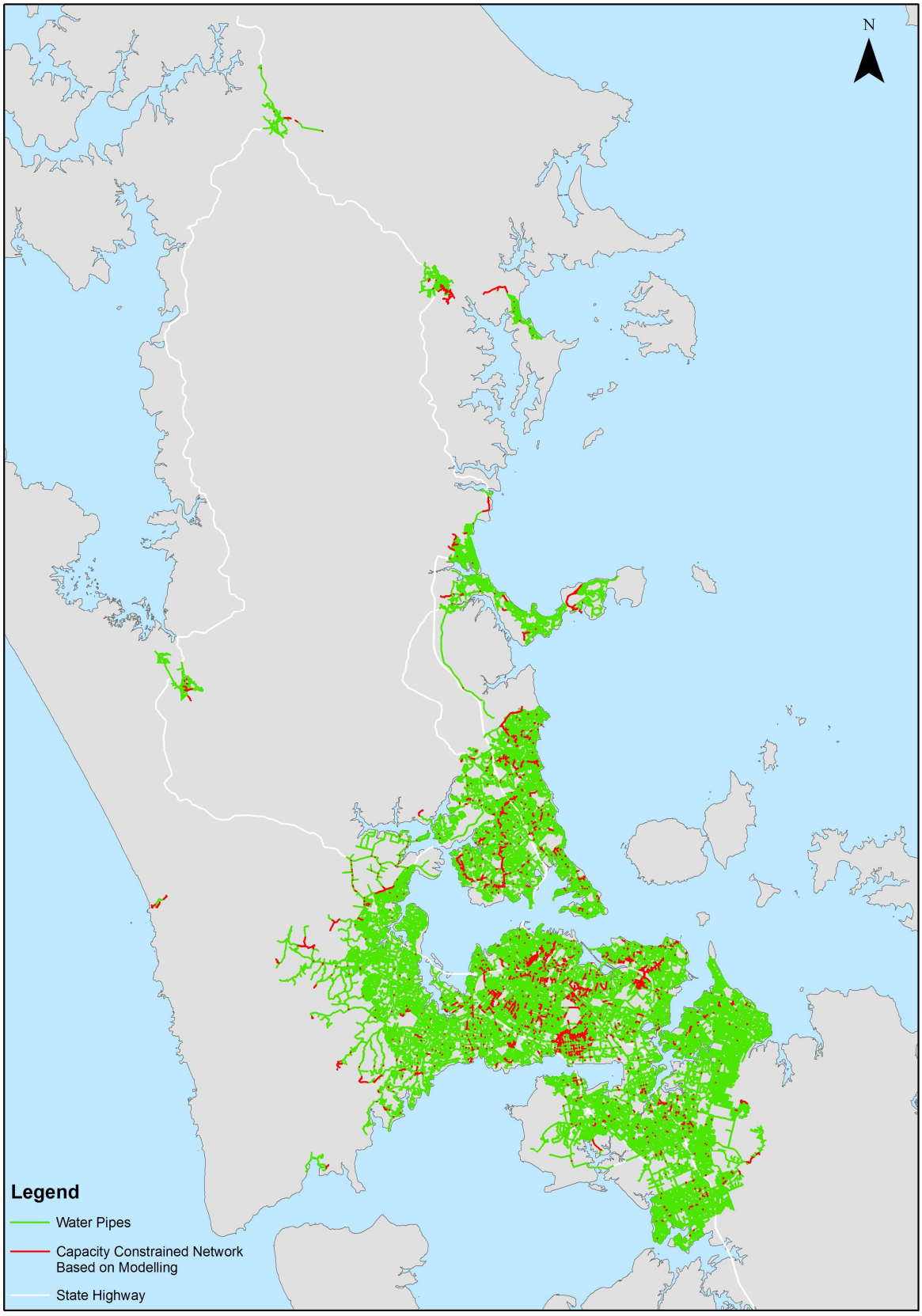
Asset	Capacity	
	Metropolitan Schemes	Non-metropolitan Schemes
Storage lakes	✓	✓
Water sources	✓	Constrained by resource consents[1]
Treatment plants	✓	✓
Raw water mains	Additional capacity required	✓
Reservoirs	More storage needed for security of supply in north western areas	More storage needed to manage peak demand in some schemes
Pipe networks	Capacity upgrades required to improve security of supply, support growth and meet fire fighting requirements (see Figure 20)	Capacity upgrades required to improve security of supply, support growth and meet fire fighting requirements (see Figure 20)
Pump stations	Upgrades required to support increased capacity of the pipe networks	Upgrades required to support increased capacity of the pipe networks

Although capacity upgrades are indicated above for the pipe networks, it should be noted that Watercare is able to deliver water to all customers. Pipe capacity determines levels of service such as minimum pressures and flow rates which may be reduced during times of peak demand in under-capacity pipes.

Watercare has analysed the capacity of the pipe networks using the water supply computer models. Figure 20 depicts the pipes that are under-capacity according to headloss, velocity or pressure parameters (for all the networks except Franklin, which as yet have not had water supply models developed). The total length of local distribution pipes that are deemed under capacity is 234 km which represents 3.1% of the local networks (excluding Franklin).

[1] The consents include requirements to maintain a minimum residual flow in rivers and streams. In summer, when flow is low and demand is high, this can result in the need for water restrictions in some schemes. Demand management and/or new bore supplies will be used to accommodate these constraints.

Figure 20: Water Pipe Capacity in the Local Distribution Networks (excluding Franklin)



The metropolitan scheme has a total of 95 million m^3 of lake storage capacity (Figure 21) and a combined treatment capacity of 570,000 m^3/day at the treatment plants (Figure 22), which meets the current demand of the metropolitan areas of Auckland.

Figure 21: Dam Storage and Year Built

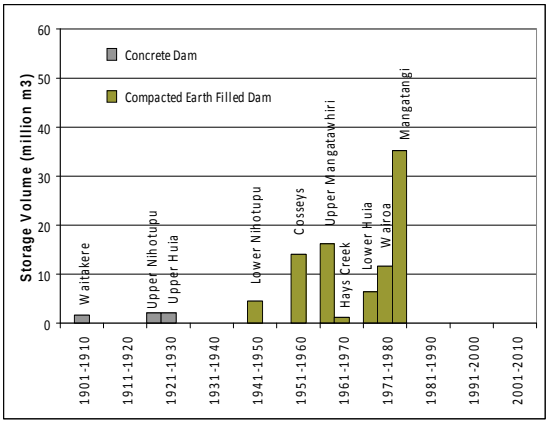
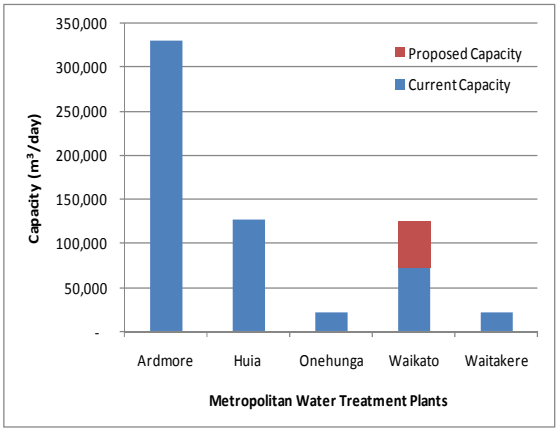


Figure 22: Water Treatment Plant Capacity



Water supply treatment plant summary table

Table 15 provides the water sources and processes used at each treatment plant and the population that the plant serves.

Table 15: Water Treatment Plants

Plant	Water Source	Processes											Population Served
		Coagulation	Clarification	Sand Filtration	Membrane Filtration	Disinfection	PAC Dosing	Granula- Activated Carbon	pH Adjustment	Alkalinity Adjustment	UV Disinfection	Fluoridation	
Metropolitan Plants													
Ardmore	Hunua Ranges Dams (4)	✓	✓	✓		✓			✓			✓	1,320,000
Huia	Waitakere Ranges Dams (4)	✓	✓	✓		✓			✓			✓	
Waitakere	Waitakere Dam	✓	✓	✓		✓			✓	✓		✓	
Papakura	Hays Creek Dam												
Waikato	Waikato River	✓	✓		✓	✓		✓	✓	✓		✓	
Onehunga	Spring	✓		✓		✓			✓				
Non-metropolitan Plants													
Pukekohe	Spring & bores					✓					✓	✓	20,300
Waiuku (3)	Bores (3)			✓		✓							8,500
Snells/Algies	Aquifer			✓		✓							4,400
Warkworth	Mahurangi River	✓	✓	✓		✓	✓						4,000
Helensville / Parakai	Dam and springs	✓	✓	✓		✓	✓		✓				3,560
Wellsford	Hoteo River	✓	✓	✓		✓			✓				1,690
Clarks Beach	Bore					✓			✓				1,320
Huia Village	Lower Huia Dam	✓			✓	✓		✓	✓				1,000
Patumahoe	Bore					✓							750
Muriwai	Springs		Cartridge filters			✓					✓		570
Buckland	Bore					✓							520
Bombay	Spring	Nitrate removal / ion exchange				✓					✓		440
Glenbrook	Bore			✓		✓					✓		350
Waiau Beach	Bore					✓							180
Douglas Rd													Out of Service
Total													**1,367,580**

Wastewater

History

In the 1880's, stream pollution and a typhoid outbreak prompted a need for a public, reticulated (piped) wastewater disposal system to replace the nightsoil collection system. Between 1900 and 1920 a combined wastewater/stormwater system was built in central Auckland, discharging directly into the Waitemata Harbour near Okahu Bay, without any treatment. Other boroughs in the south-west of the isthmus also built underground pipe networks to collect wastewater and stormwater, with discharge to the Manukau Harbour, also without treatment.

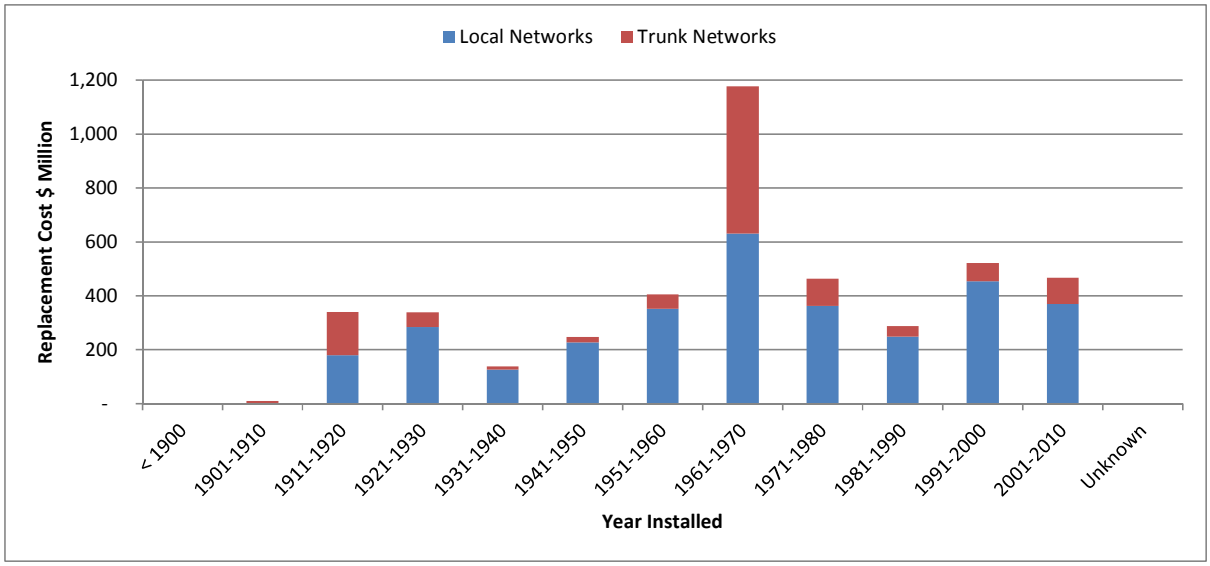
Concern about the levels of pollution in both harbours soon drove the need for the treatment of wastewater, and in 1960 the Mangere Wastewater Treatment Plant was commissioned, along with construction of the trunk interceptor sewers to convey all Auckland's wastewater (south of the Harbour Bridge) to Mangere. The Mangere Wastewater Treatment Plant was most recently upgraded in 2003, when the oxidation ponds were removed and significant foreshore restoration was undertaken.

In 1962, the Rosedale Wastewater Treatment Plant in Albany was commissioned, to accommodate the rapid development of the North Shore after the opening of the Harbour Bridge.

The non-metropolitan wastewater schemes were mostly constructed in the 1970's and 1980's when generous central government subsidies were available. The most recent scheme to be commissioned was in Kawakawa Bay, in 2011.

Figure 23 illustrates the sequential development of the wastewater networks over the last century, and the cost of this development (in today's terms). As the graph illustrates, major spending on infrastructure occurred in the 1960s with the development of the North Shore following the opening of the Harbour Bridge.

Figure 23: Cost of Developing the Wastewater Pipe Networks



Wastewater schemes today

Today Watercare manages three metropolitan schemes servicing a total population of around 1.26 million with wastewater treatment plants at Rosedale, Mangere and Army Bay; and 17 non-metropolitan schemes servicing around 60,000 people in the rural townships of Franklin, Pukekohe and Rodney. The non-metropolitan schemes are based on individual local treatment plants servicing a local community. Some of these schemes may be rationalised over time as they approach capacity and are no longer able to fulfil their consent requirements.

Wastewater assets

Watercare owns and operates all the assets of each scheme from the customer property boundary to the treatment plant effluent outfalls, that is:

• Service connections	• Pump stations
• Pipes	• Treatment plants
• Manholes	• Outfall pipes

As with the water supply assets, the only exception is in Papakura where, as discussed in Section 1, Watercare is only responsible for the bulk wastewater network assets.

The wastewater pipes account for 68% of the total value of the wastewater assets (Section 1). The standard size for local networks wastewater pipes is 150 mm diameter; the most common pipe material is asbestos cement (AC), however polyvinyl chloride (PVC), ceramic (earthernware) and concrete pipes are also common, as shown in Figure 24 and Figure 25.

Figure 24: Wastewater Pipe Lengths by Diameter

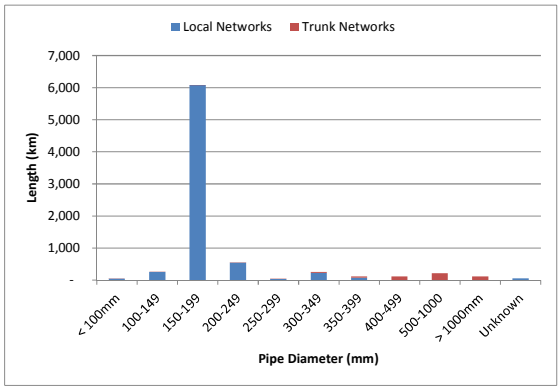
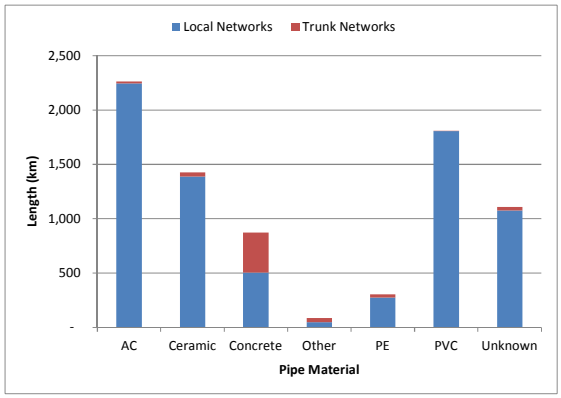


Figure 25: Wastewater Pipe Lengths by Material



Critical assets

The approach to identifying critical assets undertaken in some of the networks included consideration of:

- Volume of flow
- Diameter of pipe
- Location of overflows (eg: by waterways, or public access areas)
- Type of wastewater flow (eg: trade waste from industrial processes)
- Specific asset types such as pipe bridges and pump stations

Watercare had developed a critical assets strategy for the trunk wastewater pipes, owned prior to 1 November 2010, which was used to identify critical assets and define appropriate maintenance inspection programmes. This strategy will be modified to address the different asset types and sizes within the inherited trunk and local networks, and will be implemented region-wide to determine appropriate maintenance programmes.

Refer to Section 4.4 for maintenance of critical assets.

Asset functionality

Wastewater networks use a combination of gravity pipes and rising mains to convey wastewater from properties to the treatment plant. Pump stations are installed at low points in the network so that wastewater can be lifted to a higher point and continue its journey to the treatment plant under gravity.

The mains leading out of the pump stations are called rising mains; they tend to be of smaller diameter than the gravity pipes as they are pressurised.

The older combined wastewater/stormwater networks are designed to overflow in heavy rain, and consequently the majority of the overflows occur in central Auckland from these combined networks. Newer networks are designed to collect wastewater only (dry weather flow), with a standard allowance for additional flow resulting from stormwater inflow and infiltration (wet weather flow).

Storage in the network is provided at key critical locations and pump stations, which are built with a storage facility (wet well or stand-alone tank). Wet wells typically provide around four hours of storage in dry weather which reduces the likelihood of overflows from the network.

The networks are built utilising topography to allow gravity to do as much work as possible (minimising pumping costs), with the treatment plants generally situated at (or near) the lowest point of a town.

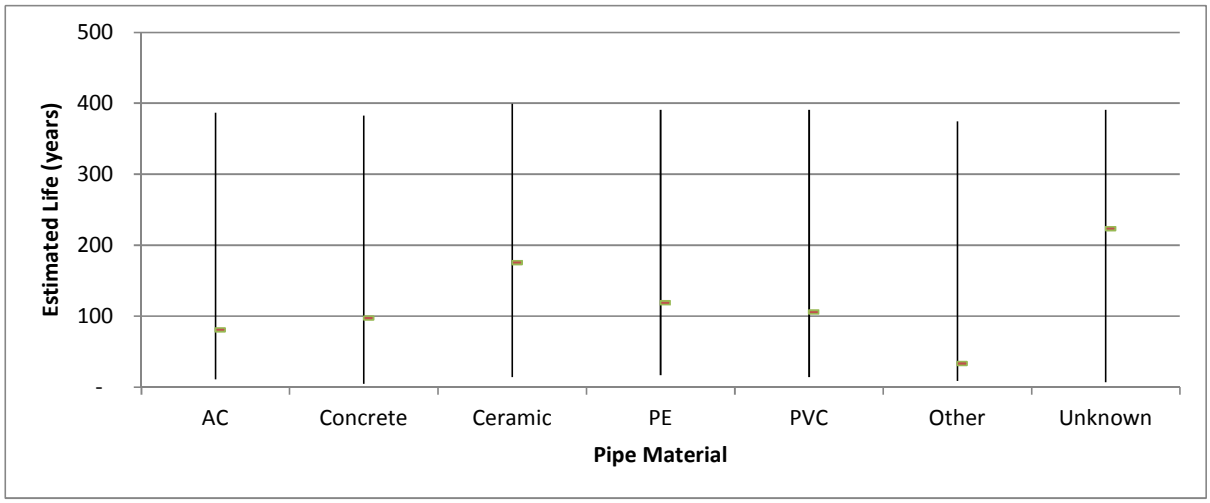
The treatment process involves removing the solids from the wastewater and treating the liquid component to make it safe for discharge. The treated liquid (effluent) is discharged via outfall pipes into a river or harbour, or onto land for irrigation. Refer to Table 17 (at the end of this wastewater section) for the treatment processes specific to each treatment plant.

Some of the non-metropolitan networks (Huapai, Point Wells and areas of Warkworth) are Pressurised Wastewater Collection (PWC) systems. In these systems wastewater generated at each property flows into a grinder pump and storage tank located on the property, owned and maintained by the property owner. The pump grinds down the waste and delivers it into the PWC network which comprises smaller diameter pipes than a traditional gravity network.

Asset age and life expectancy

The useful life of the wastewater pipes has been estimated across the different networks from industry standards, local knowledge and pipe deterioration modelling. Figure 26 illustrates the variance in estimated pipe lives across the region showing the lowest, highest and weighted average life estimated for each pipe material. Over time these will be rationalised to produce more uniform estimates across the region. This will allow more accuracy in planning for asset renewal (see Section 4.5).

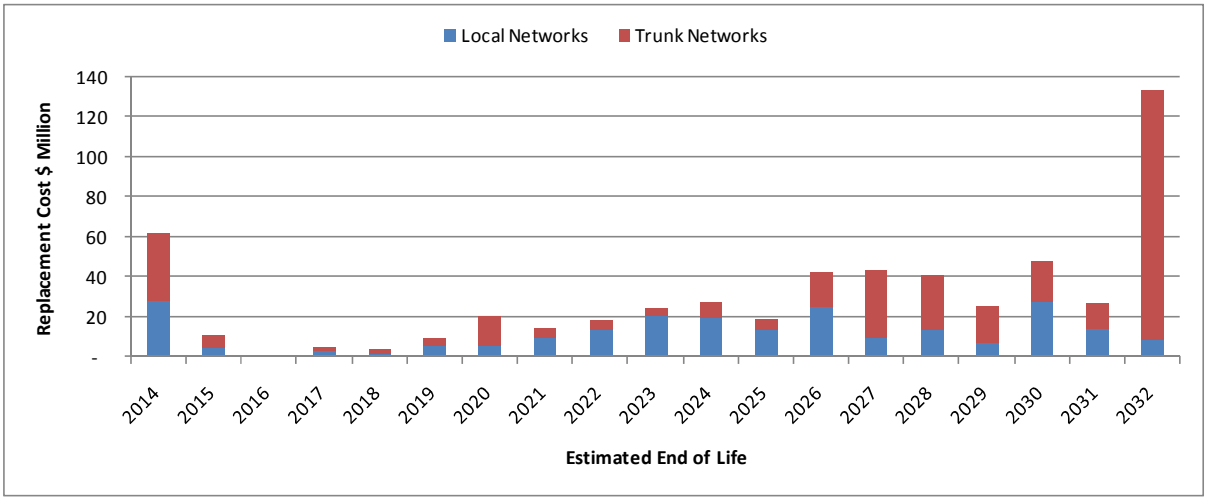
Figure 26: Wastewater Pipes Estimated Useful Life
(lowest to highest range and weighted average)



Pipes (including manholes) generally have longer useful lives than many of the other assets in the schemes. Estimated lives for the pumps, instrumentation or electrical assets of the pump stations and treatment plants tend to be considerably shorter and therefore require replacement earlier and more frequently.

Figure 27 plots the estimated life-end dates for the pipes against the 2011 replacement costs. A total of 92 km (1.2% of the total length of the combined networks) have reached or are past their financial dead dates but are still in use. In these cases the end of their estimated useful lives is assumed to be in 2014. This indicates a need for significant expenditure on pipe renewal after this date.

Figure 27: Estimated Wastewater Pipe Replacement Dates and Costs



Asset condition

As the wastewater pipe assets account for 68% of the value of the wastewater assets, considerable emphasis is placed on understanding the condition of these assets.

Condition of the trunk network assets is assessed during scheduled crew inspections, specialist pipe bridge and rising main inspections and closed circuit television (CCTV), sonar and walk-through inspections. Watercare has reliable data for the trunk assets (owned prior to 1 November 2010).

Condition assessment for the local networks (including trunk networks inherited by Watercare at 1 November 2010) was not consistently undertaken and consequently the data is not readily comparable. Typically CCTV was the standard method used to inspect the interior condition of the pipes with programmes targeted at areas of the networks that perform poorly (with frequent blockages, overflows or odour complaints) or pipes identified as critical. By extrapolating data collected in the past for three of the local networks, it is estimated that 20% of the total network is in poor or very poor condition, which reflects the significant problems experienced in many areas across the different schemes. This estimation corresponds with an estimation of condition based solely on asset age as shown in Figure 29.

Table 16 compares the lengths per condition grade for both trunk and local network pipes and Figure 28 shows the condition grading (by length) for the trunk pipes using assessment data or age based condition as available.

Table 16: Wastewater Pipe Assets Condition Grading

Condition Grade	Description	Trunk Network Pipes * (Condition based on physical assessment)	Local Network Pipes (Condition based on age)	Age Based Criteria
1	Very Good	28 km	1844 km	≥ 80% of useful life remaining
2	Good	154 km	2,729 km	60-79% of useful life remaining
3	Fair	119 km	1,254 km	40-59% of useful life remaining
4	Poor	15 km	1,254 km	20-39% of useful life remaining
5	Very Poor	1 km	295 km	< 20% of useful life remaining
	Total Lengths	**317 km**	**7,376 km**	

* Condition is based on physical assessment for trunk pipes owned by Watercare prior to 1 November 2010. Condition is based on age for trunk pipes inherited at 1 November 2010.

Figure 28: Trunk Wastewater Pipes Condition by length

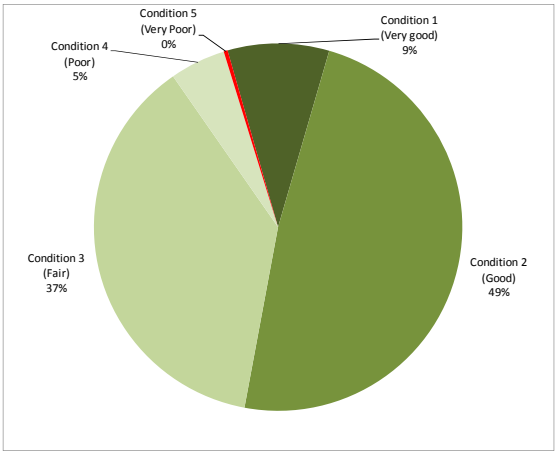
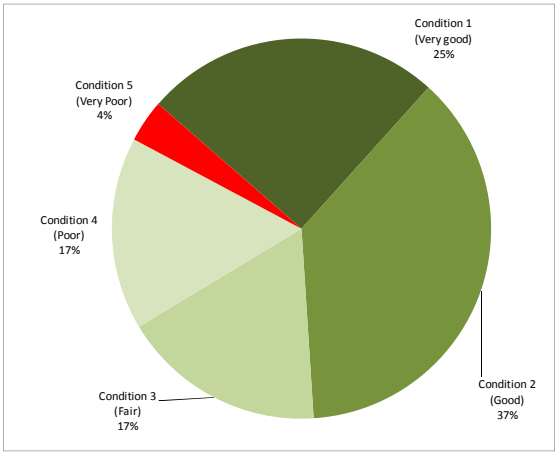


Figure 29: Local Wastewater Pipes Condition by length



Asset performance

The performance of the treatment plants is measured by their compliance with the resource consent conditions, which stipulate allowable discharge volumes and effluent quality parameters. At November 1, 2010, Watercare inherited 19 operational plants and 1 abandoned plant. Of these, 12 were not compliant with their consent conditions, or were operating under expired consents.

As part of its commitment to maintaining and improving levels of service, Watercare intends to maintain compliance at the plants that are currently achieving compliance, and have developed a prioritised programme for the non-compliant plants. The programme includes plant upgrades to achieve consent compliance and the necessary works to obtain consents for those plants with expired consents.

Compliance issues at the treatment plants are outlined in Table 17 at the end of this section.

The wastewater system consists of combined and separated networks that perform to varying degrees of service. There are approximately 800-1000 constructed overflow structures that overflow to the environment from 0 to 100 times per year. Watercare is progressively reducing frequent overflows through network upgrades undertaken on a prioritised basis.

Water and Sanitary Services Assessments

Refer to the Water and Sanitary Services Assessments section under Section 4.2.1: Water Supply.

Asset capacity

On the Watercare website, “red zone” maps (shown in Figure 30) are published which show the areas where development is constrained due to treatment plant and/or network capacity issues. No new connections can be made to the networks in Helensville, Waiwera, Matakana, Waiheke and only restricted connections are allowed in identified areas of Manukau until network and treatment plant upgrades have been undertaken. Under the pre-integration water industry structure, the approach to identifying capacity constrained areas was not consistent across the region and the development of a consistent approach to applying constraints is underway where there are known capacity issues.

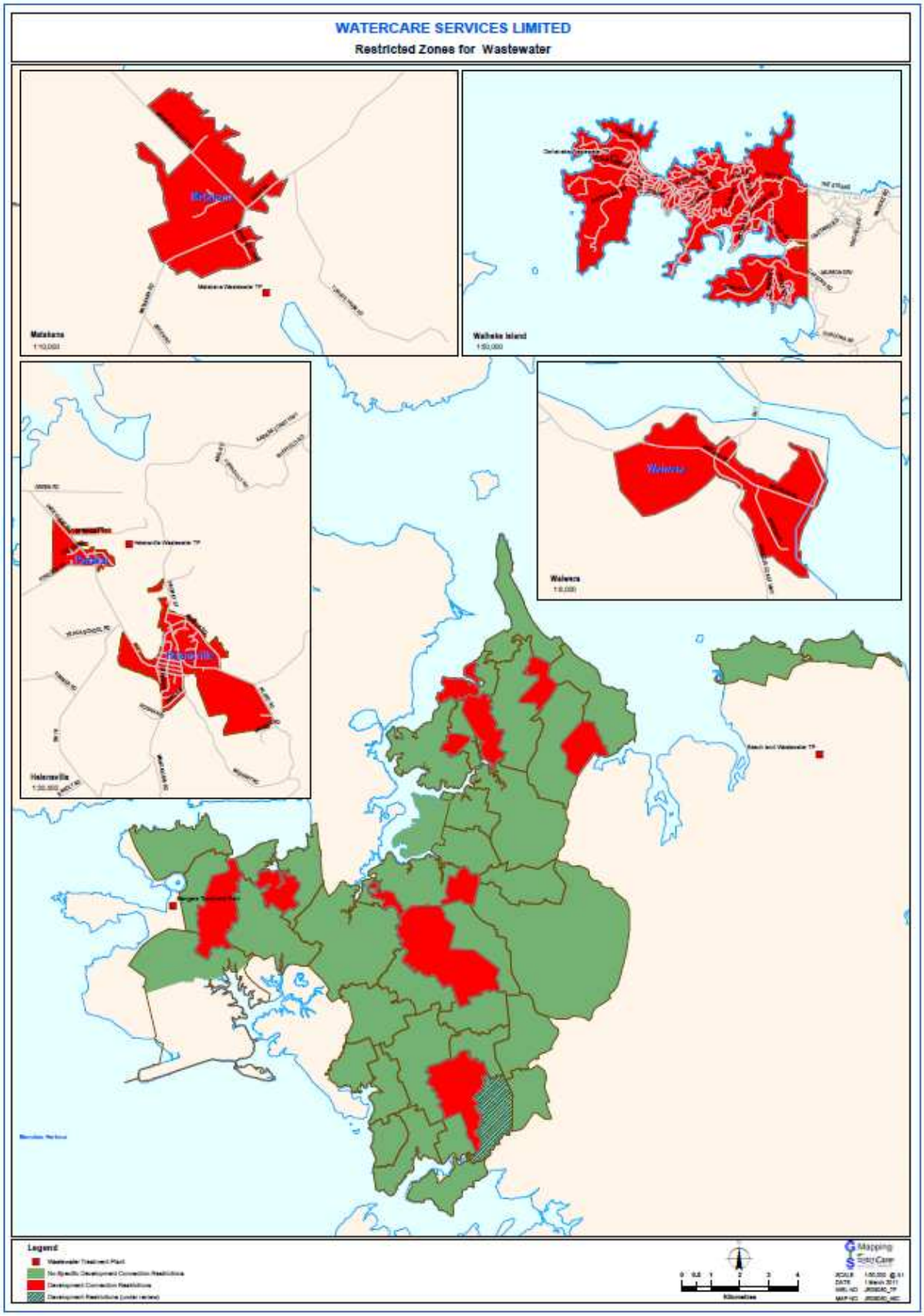
The Huapai plant is at capacity, but the connection of the Huapai network to the Mangere Wastewater Treatment Plant provided for in this AMP period will remove the constraints on new connections for this area.

Capacity of the pipe networks is typically analysed using computer models, however only some of the inherited wastewater catchments were modelled and the models were calibrated to varying degrees of accuracy and confidence.

The capacity of the networks is compromised with stormwater entry and all the networks suffer under heavy rain. Rainwater enters the networks via the illegal connection of building downpipes to the wastewater system; through low gully traps or by groundwater entering the system through defective pipe joints. This phenomenon is known as inflow and infiltration (I & I) and it can cause uncontrolled overflows from manholes and pump stations during heavy rain. Watercare is developing a region-wide I & I reduction programme as part of its wet weather overflow reduction strategy and has programmed the construction of several new pump station storage facilities to increase the storage capacity of the network and reduce the likelihood of overflows.

Forecast growth in the Auckland metropolitan areas will necessitate capacity upgrades of the networks, some of which have been programmed for this AMP period.

Figure 30: Red Zone Map – Wastewater Services



4.2.2. Wastewater treatment plant summary table

Table 17 lists the different processes for treatment used at each of the treatment plants and any current plant issues.

Table 17: Wastewater Treatment Plants

Plant	Processes												Receiving environment	Population Served
	Inlet Screening	Primary Clarifiers	Biological Reactors	Secondary Clarifiers	Oxidation Ponds	Mechanical Aeration	Tertiary Filtration	UV Disinfection	Wetlands	Outfall	Solids Thickening	Solids Digestion		
Metropolitan Plants														
Mangere	✓	✓	✓	✓		✓	✓	✓			✓	✓	Manukau Harbour	1,001,267
Rosedale	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	Rangitoto Channel	225,000
Army Bay	✓		✓			✓		✓		✓	✓		Whangaparaoa Passage	43,000
Non-metropolitan Plants														
Pukekohe	✓		✓			✓		✓					Waikato River	25,261
Waiuku					✓	✓	✓	✓		✓			Waiuku Estuary	8,572
Beachlands	✓		✓	✓		✓	✓	✓			✓		Hauraki Gulf	5,500
Snells / Algies					✓	✓				✓			Kawau Bay	4,163
Warkworth	✓		✓	✓		✓	✓	✓			✓		Mahurangi River	4,026
Helensville					✓	✓				✓			Kaipara River	3,833
Clarks Beach					✓	✓	✓	✓					Waiuku Estuary	2,741
Wellsford					✓	✓			✓				Hoteo River	1,722
Waiwera					✓	✓				✓			Waiwera Estuary	1,064
Omaha					✓	✓	✓	✓					To forest and Mangatawhiri Spit	747
Kawakawa Bay	✓		✓				✓	✓			✓		Plantation forest	600
Huapai	✓		✓			✓		✓					Kumeu River	451
Matakana			✓						✓				Matakana River	272
Kingseat			✓										Manukau Harbour	180
Denehurst						✓	✓				✓		Local disposal field	50
Owhanake			✓				✓						Hauraki Gulf	30
Bombay			✓										Local disposal field	30
Patumahoe					✓								Now obsolete	0
Total														1,328,509

4.3 Asset Creation Strategies

Asset creation involves the design and construction of new assets which increase the capacity or performance of the system. Asset creation is necessary to accommodate growth or changes in demand or customer expectations.

All capital works are undertaken under a full tendering process. Watercare uses professional services consultants for design and contractors for construction of capital works projects.

4.3.1. Procurement strategy

Watercare is in the process of developing a procurement strategy based around category management of the following nine key categories:

- Construction
- Network Maintenance
- Professional Services
- Mechanical/Engineering
- Property & Facilities Management
- Energy
- Information Technology Hardware
- Chemical
- Machinery & equipment

Category management papers will be produced detailing the strategic approach to procurement for each category and will include recommendations of:

- Centralised or decentralised approach
- Approach to ensure competition/value
- Tender cycles
- Risks
- Market characteristics

As the sole provider of water and wastewater services for Auckland, Watercare has considerable influence on the marketplace. Watercare liaises with Auckland Transport and Auckland Council to ensure procurement strategies and decisions allow for the long term, competitive sustainability of the market.

4.3.2. Major asset creation projects

The major asset creation projects to be constructed over the next ten years, are listed in Table 18. Costs are presented in millions of dollar and expressed in nominal dollar terms.

Table 18: Major Asset Creation Projects

Project Name	Description	Proposed Timing	Estimated Total Cost	Level of Service	Growth
Hunua No.4	Construct a new 35km trunk watermain between the Redoubt North complex and the Khyber Pass Reservoirs in central Auckland.	2012-2030	$339.12	✓	✓
North Harbour Duplication	Duplicate the North Harbour Watermain from a new Titirangi No 3 Reservpor to the Albany Reservoir.	2013-2023	$208.00	✓	✓
Waikato Stage 3 Expansion	Next stage of expansion of the Waikato Water Treatment Plant	2020-2021	$58.20	✓	✓
Southern Supply Main	Construct new watermains to connect areas of the former Franklin District to the Waikato watermain	2011 - 2016	$49.9	✓	✓
Titirangi Reservoir Expansion	Construct a new reservoir, treated water tanks and pump station	2013-2017	$35.8	✓	✓
Central Interceptor Spine	Construct a new interceptor form Western Springs to the Mangere WWTP	2013-2024	$829.7	✓	✓
Rosedale Diversion	Construct a new interceptor to divert flows from NorSGA and KHR to the Rosedale WWTP	2013-2020	$148.19		✓
Bio-Nitrogen Removal	Construct additional biological and nitrogen removal and clarifier capacity at the Mangere WWTP	2013-2018	$116.7		✓
North Shore Trunk Sewer Upgrades - East	Construct additional trunk sewer and storage capacity in the Eastern suburbs of the North Shore	2013-2022	$85.9	✓	✓
North Shore Trunk Sewer Upgrades - West	Construct additional trunk sewer and storage capacity in the Western suburbs of the North Shore	2013-2022	$70.1	✓	✓

4.4 Operational Strategies

4.4.1. Operations and maintenance definitions

Operational activity is the daily operation of the networks to deliver the required service. The main resources used in the operation of the water and wastewater networks are energy (power supply for pump stations and treatment plants) and chemicals (for use in treatment processes). Operational activity also includes routine inspections and monitoring of asset condition to identify the need for maintenance work or replacement.

Maintenance is the on-going work carried out to ensure the reliable performance of the assets. Maintenance is programmed in two ways:

- **Reactive (unplanned) maintenance** is undertaken in response to a customer service request, with response times varying dependent on the severity of the problem and its potential impact. Broken mains or water quality complaints, for instance, will be responded to within an hour, whereas a small leak will be responded to in a longer timeframe. Around 80% of the maintenance work on the local distribution networks is unplanned. Reactive maintenance is usually adopted as a least cost strategy for non-critical assets and where consequences of failure are small.
- **Proactive (planned) maintenance** is work carried out at regular intervals to ensure performance (*fixed time maintenance*) and prevent failure (*condition based maintenance*). This strategy is applied to critical assets where consequences of failure are great.

4.4.2. Operations and maintenance objectives

The operations and maintenance activities are undertaken to contribute to the objectives outlined in Table 19:

Table 19: Operations and Maintenance Objectives

Category	Objective
Water supply treatment plants	• Minimise the risk to the 'A' grade to metropolitan water treatment plants • Manage the maintenance of aging assets • Improve plant operational performance
Wastewater treatment plants	• Reduce maintenance and operating costs • Achieve resource consent compliance
Water supply & wastewater local distribution networks	• Deliver on contractual levels of service by maintaining the integrity of the networks • Safeguard public health and minimise undesirable effects on the environment
Shared services	• Develop efficient maintenance strategies • Effective trade waste management • Consistent compliance management
Maintenance services	• Improve productivity
Energy Management	• Increase generation and efficiency of energy usage • Careful selection of energy provider and lines companies • Use of off-peak power and support government initiatives • Careful use of storage facilities and abstraction models to maximise use of low energy cost facilities

Watercare has a central objective to reduce costs associated with the operation and maintenance of the water and wastewater networks. The following two sections explain the strategies Watercare employs to meet this objective, and how the above objectives impact on the overall cost minimisation objective.

4.4.3. Operating and Maintenance Costs

Water operating costs

In addition to the cost of labour the operating costs of the collection, treatment and distribution systems include:

- Chemicals to treat the raw water at the treatment plants
- Electric power to operate dam aerations systems, water treatment plants and pump stations
- Diesel for dam aeration systems at Upper Huia and Upper Nihotupu dams
- Rights-of-use and resource consent fees
- Inspection and monitoring of all components of the systems

The water operating costs are affected by:

- The volume, quality and pressure of the water required
- Weather (heavy rainfall can cause turbidity requiring increased chemical treatment)
- Seasons (peak demand in summer)
- Algal growth in lakes
- Price of energy
- International pricing of chemicals

- Increasing land rates
- Generation of electricity from the hydro stations

Wastewater operating costs

In addition to the cost of labour the operating costs of the collection, treatment and disposal systems include:

- Electric power and gas to operate pump stations and treatment plants
- Removal of fat, grit and debris from the network
- Electric power to operate pump stations and treatment plants
- Inspection and monitoring of the collection system
- Emergency works such as cleaning after overflows
- Cleaning, flushing of networks to maintain system capacity
- Cleaning of screens and grit disposal at the treatment plants
- Chemicals used in the wastewater treatment processes
- Biosolids disposal

The wastewater operating costs are affected by:

- The quality of the wastewater entering the treatment plants
- Consent requirements for effluent quality
- Weather (stormwater entering the networks increases the total wastewater volume which increases the operating costs at the pump stations and treatment plants)
- Seasons (peak flows in winter)
- Price of energy
- International pricing of chemicals
- Generation of electricity from the biogas engines at Mangere and Rosedale treatment plants

Shared services operating costs

Shared services include asset planning and acquisition, property management, Supervisory Control and Data Acquisition systems (SCADA), accounting, information management, procurement, human resources, business development and trade waste.

The operating costs incurred by the shared services function generally relate to costs of labour, professional services and replacement of electronic equipment and computers which have short asset lives in the order of 10 years. Much of the focus of these services is on developing cost-effective solutions to reliably meet the required standards of service delivery, future growth and the requirements for quality standards and environmental consents.

4.4.4. Operational strategies

The predominant operating costs for both water and wastewater are energy (power and gas) and chemicals. Operational strategies therefore tend to be specifically directed at reducing these costs.

Water supply

The metropolitan water sources are operated conjunctively to overcome the capacity restrictions of individual plants, pipes and pump stations and to achieve:

- **Compliance with resource conditions** – optimising abstraction rates to stay within maximum allowable limits, and carefully controlling compensation flows to satisfy environmental consents
- **Best use of energy** –
  - Pumping during off-peak times
  - Maximising hydro-generation potential at the dams

- Carrying out pump efficiency studies to ensure that pumps operate close to their best efficiency points
- Maximising the use of low energy cost treatment plants where possible
- Power factor correction to avoid penalties
- Management of peak loads to reduce regional coincidental demand

Watercare uses an Integrated Source Management Model (ISMM) to optimise the volume of raw water abstracted, at minimal operating cost, from the metropolitan water sources. The model is run to ensure that Watercare meets demand in a drought with a 1% probability of occurrence, leaving 15% residual capacity in its reservoirs. The model includes known operating constraints.

The non-metropolitan treatment plants are operated under lump sum contracts.

Chemical costs in the treatment of the raw water are minimised, where possible, with the adoption of source isolation practices in preference to chemical dosing.

Watercare undertakes a number of operational programmes ultimately aimed at reducing operating costs, such as leak detection programmes and demand management planning (further discussed in Section 8.2).

Wastewater

Wastewater operating costs tend to be considerably greater than water supply operating costs. Wastewater costs are significantly affected by the entry of stormwater or groundwater into the networks as the increased volumes result in increased pumping, treatment (power and chemicals) and overflow clean-up costs. Chemical use is a significant cost in wastewater treatment. Watercare undertakes process optimisation in order to minimise costs.

Watercare is committed to reducing energy and chemical costs across all plants and wastewater functions by process optimisation and alternative solutions. The largest plant, Mangere, generates on average about 5,000kW of power which is approximately half of its own energy requirements using the biogas from the sludge digestion process. Similarly, the Rosedale plant, which is the second largest, generates up to 72% of its energy requirements in order to run their blowers and disinfection processes in order to comply with resource consent conditions.

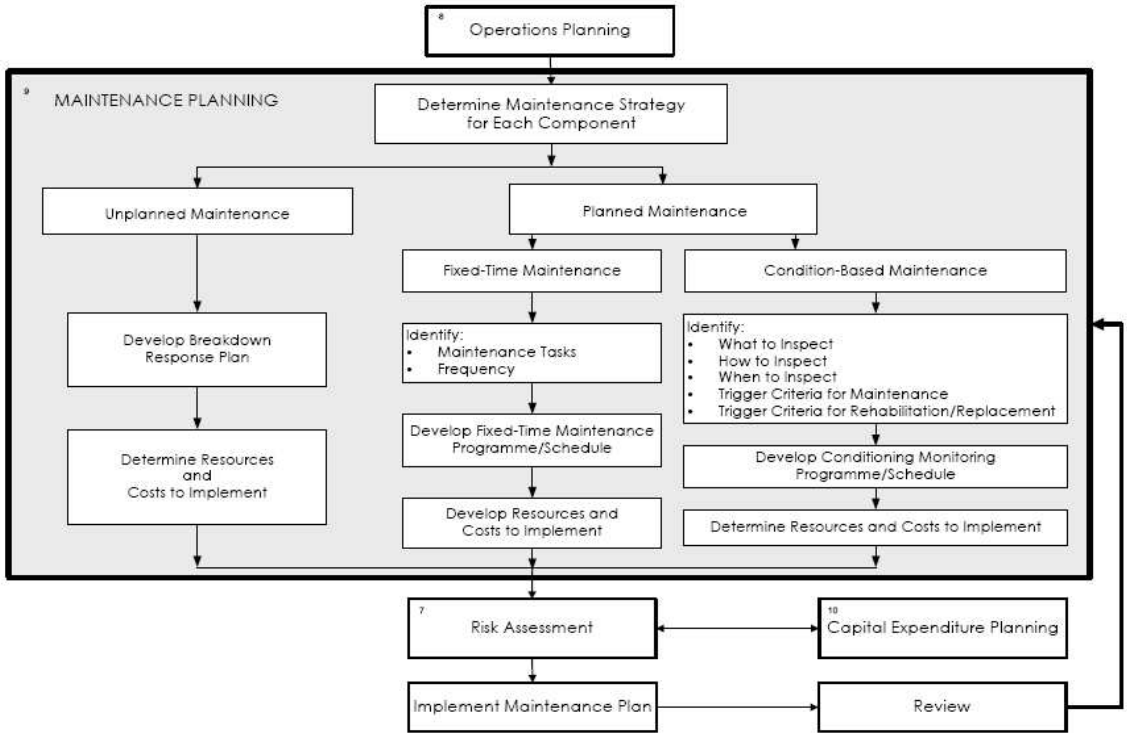
There will be a slight increase in wastewater operating costs over this AMP period associated with bringing the inherited non-metropolitan treatment plants into compliance with their resource consents.

4.4.5. Maintenance strategies

The approach to undertaking planned or unplanned maintenance is illustrated in Figure 31.

Watercare assets with a high criticality and / or has severe consequences if the asset failed are placed on planned maintenance schedules. Non-critical assets with minor consequences, if the asset failed, are repaired or replaced when they fail. This “unplanned” maintenance approach is the least whole-of-life-cost maintenance strategy for non-critical assets. Watercare balances maintenance budgets between planned and unplanned maintenance activities to reduce overall maintenance costs.

Figure 31: Maintenance Planning Approach



Planned maintenance

The metropolitan treatment plants and bulk pipe networks are maintained on a rigorous planned maintenance programme developed using Reliability-Centred Maintenance (RCM), for optimal cost effectiveness. RCM analysis determines the safe minimum level of maintenance that allows the asset to still perform reliably, based largely on past failure patterns.

The non-metropolitan treatment plants are maintained under planned maintenance programmes which include weekly, monthly and quarterly inspections.

Critical assets typically receive more programmed maintenance than less critical assets, depending on the consequence of their failure. Although no consistent region-wide strategy has yet been developed to identify critical water and wastewater assets, the critical assets maintenance regimes continue, where they existed, under the legacy maintenance contracts. For example Watercare undertakes a rolling programme of visual inspection and CCTV condition assessment for all the trunk sewer pipe bridges and similar programmes exist for the distribution networks. Development of the region-wide critical assets strategy will include development and implementation of consistent maintenance practices for critical assets.

A key to the success of this programme will be the development of accurate asset data and management systems for the assets inherited from the legacy councils in order to prepare specific maintenance plans which reflect the consequence of failure.

Unplanned maintenance

The local networks are maintained under service contracts (refer Section 4.4.6) that are based on high volumes of reactive work due to a 'run to failure' philosophy, with minimal planned maintenance (except where required to achieve minimum levels of service).

4.4.6. Service delivery

The local distribution networks are currently operated and maintained under legacy contracts, inherited by Watercare. The types of contract vary from a scheduled-rates basis to more fixed price, performance-based

contracts. The terms vary from three to five years, with rights of renewal for additional terms in some cases. Separate contracts cover more specialised activities such as leak detection, backflow device auditing, water quality sampling, CCTV inspection and telemetry system maintenance.

Operation and maintenance of the bulk networks is undertaken by Watercare staff with contractors only used to carry out specialist work or to provide support in peak workload periods. This has been a deliberate strategy to minimise risk by retaining operating knowledge in-house and retaining direct control over activities where the consequence of failure is can be catastrophic.

4.4.7. Operational activities

Table 20 lists the operational activities for the water and wastewater services, and the associated standards where appropriate.

Table 20: Operational Activities

Asset Group	Operational Activities	Standards and Specifications
Water networks	Leak detection	Minimum night flow analysis
	Water quality monitoring	DWSNZ
	Flushing	As per flushing programmes and Operating Manuals
	Backflow auditing	AS2845.1:2010 Water New Zealand Backflow Group – Backflow Code of Practice for Water Suppliers
Wastewater networks	Overflow monitoring (via telemetry) of pump stations and designated manholes	Resource consent conditions
	Clean-up of overflows	Agreed levels of service
	Trade waste monitoring	Inspections at trade waste customer properties
All treatment plants	Treatment plant operation	TP Operating Manuals (specific to each plant)
Water treatment plants	Water abstraction rates monitored through telemetry	Resource consent conditions
	Water quality monitoring	DWSNZ
	Monitoring of wastewater discharge	Resource consent conditions
	Process monitoring to allow optimisation of processes and cost minimisation	
Wastewater treatment plants	Receiving environment monitoring	Resource consent conditions
	Discharge monitoring	Resource consent conditions
	Process monitoring to allow optimisation of processes and cost minimisation	

4.4.8. Maintenance activities

Table 21 lists the planned and unplanned maintenance activities for the water and wastewater services, and the associated standards where appropriate.

Table 21: Maintenance Activities

Asset Group	Maintenance Activities	Standards and Specifications
Planned Maintenance		
Water networks	Meter testing	Manufacturer's specifications
	Valve and hydrant inspections	Operated to identify maintenance needs
	Pump station and reservoir inspections	Bulk network – RCM based programme logged in AM system Local networks – Routine pump/electrical testing to manufacturer's specifications
	Pipe and structural condition surveys	Planned programmes
Wastewater networks	Sewer cleaning and siphon flushing	Planned programmes
	Pipeline CCTV inspections	Planned programmes
	I & I testing	Flow model calibration Planned programmes for inspections of properties
	Critical asset inspections (pipe bridges, suspended sewers, control valves, outfalls, siphons)	Planned inspection programmes
All pump stations and treatment plants	Planned preventative maintenance programmes	Bulk network – RCM based programme logged in AM system Local networks – Routine inspections/ cleaning
	Pump overhauls and electrical testing	Manufacturer's specifications
	Safety inspections of lifting beams and backflow preventers	Manufacturer's specifications
Unplanned Maintenance		
Water network assets	Repair broken mains/pipes	Reactive maintenance is carried out in accordance with the KPIs set in the maintenance contracts and the legacy councils' engineering design and construction standards
	Repair/replace broken/under-reading meters	
	Repair/replace leaking valves and hydrants	
	Flushing in response to water quality complaints or identified problems	
Wastewater network assets	Repair broken pipes and blockages	
Treatment plants/ reservoirs/ pump stations	Repair plant/equipment failures	Manufacturer's specifications

4.5 Renewal Strategies

4.5.1. Renewal resources

Renewal and rehabilitation works are undertaken, where possible, by in-house staff or the maintenance contractors as appropriate. Specialist contractors are engaged for works requiring technical or specialist skills (such as the upgrading of telemetry systems).

All capital works are undertaken through a full tendering process. Tendering procedures are outlined within the Project Delivery Manual on the Watercare Intranet.

Refer to Section 4.3.1 for procurement strategies.

4.5.2. Renewal decisions

Renewal and replacement decisions are based on asset age, life expectancy, condition and performance. Further projects are also planned based solely on levels of service expectations or risk factors, when necessary.

In 2011 Watercare developed a Networks Asset Replacement Strategy to guide renewal decisions region-wide. It provides tactics and criteria for renewal decisions of reticulation assets based on the following strategies, Figure 32:

Figure 32: Assets Renewal Strategies

Levels of Service	adoption of service levels to address Watercare's strategic priorities
Critical Assets	assets prioritised for proactive management
Informed Decisions	based on data collection and analysis
Asset Management Practices	appropriate measures taken to extend asset lives
Rapid Response	respond quickly when assets fail

Wastewater

Watercare uses condition assessment data with industry-standard life expectancy curves to forecast an asset's likely end-of-life. The end-of-life forecasts are then analysed against asset capacity data from the network models to:

- Identify urgent remedial works (to be carried out by the maintenance contractors or in-house Watercare staff)
- Develop 1-3 year renewal programmes

This analysis has identified that a significant amount of rehabilitation of the wastewater network will be required over the next 20 years as a large proportion of the network enters the third quarter of its forecast life.

Watercare is developing a region-wide wastewater asset renewal strategy. The strategy will provide renewal guidance and consistency to assist renewal decision making. For each asset type it will provide an appropriate renewal approach, such as whether it should be run to failure or renewed pre-emptively, based on:

- Asset criticality
- Flows
- Life expectancy
- Condition
- Ease of replacement
- Equipment support based on product lifecycle

Water Supply

Several approaches were historically used to develop short-term renewal programmes and long-term renewal forecasts. These included:

- Analysis of repeat failures to prioritise individual projects based on maximising reduction in property shut-downs per dollar invested
- Pipe renewal policies to ensure that connected properties suffer no more than three shut-downs per year
- Deterioration modelling to project the end of asset life in conjunction with economic analysis to identify the trade-off between cost of asset maintenance and asset renewal

Section 8.2.4 summarises Watercare's programmes to inspect and assess the condition of the water and wastewater assets.

4.5.3. Major planned renewal projects

The major renewal projects to be undertaken over the next ten years are listed in Table 22. Costs are presented in millions of dollar and expressed in nominal dollar terms.

Table 22: Major Renewal Projects

Project Name	Description	Estimated Total Cost	Proposed Timing	Rational for Project Timing
Network controls upgrade	Upgrade data acquisition and transmission from remote sites	$18.0	2011-2015	Based on expected obsolescence of installed equipment and failing support
Local network rehabilitation, replacement and improvement	Works within the local network, including pump stations and reservoirs	$209.7	2012-2022	Replace assets at the end of economic life, planned and unplanned maintenance.
Huia No 1 and No 2	Replace the Huia No.1 watermain with an upsized watermain on a slightly different alignment, whilst keeping the existing watermain in service to minimise disruption	$36.8	2012-2021	Increase the size of the watermain to meet Levels of Service and to replace an asset at the end of its economic life.
Huia Treatment Plant Upgrade	Replacement of the Huia Water Treatment Plant with new structures and new treatment process	$242.21	2012-202	The Huia WTP production is limited by the existing sludge thickening system and there are issue with the ability of the plant to treat the deteriorating raw water to the required standard
Provision for rehabilitation for Water Treatment Plants	Works within the water treatment plants to ensure asset performance and operational efficiency.	$22.9	2012-2022	Replaces assets at the end of economic life.
Waitakere Treatment Plant Upgrade	Replacement of the filters and chemical systems at the Waitakere Water Treatment Plant	$31.6	2014-2016	Improves operational efficiency, water quality and compliance
Central Interceptor Spine	Construct a new interceptor from Western Springs to the Mangere WWTP	$829.7	2013-2024	Replaces the Hillsborough Tunnel and Manukau Siphon that are reaching the end of their economic lives
Local Sewer Planned Replacements	Replacement or rehabilitation of local network manholes and pipes.	$31.5	2013-2022	Replaces or rehabilitates assets at the end of economic life.
Trunk Sewer Planned Replacement (Mangere)	Replacement or rehabilitation of trunk network manholes and pipes that convey flows to the Mangere Wastewater Treatment Plant.	$32.0	2013-2022	Replaces or rehabilitates assets at the end of economic life.
Trunk Rising Main Replacement (Mangere)	Replacement of trunk sewer rising mains that convey flows to the Mangere Wastewater Treatment Plant.	$20.6	2013-2022	Replaces or rehabilitates assets at the end of economic life.
Replacement of Existing Screening Equipment	Replacement of the existing screening equipment at the Mangere Wastewater Treatment Plant.	$18.5	2013-2022	Replaces or rehabilitates assets at the end of economic life.

4.6 Disposal Strategies

Disposal is the retirement or sale of assets that have become surplus, or have been superseded by new or improved systems. As part of the whole lifecycle management of assets, Watercare incorporates the costs of asset disposal into the capital cost of asset creation works or asset renewals.

Typically an asset is identified for retirement by operations or planning staff. The planning team then assess whether it should be decommissioned and removed/demolished or taken out of service but kept in situ for potential future use. The decommissioning and removal of major assets is programmed in the AMP and the works are tendered if necessary or undertaken by operations staff. Assets taken out of service (but not removed) are regularly inspected by operations staff and their potential use is reviewed.

Watercare has a programme of works to investigate abandoned assets to ensure that they remain safe and secure, that they do not pose a risk to the public, and to identify works to make assets safe for the long term.

Disposal strategies, processes and procedures are documented in the Asset Retirement section of the Project Delivery Manual which is published on the Watercare Intranet.

Furthermore, Watercare's SCI states that the company will consult with the shareholder prior to the disposal of any part of its undertakings, which, in any one year, exceed the aggregate 5% of the current book value of its assets. From 1 July 2012 the process for disposal of assets will be affected by the Accountability Policy for Council-Controlled Organisations.

5 INFRASTRUCTURE SUSTAINABILITY

5.1 Overview

Sustainable development means that the decisions and actions of an entity effectively balance the needs of present and future customers. Consideration of the interrelated components of environmental, economic, social and cultural well-being is essential for us to take a sustainable development approach. From an asset management perspective, sustainability is critical, as many assets have a long lifespan and the asset itself and any externalities must be 'future-proofed' in order to meet the needs and expectations of future generations.

In general terms, a sustainable water supply and wastewater system or process must:

- Not exceed its limits (it must be based upon a resource that will not be exhausted)
- Understand interconnections between economy, society, people and environment
- Focus on the equitable distribution of resources and opportunities
- Not generate unacceptable waste
- Not cause pollution

Watercare is committed to sustainability across its organisation through the asset management planning process, by aligning strategic goals to sustainability and building sustainability concepts into operational processes.

In pursuing sustainability goals, Watercare needs to develop sustainability strategies that best suit the organisation and the community, and that achieve balance within the wider expectations of Auckland Council and the Auckland community.

Watercare is developing a project prioritisation model (discussed in Section 8.2.5) based on multi-criteria decision analysis. The criteria agreed upon for the model all contribute to a sustainability outcome. This model, although not developed in time for use in this AMP, will be implemented in future to rank all capital works projects and allow projects to be prioritised on a sustainability basis.

In the interim, Watercare will continue to apply the Project Objective Ranking criteria developed in 2010, See Figure 35.

The importance of including sustainability planning within asset management planning is that Watercare will ensure, over the long term, that its infrastructure services facilitate the achievement of community wellbeings.

5.2 Community Wellbeings

The four wellbeings of the community are social, cultural, environmental and economic.

Social Wellbeing

The provision of water supply and wastewater services has a direct social impact on the community, especially in terms of:

- Health and safety (maintaining public health)
- Education and awareness
- Leadership – demonstrating a transparent organisation, consulting and engaging with the community

Watercare further contributes to the social wellbeing of the community through the provision of the Coastal Walkways around the Manukau Harbour and the Exhibition Drive walkway and Rainforest Express in the Waitakere Ranges.

Cultural Wellbeing

Section 2.7 Community Engagement discusses Watercare's approach to engagement with tangata whenua to ensure Te Ao Māori is valued in decision-making to enhance the cultural wellbeing of the community. For example, the water and wastewater activity has direct impact on Te Ao Māori and Watercare recognises the Kaitiakitanga responsibilities of tangata whenua. Of specific concern is the disposal of wastewater effluent to water. Land disposal is the preferred option; however this is not always possible. The Kawakawa Bay and Omaha schemes both successfully discharge effluent to land, and floating wetlands at the Helensville treatment plant have proved successful as a culturally acceptable compromise.

Environmental Wellbeing

Watercare has a responsibility to protect the environment from any negative impacts that could result from operational or development activities. To minimise the impact on the environment, the development and operation of the water and wastewater services is managed as follows:

- Minimising the impact of operations and discharges to the receiving environment,
- Adhering to legislative requirements, including statutory plans (Resource Management Act)
- Designing new works to be efficient in terms of footprint (inputs) and waste production (outputs)

Economic Wellbeing

Watercare aims to provide high quality services to enable the prosperous growth of the business community. This is achieved through asset management planning methodologies which address the following criteria:

- Growth
- Demand
- Life cycle
- Levels of service
- Risk management

A key outcome of this asset management plan is that targets in each of these areas are developed and monitored. Key issues relating to each of these factors are discussed in the relevant sections of this document.

Table 23 outlines the main issues facing the four wellbeings and provides initiatives and targets which are included in the levels of service.

Table 23: Issues, Initiatives and Targets to Achieving the Four Wellbeings

Key issues currently facing Watercare to achieve wellbeing outcomes	**Initiatives** in place to address these issues	**Targets** * Levels of Service Target	**Wellbeings**			
			Social	Cultural	Environme	Economic
Providing the same standard of high quality water to all connected communities	Upgrading of non-metropolitan treatment plants or connection of non-metropolitan supplies to the metropolitan scheme to improve water quality and availability	Achieve Aa grading at 50% of the non-metropolitan water supplies by 2015 and 100% by 2020*	✓	✓		✓
Servicing growth	Working with Auckland Council to define location, sequencing and timing for staged, cost-effective infrastructure development	Alignment of Watercare growth improvements with the Spatial Plan	✓	✓	✓	✓
Wastewater overflows	Trialling of screens on overflow structures to remove solid material from wastewater discharges	Reduction in wet weather overflows. ≤ 15 dry weather overflows per 100 km of wastewater pipe lengths each year*	✓	✓	✓	
	I & I reduction programmes					
Sustainable disposal of biosolids	Establishment of a region-wide Biosolids Strategy	Region-wide sustainable disposal of biosolids	✓	✓	✓	✓
	Disposal of biosolids from the Mangere treatment plant on Puketutu Island	Minimise lifecycle costs and contribute to the rehabilitation of a quarry site into a usable landform	✓	✓	✓	✓
Quality of wastewater effluent discharges from treatment plants	Upgrades of non-metropolitan treatment plant	65% of non-metropolitan plants compliant with wastewater treatment plant discharge consents by 2015; 100% by 2020*		✓	✓	
	Environmental monitoring and sampling programmes					
	Investigation of potential land areas for disposal of effluent for irrigation					
Finding workable solutions that incorporate the principles of Te Ao Māori	Wetland treatment or land disposal of wastewater effluent	Investigate further land for effluent disposal		✓	✓	
Greenhouse gas emissions from treatment plants and pump station power consumption	I & I reduction programmes	Reduction in power consumption and associated costs. Target: Water 0.2 kwh/m^3 Wastewater 0.7 kwh/m^3			✓	✓
	Energy and Control Systems (ECS) continually seeks ways to reduce energy costs					
	Leak detection programmes	Reduction in gross per capita consumption to a sustainable level, 255 L per capita by 2025*				
	Water demand management					
Operating costs	Hydro power generation at dams for WTPs operation	Reduction in operating costs			✓	✓
	Use of biogas for power generation at WWTPs and implementation of software to maximise generation revenue					
	Reuse of treated effluent at WWTPs for engine cooling and primary tanks sprays					

Key issues currently facing Watercare to achieve wellbeing outcomes	**Initiatives** in place to address these issues	**Targets** * Levels of Service Target	**Wellbeings**			
			Social	Cultural	Environme	Economic
	Management of power factor, peak demand and maximisation of off-peak power usage					

6 ASSET VALUE MANAGEMENT

6.1 Overview

This section:

- outlines the strategies for ensuring that Watercare gets maximum value for money from its investment in assets
- describes how Watercare's current business as usual processes ensure value for money
- describes how transition from the legacy councils to the new Watercare structure and recent initiatives have given rise to identified efficiency gains
- identifies specific future opportunities and strategies for improving value for money

Standards New Zealand define Value Management as a structured and analytical process that seeks to achieve value for money by providing all the necessary functions at the lowest total cost consistent with the required levels of quality and performance (NZS 4183:1994). While Watercare is yet to develop a formal Value Management approach, the key concepts from that standard already form part of its business as usual processes.

Watercare benefits from applying Value Management principles by identifying opportunities for improvement, encouraging optimum use of resources and the development of innovative ideas. There is a strong focus on carefully defining what Watercare is trying to achieve and then considering alternative solutions. Value Management is not about finding "cheap" solutions; rather it is about finding innovative, sustainable solutions that enable us to deliver more outputs for the same or less inputs.

At a corporate level, Watercare has adopted a number of processes that align with Value Management principles. Key examples are set out in Table 24.

6.2 Opportunities Identified

The integration of the Auckland councils has provided considerable opportunity for efficiency gains within the delivery of the water and wastewater services, which has been directly translated into price reductions for customers with the introduction of a standardised metropolitan water tariff from 1 July 2011.

This AMP makes provision for the upgrade of non-compliant rural treatment plants (both water and wastewater). This will allow all the connected communities of Auckland to receive the same minimum service standard, a target which was not achievable before integration.

Watercare as the integrated water supply company for Auckland is now able to explore further opportunities for value management on a region-wide basis through:

- Integrated planning of major infrastructure projects – where previously joint planning was necessary between the planning departments of Watercare and the former councils, this is now all undertaken within the Watercare planning team
- Integrated planning across all COs, CCOs and Council departments
- Implementation of asset management systems – Watercare is currently in the process of implementing SAP as the integrated asset management and finance system to replace obsolete systems
- Rationalised use of information systems
- The standardisation of business processes across the region
- Process innovation
- The implementation of Reliability Centred Maintenance practices across the region
- Development of prioritised regional renewal programme
- A regional approach to Public Health Risk Management Plans (PHRMPs) – this will allow a direct comparison of risks and risk levels between schemes and networks to develop a standardised prioritisation of actions to avoid or mitigate public health risks

Table 24: Value Management Processes

Corporate process	Description
Project Prioritisation Framework	Watercare is developing a project prioritisation model to prioritise the more than 600 water and wastewater projects across the Auckland region (refer Section 8.2.5.).
Project Management Framework	The Project Delivery Manual (PDM) has been developed to ensure Watercare projects are managed in a way that maximises customer value from investment (refer Section 4.1).
Procurement Strategy	Watercare is developing an integrated corporate strategy for procurement (refer Section 4.3.1)
Project Improve	Project Improve is a framework Watercare has developed for the management of improvement projects and an ideas scheme to encourage staff to initiate ideas for improvement, with the main objectives being to deliver cost savings and promote a strong improvement culture within Watercare.
Maintenance Optimisation Design	This project reviewed maintenance methodologies and selected and implemented Reliability Centred Maintenance (RCM) as the appropriate methodology for Watercare to achieve task optimisation and cost improvement (refer Section 4.4.5). It has also, to date, developed a standard work order system across the company and implemented management control and reporting systems that drive maintenance optimisation.
Energy Focus	This project was established to identify ways Watercare could use energy more efficiently and areas where energy generation could be increased. To date this project has: • Established an Energy Management System • Implemented an energy conservation education programme across Watercare • Negotiated carbon credits for Watercare's hydro schemes • Increased gas and co-generation capabilities • Commissioned additional hydro schemes under Central Government's "projects to reduce emissions" and negotiated abatement targets in exchange for carbon credits Resultant energy cost reductions are estimated in excess of $3M per annum. (refer Section 4.4) Initiatives under consideration are: • Control changes to maximise off-peak production • Biogas storage to improve engine operation and ability to generate during peak demand • Support of national initiatives such as the North Island Voltage Support, automated load interruption • Control changes to make sure pumps operate "on-curve" • Change existing lighting systems to modern LED technology
Zero Waste	The objective of this project is to minimise or eliminate waste throughout Watercare and the following initiatives have been implemented to date: • Recycling schemes • Reduction in paper use • Reduction in amount of rubbish sent to landfill • Worm farms
Continuous Improvement	The Continuous Improvement programme is broader than cost reduction, it also covers: • Health & Safety improvements • Productivity gains • Customer service improvements • Operational excellence • Standardisation and streamlining of business processes A Continuous Improvement database, and an improvement capture and management

Corporate process	Description
	process have been established and a recognition scheme has been implemented.

- A regional approach to hydraulic and catchments modelling – this will provide more accurate scenarios of capacity improvements and configuration options for improved planning of capital works
- Region-wide flow / pressure monitoring and management – integrated understanding of the networks allows for optimised operational efficiencies
- Region-wide water source management – which allows for region-wide water demand management
- Region-wide demand analysis
- Energy management opportunities
- Rationalise regional levels of service

7 FINANCIAL SUMMARY

7.1 Overview

7.1.1. Revenue and financing policy

Following the amalgamation of Auckland's local government on 1 November 2010, Watercare has been the integrated provider of water and wastewater services to Auckland. Integration has generated a variety of challenges for Watercare including the need to address: asset quality issues; reprioritised asset management planning; customer service; unified pricing; and data integrity. These challenges add uncertainty to Watercare's forward financial projections and asset management plans. As a consequence, development of Watercare's Revenue and Financing Policy needs to be carefully progressed over the next few years during which time a better understanding of all assets inherited will be determined, thereby generating a corresponding increase in certainty as to future funding needs.

7.1.2. Revenue and financing policy guidelines

The Strategy and Finance Committee of the Auckland Council have endorsed the following principles as the basis for its Revenue and Financing Policy.

Paying for Benefits Received

In general, if a service mainly benefits a particular person or group, then that person or group should contribute to the cost of the service.

Intergenerational Equity

The spread of benefits over time from an item of expenditure should be reflected in a spread of cost to users over time.

Paying for Costs Imposed

As far as practicable, cost should be recovered from the people who have caused the cost to be incurred i.e. Causer pays.

Transparency and Accountability

Where the principles of paying for benefits and paying for costs suggest that a particular person or group should contribute towards the cost of a service, then that service should be funded separately from other services, if it is practicable to do so.

Financial Prudence and Sustainability

Revenue, expenditure, assets, liabilities, investments and general financial dealings should be managed in a prudent and sustainable manner.

Optimal Capital Usage

Limited financial resources should be used in such a way as to maximise the benefits provided to the community, while minimising the burden on Aucklanders. Among other things, this principle influences decisions on the best mix of funding (between revenue sources and borrowings) for assets and services.

Efficiency and Effectiveness

Revenue and financing policies should have regard to the costs of carrying them out, and how effective they will be in achieving their objectives.

Affordability

In addition to other guiding principles, revenue and financing policies need to reflect consideration of people's ability to pay and the desire to provide broad access for people to fundamental services.

Overall Social, Economic, Environmental and Cultural Impacts

Revenue decisions should take into account the impact of the decision on the current and future social, economic, environmental and cultural well-being of the community.

Minimise the Effects of Change

The integration/harmonisation of the revenue and financing policies of previous councils and council organisations may lead to incidences of major change in price for services. Revenue and financing policy should seek to minimise or manage the impact of these changes.

7.1.3. Funding operational expenditure

Watercare ensures its projected operating revenue is sufficient to cover the cost of regular, ongoing operating activities. A range of fees and charges are used to fund operating expenditure.

7.1.4. Funding capital expenditure

Watercare considers both borrowings and fees and charges to be appropriate for its capital expenditure depending on the nature of that capital expenditure.

The principle of intergenerational equity suggests that assets with a long life span (the majority of Watercare assets) should initially be funded by borrowings. In that way, repayments are spread over a longer period, instead of users paying for the entire cost of an asset in the year that it is acquired/built. This general principle, however, needs to be balanced by consideration of the nature of the capital expenditure and other relevant funding principles.

Growth Related Capital Expenditure

Borrowings are appropriate when the new growth asset has a long life and will provide a benefit over a long period. By financing over a long period, current and future users both pay for the benefit they receive.

Borrowings are also appropriate when there is a timing difference between when expenditure is incurred on an asset and when income is received from it.

Long-life Service Improvement Related Capital Expenditure

Borrowings are appropriate when the service improvement asset has a long life and will provide a benefit over a long period. By financing over a long period, current and future users both pay for the benefit they receive.

Borrowings are also appropriate when there is a timing difference between when expenditure is incurred on an asset and when income is received from it.

Renewal Capital Expenditure

Watercare has an ongoing obligation to maintain the long term integrity of its assets and as a result an annual requirement to fund a substantial level of renewal capital expenditure. Since this annual programme of work is required to replace ageing infrastructure rather than add service capacity or cater for new growth, it is appropriate that fees and charges to current users fund this capital expenditure.

Short Life Service Improvement Related Capital Expenditure

Watercare has an ongoing programme of capital expenditure that relates to short life service improvements, e.g. IS capital expenditure. It is appropriate that fees and charges to current users fund this capital expenditure.

7.1.5. Funding interest and principal repayments on borrowings raised to fund capital expenditure.

Fees and charges are appropriate to fund the ongoing servicing cost and repayment of borrowings raised to fund growth and service improvement capital expenditure. This is consistent with both intergenerational equity and financial prudence and sustainability principles.

In particular Infrastructure Growth Charges (IGC's) are appropriate to fund a share of the ongoing servicing cost and repayment of borrowings raised to fund growth related capital expenditure as an application of causer pays. If a capital expenditure project provides capacity to cater for future population growth, it is appropriate to use IGC's to fund some of the project's costs. The IGC policy should take into account a number of considerations including benefits and causes to ensure developers and new residents contribute fairly to these costs. It should also recognize that there is a wider public good provided by growth related capital expenditure. As a result, a portion of the ongoing servicing cost and repayment of borrowings in respect of growth related capital expenditure will be met via user fees and charges and a portion by IGCs.

7.1.6. Financial strategy

Watercare's Revenue and Financing Policy is being developed in the context of a prudent Financial Strategy that ensures the long term viability and integrity of Watercare. This will be achieved by maintaining appropriate thresholds in the following key areas which impact the level of future expenditures able to be funded via fees and charges and borrowings.

Funds from Operations to Interest Cover ratio (FFO Ratio)

The FFO ratio measures Watercare's ability to generate sufficient cash from which debt is serviced. Watercare's SCI requires the organisation to maintain a minimum FFO ratio of 2.5 times. This is higher that the minimum stipulated in the Auckland Council guarantee of 2.0 times, but allows Watercare a small buffer to cover unexpected increases in costs or interest expense or reduction in revenue. If the ratio of 2.0 times is not able to be met, the guarantee will not be available, it will be difficult to borrow, the interest rate will be higher and prices will need to be higher to cover the increased interest cost. Watercare's forward pricing and revenue projections need to achieve a minimum FFO ratio of 2.5 times. Watercare's 2011/12 budgeted FFO ratio is 2.95.

Debt

In any particular period Watercare will be raising debt to fund a level of new capital expenditure in accordance with its Revenue and Financing Policy and will be generating fees and charges to repay prior period debt. In practice however these two cash flows will be netted and managed in accordance with Watercare's Treasury Management Policy. Given the long life of Watercare's debt funded assets, fees and charges projections should achieve a level of FFO sufficient to repay debt within the life period of the asset for which the debt was raised.

Gearing

A company's gearing is the relationship between its levels of debt and equity. Increased gearing will normally predicate reduced financial flexibility and the need for increasing levels of price increases in order to maintain the FFO ratio. Watercare's 2011/12 budgeted average debt is $1.266b and average net equity (after allowing for the June 2011 revaluation of assets) is $5.72b. Watercare's 2011/12 budgeted ratio of Debt to Debt plus Equity is therefore 18.1%. Watercare's forward debt projections should reflect a prudent ratio of Debt to Debt plus Equity.

7.1.7. Financial implications of the Asset Management Plan

The Asset Management Plan includes substantial real increases in capital expenditure over the next ten years, particularly with the inclusion of the Central Interceptor project. Almost 50% of the capital expenditure is growth based which will result in Infrastructure Growth Charges needing to increase

materially over the period of the plan, both in unit rate terms and also as a percentage of Watercare revenue.

7.2 Asset Values

Table 25 provides a summary of the value of existing assets and the associated annual depreciation *for each asset group.*

Table 25: Estimated Value of Infrastructure Assets (30 June 2011)

Asset Group	Fair Value ($ millions)	Annual Depreciation ($ millions)
Buildings (Operations)	82.6	2.7
Water - Wholesale	1,222.4	29.7
Water - Retail	1,702.9	38.1
Wastewater – Wholesale	910.3	33.0
Wastewater - Retail	3,261.6	53.4
TOTAL	7,179.8	156.9

Watercare's valuation of water and wastewater infrastructure assets was based on depreciated replacement cost in accordance with generally accepted accounting standards (NZIAS 16) and in accordance with the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines Manual Edition 1.0, 2006 (NZIAV). Depreciation was calculated on a straight-line basis over the assets useful life.

7.3 Capital Expenditure Summary

Watercare's capital expenditure forecasts for the period 1 July 2012 to 30 June 2022 are presented in real dollars (excluding inflation and capitalised interest) and nominal dollars (including inflation) in Table 26 : Capital Expenditure Forecast 1 July 2012 to 30 June 2022 ($ millions, excluding capitalised interest) Table 26.

The forecast capital expenditure for the 10-year period (excluding capitalised interest) is $3.7 billion in real terms and $4.8 billion in nominal terms.

About 42% of the forecast expenditure can be attributed to meeting the requirements for growth.

Over the 10-year period, the investment in water and wastewater (in nominal terms) are at similar levels of $2.27 billion and $2.44 billion respectively. However, the investment mix between the two business areas, on an annual basis during the 10-year period, is variable.

There is also forecast capital expenditure of $0.15 billion associated with shared services.

Figure 33 and Figure 34 shows the location of proposed water and wastewater capital projects over the 10 year horizon of this AMP.

Figure 33: Location of Proposed Water Capital Projects in the Next 10 Years

Capital expenditure is split by activity; water, wastewater and shared services, such as infrastructure planning, project delivery, customer services, property, finance, procurement, information systems, human resources, statutory planning, risk management, communications and internal audit. Shared service projects are projects that contribute to both water and wastewater activities. For each activity capital expenditure is split into growth, renewal and level of service.

This AMP reports capital investment forecasts for programmes of work related to the business areas of the company: water, wastewater and shared services. The programmes of work are broadly categorised into:

Expansion (Growth)
Replacement and Rehabilitation (Renewal)
Improvement (Level of Service)

It is important to recognise that most projects can have costs that may be ascribed to more than one of these categories. The allocation of costs to each of these categories is based on the understanding of the project objectives, the project concept design and cost estimates.

Cost of Growth

The cost attributed to that portion of the planned (or completed) capital projects providing capacity in excess of existing community demand at current agreed levels of service.

Cost of Renewal

The cost attributed to the replacement of an existing asset, with a modern equivalent asset to the same function and capacity, at the end of its life.

Cost of Level of Service Improvement

The cost attributed to that portion of planned (or completed) capital projects that are required to rectify a shortfall in service capacity to meet existing community demand at the current agreed levels of service and cost to enhance levels of service or efficiencies to above current applicable levels.

7.4 Operational Expenditure Summary

Watercare's operational expenditure forecast for the period 1 July 2012 to 30 June 2022 is presented in real dollars (excluding inflation) and nominal dollars (including inflation) in Table 27.

Operational expenditure (excluding depreciation and interest) is split by activity; water, wastewater and shared services. Shared service expenditure contributes to both water and wastewater activities. For each activity capital expenditure is split into labour, maintenance and asset operating costs.

The total forecast operational expenditure for the 10-year period (excluding depreciation and interest) is $2.06 billion in real terms and $2.47 billion in nominal terms.

Labour costs make up 20% of the total operational costs while maintenance contributes to 22%. The remaining 58% is attributable to other asset operating costs (including energy and chemicals).

Over the 10-year period, the operational expenditure in water and wastewater (in nominal terms) are $634 million and $925 million respectively. The mix between the two business areas, on an annual basis during the 10-year period, is consistent.

There is also forecast operational expenditure of $910 million associated with shared services. Operational expenditure forecasts have been based on indexation (for inflation and increased demand) of the 2011/12 operational expenditure budget. They do not include consequential expenditure arising from operations and maintenance of new assets, cyclical maintenance costs, or increased maintenance costs due to deferral of capital projects. Consequential costs of any new infrastructure and cyclical maintenance

costs are factored into the budget, for the year in which the assets are commissioned or when cyclical maintenance is due, when the annual budget is prepared.

7.5 Financial Assumptions, Risks and Issues

Key financial assumptions are as follows:

- Inflation – In line with BERL August 2011 forecasts of price level change adjustors
- Growth – Auckland Council's medium population growth forecast
- Revenue – Prices maintained at minimum levels consistent with the effective conduct of Watercare's total business and the maintenance of the long term integrity of its assets. Pricing is considered on a consolidated basis given that the vast majority of customers receive both water and wastewater services. Pricing of water and wastewater is generally around inflation levels with a more material increase in 2017/18. IGC increases are expected to be substantially above inflation to assist in funding an increasing share of growth based capital expenditure.
- Operating Expenditure – Increases are in line with inflation and demand growth.

The key financial issue is the funding of growth and the need to monitor growth and adjust forward capital expenditure plans accordingly. If growth based capital expenditure gets too far ahead of population growth and growth in number of dwellings then IGC revenue shortfalls may need to be offset by fees and charges to users.

The information presented in this Asset Management Plan is the most accurate available at this time. Projections will be fine tuned over time, however as better information on existing assets is determined and more accurate projections of future needs become available.

7.6 Financial Sustainability

Rationale for the mix of funding sources used to support this Asset Management Plan is covered in Section 7.1.

The funding mix is considered sustainable within the parameters of the financial strategy (refer Section 7.1.6).

Figure 34: Location of Proposed Wastewater Capital Projects in the Next 10 Years

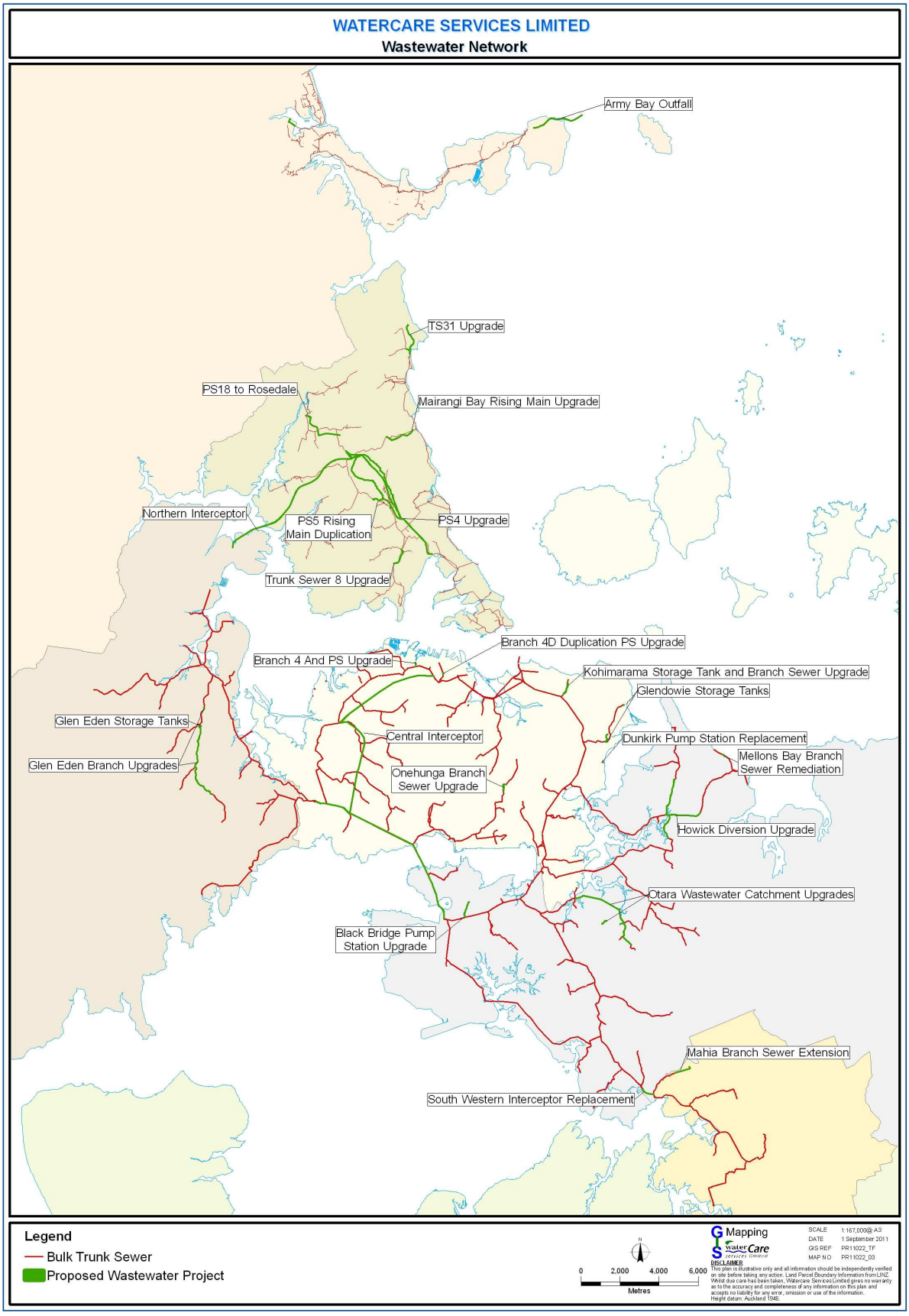


Table 26 : Capital Expenditure Forecast 1 July 2012 to 30 June 2022 ($ millions, excluding capitalised interest)

	2011/12 Dollars	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	10-Year Total
Water	Growth	78.04	82.54	64.09	73.07	69.64	65.14	70.98	70.48	60.83	78.03	712.84
	Renewal	40.22	39.29	37.94	60.21	76.86	78.08	72.26	62.51	72.34	72.50	612.20
	Level of Service	46.17	68.46	54.34	49.29	42.56	40.08	38.35	39.27	31.82	32.63	442.97
	Sub-total Water	**164.44**	**190.29**	**156.37**	**182.57**	**189.05**	**183.31**	**181.58**	**172.26**	**164.99**	**183.16**	**1,768.02**
Wastewaster	Growth	41.34	45.07	54.88	53.27	106.32	91.95	115.47	106.90	100.78	111.81	827.80
	Renewal	39.40	29.77	28.99	21.93	36.59	50.06	60.44	68.78	74.70	78.42	489.07
	Level of Service	27.22	32.04	46.43	24.08	28.77	34.10	48.98	75.26	85.67	95.45	498.01
	Sub-total Wastewater	**107.96**	**106.88**	**130.29**	**99.28**	**171.69**	**176.11**	**224.89**	**250.94**	**261.15**	**285.68**	**1,814.88**
Shared Services	Growth	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.61
	Renewal	3.43	3.29	3.40	0.72	1.03	0.76	0.83	3.24	3.14	3.20	23.03
	Level of Service	13.88	10.83	9.51	7.94	7.08	4.86	5.46	7.66	15.53	12.33	95.09
	Sub-total Shared Services	**17.37**	**14.18**	**12.97**	**8.73**	**8.17**	**5.68**	**6.35**	**10.96**	**18.73**	**15.58**	**118.72**
Total Watercare	Growth	119.44	127.67	119.03	126.41	176.02	157.16	186.51	177.44	161.67	189.90	1,541.25
	Renewal	83.05	72.34	70.33	82.86	114.48	128.90	133.52	134.52	150.18	154.12	1,124.30
	Level of Service	87.28	111.34	110.28	81.31	78.41	79.04	92.79	122.19	133.02	140.41	1,036.07
	TOTAL	**289.77**	**311.35**	**299.64**	**290.58**	**368.91**	**365.09**	**412.82**	**434.15**	**444.87**	**484.43**	**3,701.62**

	Nominal Dollars	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	10-Year Total
Water	Growth	82.10	90.65	72.99	86.39	85.79	83.86	95.75	100.02	91.08	123.14	911.78
	Renewal	42.32	43.15	43.21	71.18	94.68	100.51	97.48	88.71	108.31	114.42	803.97
	Level of Service	48.57	75.19	61.89	58.27	52.43	51.60	51.73	55.74	47.64	51.49	554.55
	Sub-total Water	**172.99**	**208.99**	**178.09**	**215.83**	**232.89**	**235.97**	**244.97**	**244.47**	**247.03**	**289.05**	**2,270.30**
Wastewaster	Growth	43.49	49.50	62.50	62.98	130.98	118.37	155.78	151.71	150.90	176.45	1,102.66
	Renewal	41.45	32.69	33.01	25.92	45.08	64.44	81.53	97.61	111.85	123.76	657.35
	Level of Service	28.79	35.35	53.04	28.63	35.62	44.07	66.26	106.99	128.47	150.83	678.05
	Sub-total Wastewater	**113.72**	**117.54**	**148.55**	**117.54**	**211.67**	**226.88**	**303.58**	**356.32**	**391.22**	**451.04**	**2,438.07**
Shared Services	Growth	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.78
	Renewal	3.60	3.61	3.87	0.85	1.27	0.98	1.12	4.59	4.70	5.04	29.64
	Level of Service	14.60	11.90	10.84	9.39	8.72	6.25	7.36	10.87	23.26	19.46	122.65
	Sub-total Shared Services	**18.27**	**15.58**	**14.78**	**10.32**	**10.07**	**7.31**	**8.56**	**15.55**	**28.04**	**24.59**	**153.07**
Total Watercare	Growth	125.66	140.22	135.56	149.44	216.84	202.31	251.62	251.82	242.07	299.68	2,015.21
	Renewal	87.37	79.45	80.10	97.95	141.03	165.93	180.14	190.92	224.86	243.22	1,490.96
	Level of Service	91.96	122.44	125.76	96.29	96.76	101.92	125.36	173.60	199.37	221.79	1,355.26
	TOTAL	**304.99**	**342.11**	**341.42**	**343.69**	**454.63**	**470.16**	**557.12**	**616.34**	**666.30**	**764.68**	**4,861.44**

Table 27 : Operational Expenditure 1 July 2012 to 30 June 2022 ($ millions, excluding depreciation and interest)

	2011/12 Dollars	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	10-Year Total
Water	Labour	4.3	4.3	4.3	4.3	4.4	4.4	4.4	4.5	4.5	4.5	43.87
	Maintenance	19.9	19.9	20.1	20.2	20.4	20.5	20.6	20.8	20.9	21.0	204.23
	Asset Operating Costs	27.4	27.5	27.7	27.9	28.2	28.3	28.5	28.7	28.9	29.0	282.10
	Sub-total Water	**51.56**	**51.59**	**52.07**	**52.50**	**52.92**	**53.26**	**53.60**	**53.93**	**54.24**	**54.55**	**530.20**
Wastewater	Labour	9.2	9.2	9.2	9.3	9.4	9.5	9.5	9.6	9.6	9.7	94.13
	Maintenance	24.4	24.4	24.6	24.8	25.0	25.2	25.3	25.5	25.6	25.8	250.42
	Asset Operating Costs	41.7	41.7	42.1	42.4	42.8	43.0	43.3	43.6	43.8	44.1	428.48
	Sub-total Wastewater	**75.17**	**75.22**	**75.92**	**76.54**	**77.15**	**77.66**	**78.15**	**78.63**	**79.07**	**79.53**	**773.03**
Shared Services	Labour	25.6	25.6	25.8	26.0	26.2	26.4	26.6	26.7	26.9	27.0	262.78
	Maintenance	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.63
	Asset Operating Costs	47.5	47.5	48.0	48.4	48.8	49.1	49.4	49.7	50.0	50.3	488.63
	Sub-total Shared Services	**74.00**	**74.06**	**74.74**	**75.35**	**75.96**	**76.46**	**76.94**	**77.41**	**77.85**	**78.29**	**761.04**
Total Watercare	Labour	39.0	39.0	39.4	39.7	40.0	40.3	40.5	40.8	41.0	41.2	400.79
	Maintenance	45.1	45.2	45.6	46.0	46.3	46.6	46.9	47.2	47.5	47.8	464.28
	Asset Operating Costs	116.6	116.7	117.8	118.7	119.7	120.5	121.2	122.0	122.7	123.4	1,199.21
	TOTAL	**200.73**	**200.87**	**202.72**	**204.38**	**206.02**	**207.38**	**208.69**	**209.96**	**211.16**	**212.36**	**2,064.28**

	Nominal Dollars	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	10-Year Total
Water	Labour	4.4	4.5	4.7	4.9	5.1	5.3	5.5	5.7	6.0	6.2	52.49
	Maintenance	20.5	21.2	22.0	23.0	23.9	24.8	25.7	26.7	27.7	28.8	244.32
	Asset Operating Costs	28.3	29.2	30.4	31.7	33.0	34.3	35.5	36.8	38.3	39.8	337.47
	Sub-total Water	**53.21**	**54.95**	**57.23**	**59.60**	**62.06**	**64.41**	**66.76**	**69.25**	**71.94**	**74.88**	**634.29**
Wastewater	Labour	9.4	9.8	10.2	10.6	11.0	11.4	11.9	12.3	12.8	13.3	112.61
	Maintenance	25.1	26.0	27.0	28.2	29.3	30.4	31.5	32.7	34.0	35.4	299.58
	Asset Operating Costs	43.0	44.4	46.2	48.2	50.2	52.1	54.0	56.0	58.1	60.5	512.60
	Sub-total Wastewater	**77.57**	**80.11**	**83.44**	**86.90**	**90.49**	**93.91**	**97.33**	**100.96**	**104.89**	**109.18**	**924.79**
Shared Services	Labour	26.4	27.2	28.4	29.5	30.8	31.9	33.1	34.3	35.7	37.1	314.37
	Maintenance	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	11.52
	Asset Operating Costs	49.0	50.6	52.7	54.9	57.2	59.4	61.5	63.8	66.3	69.0	584.55
	Sub-total Shared Services	**76.37**	**78.87**	**82.15**	**85.55**	**89.08**	**92.45**	**95.82**	**99.40**	**103.26**	**107.49**	**910.44**
Total Watercare	Labour	40.2	41.5	43.3	45.1	46.9	48.7	50.5	52.3	54.4	56.6	479.46
	Maintenance	46.6	48.1	50.1	52.2	54.3	56.4	58.5	60.6	63.0	65.6	555.43
	Asset Operating Costs	120.3	124.3	129.4	134.8	140.4	145.7	151.0	156.6	162.7	169.4	1,434.62
	TOTAL	**207.15**	**213.93**	**222.81**	**232.05**	**241.63**	**250.77**	**259.92**	**269.60**	**280.09**	**291.55**	**2,469.52**

8 ASSET MANAGEMENT PRACTICES

8.1 Overview

Watercare needs to be able to translate the long-term aspirations identified in the Auckland Plan into appropriate asset solutions, which are the essential outputs of effective asset management practices. This section will describe the practices that have enabled us to provide the information contained in the previous sections of this AMP.

These practices can be grouped into three broad areas:

1. Processes – the detailed processes for making and implementing day-to-day asset management decisions
2. Systems – asset management information systems (AMIS), and
3. Data – the asset data sets contained in those systems.

Watercare currently uses the following asset management practices and processes for the successful delivery of the water and wastewater services, some of which have been discussed in earlier sections with the remainder discussed following:

- Demand forecasting and management (Section 3)
- Environmental management (Section 5)
- Network modelling and long-term planning (Section 8.2.1)
- Real-time operational control (Section 8.2.2)
- Operations and maintenance programmes (Section 8.2.2)
- Condition assessment and renewal programmes (Section 8.2.4)
- Capital works planning (Section 8.2.5)
- Emergency management (Section 8.2.6)
- Health and safety (Section 8.2.7)
- Risk (Section 9)

8.2 Processes

8.2.1. System modelling and long-term planning

Watercare uses treatment, hydraulic and catchment models to analyse the flow in the water supply and wastewater systems, in order to optimise the performance of the treatment plants and networks. The modelling highlights areas where improvements are required to increase pressures or flows for fire fighting and maintaining minimum levels of service into the future, increase chlorine residual or reduce the number of wastewater overflows in wet weather. The findings inform the planning of capital works improvement projects.

Most of the water and wastewater networks have been modelled although some of the models are over five years old and require updating.

Models are adjusted for different possible demand scenarios to show where future capacity improvements will be needed. Using the bulk supply and wastewater models, Watercare has developed Master Plans for the bulk networks that include various configuration options, new treatment plant locations and potential water sources to meet future growth and demand.

8.2.2. Real time operational control

Watercare operates a Supervisory Control and Data Acquisition (SCADA) system, to monitor and control the water and wastewater networks from a central control room. The SCADA system automatically collects data from the majority of the remote sites such as pump stations, reservoirs and dams. Typical data collected is pump flow, reservoir level and water main pressure.

Programmable Logic Controllers (PLC) control many of the network assets. These systems automatically stop and start pumps to achieve the flows and levels demanded by operastions and provide process and system health information to the SCADA system.

The treatment plants are operated locally with Distributed Control Systems (DCS). The DCS systems are used to monitor and control the processes of each plant, such as water filtration, chemical addition, aeration, digestion, etc. Residual chlorine, ph and turbidity must be regularly reported to achieve compliance with drinking-water standards.

The Mangere wastewater treatment plant has a dedicated 24-hour control room that monitors and controls plant performance. The main water treatment plants are monitored from the central control room in Newmarket. Some major plants such as Waikato are often unmanned.

Data collected by SCADA and DCS is validated and displayed graphically as useful information on screen in centrally located control rooms throughout the company and at specific plant areas. It is also logged within plant historian databases to support operations, maintenance and planning activities.

8.2.3. Operations and maintenance programmes

The operations and maintenance practices which are regularly undertaken across the networks, the results of which are used to make asset management decisions, include:

- **Water supply pressure, flow and water source levels monitoring** – includes remote and manual monitoring of bulk meters and flowmeters for billing, network analysis and modelling, operations and leak detection purposes. Pump stations, reservoirs and treatment plants are alarm monitored for low/high pressures and water levels, faults, power failures or water quality deterioration. The control systems also allow remote control of pumps based on reservoir levels. Rainfall stations, lake-level recorders and in-stream weirs record water levels for use in dam safety surveillance, consent compliance reporting, operation of the headworks and drought security analysis.
- **Wastewater flow monitoring and control** – pump stations are continuously monitored for pump run-times, flows, wet well levels and overflows. Monitoring allows for pumping discharge to be adjusted according to conditions and enables fast response to potential overflow incidents to facilitate clean-up.
- **Water supply interruption management** – customers are notified in advance, where possible, of planned water supply shut-downs.
- **Water source management** – involves operating the water sources to ensure compliance with consent conditions (regarding allowable volumes of water takes), to optimise efficient use of energy (through minimising pumping and water treatment costs and maximising hydro-generation potential) and to provide volumes within the capacity limitations of the treatment plants, pipelines and pump stations.
- **Pressure management** – operating the networks within minimum and maximum pressures
- **Leak detection and management** – using telemetry to monitor night-time flows (Metropolitan schemes), by line walking and chamber inspection programmes (bulk supply network) or reactively (Non-metropolitan schemes). Water leaks are a primary cause of non-revenue water or water losses. The management of non-revenue water volumes is a key focus for Watercare as significant water loss can generate the need to invest in new water supply capacity earlier than otherwise would be necessary.
- **Meter management** – small meters are maintained or replaced reactively. Large meters are monitored (some remotely) and replaced proactively with some meters.
- **Inflow and infiltration (I&I) control** – inflow (from the illegal stormwater connections) and infiltration (from groundwater) can cause overflows from the wastewater networks during wet weather. The effectiveness of programmes to reduce I&I, undertaken in different parts of the region, is being assessed in terms of programme cost and wet weather flow reduction achieved.

- **Wastewater overflow management** – overflows occur because of I&I; insufficient capacity in the wastewater pipes; poor design; blockages (by fat build-up or root intrusion), collapse or breaks in the pipes (from third party damage). Management techniques used include education, regular pipe flushing, enzymes to reduce fat accumulation, strict trade-waste management and monitoring, network redesign, and investigation of repeated blockages.
- **Water quality management** – routine sampling (using portable instrument panels) and testing is undertaken throughout the region in accordance with the Drinking-water Standards for New Zealand (DWSNZ). Reactive water quality tests and flushing are also carried out in response to customer water quality complaints. Routine flushing is undertaken in areas where repeat problems occur, due to dead end or cast iron mains, for instance.
- **Backflow prevention** – all commercial and industrial customers are required to have a certified backflow prevention device installed at the boundary of the property, to prevent contaminants entering the public network from private connections. Watercare undertakes a monitoring and enforcement role to meet the requirements of the DWSNZ.

8.2.4. Condition assessment and renewal programmes

The types of condition assessment practices undertaken across the region, the results of which are used to develop renewal programmes, are described in Table 28.

Table 28: Condition Assessment Practices

Asset Group	Condition Assessment Practices
Wastewater pipes	• Scheduled crew inspections • Specialist pipe bridge and rising main inspections • Closed-circuit television (CCTV), sonar, laser profiling and walk-through inspections
Water supply pipes	• Pipe sampling (pipe samples are cut when the pipe is exposed during maintenance) • A 1-5 condition grade assessment by the contractor when maintenance is undertaken • Analysis of pipe performance (breaks/leaks) to interpret condition
Valves and hydrants	• Tested (operated) and maintained at varying intervals • The NZ Fire Service has a regular programme of hydrant flow testing
Water supply dams	• Annual investigation and inspection of each dam to report on its safety performance • Five yearly independent dam safety assurance audit to evaluate dam condition • Routine monitoring and assessment to ensure dam condition is maintained
Treated water reservoirs	• Findings of visual inspections, conducted by operations and maintenance personnel, trigger in-depth condition assessments, such as structural assessments
Treatment plants	• Visual inspections by on-site operators • Detailed, scheduled condition inspections by the maintenance team
Wastewater pump stations	• Regular routine inspections (in conjunction with maintenance work such as wet-well washing to remove fat build-up) • Vibration monitoring, thermography and leak detection testing to determine likely failure of bearings in motors and pump units • Monitoring of motor insulation to ensure integrity and detect evidence of potential early failure • Testing of pump station efficiency, in terms of actual pump rate compared to design pump rate • Annual inspection of all lifting beams and gantry cranes to check the integrity of the fixing bolts, supports, wire ropes and chains to comply with statutory requirements

8.2.5. Capital works planning

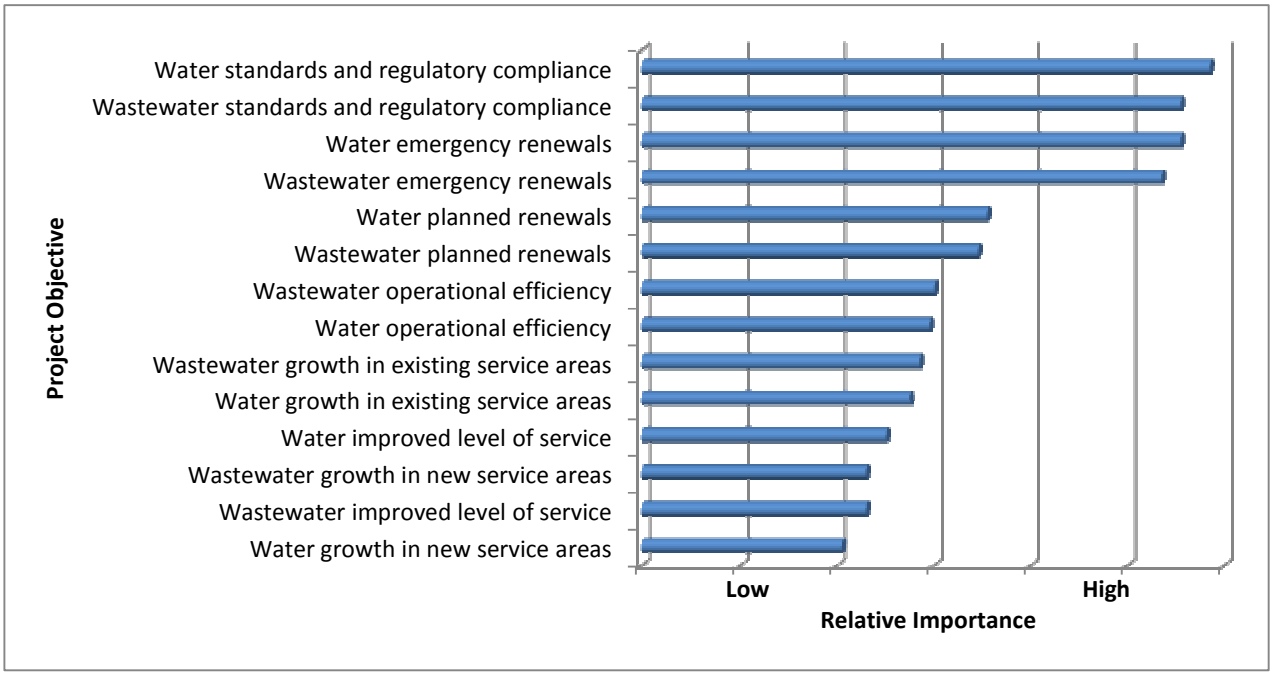
Capital works include both renewals works (rehabilitation or replacement of assets) and asset creation works. With the integration of all the Auckland councils, Watercare inherited a long list of planned capital projects.

Watercare is developing a project prioritisation model based on multi-criteria decision analysis and decision conferencing. This model, although not developed in time for use in this AMP, will be implemented in future to rank all capital works projects and allow projects to be prioritised on a regional basis.

In the interim, Watercare will continue to apply the Project Objective Ranking criteria developed in 2010. The model focuses on Watercare's main strategic objectives.

Watercare has determined a relative weighting for each project objective Figure 35. The weighting can change as a result of changes in business strategy and / or customers' service expectations. This weighting is one part of the capital project prioritisation process and gives the reader an appreciation for the importance that Watercare places on different aspects of service delivery.

Figure 35: Project Objective Ranking



Watercare is committed to developing and refining this prioritisation model further to assist the project prioritisation decision. The highest priority projects are not necessarily the one with highest benefit/cost ratio.

Watercare design and construction standards

The enforcement of Engineering Standards ensures that new assets are built to best practice engineering quality standards, in order to maximise the life of the assets and minimise future network problems. Work undertaken on the networks must be carried out in accordance with the appropriate Watercare engineering design and construction standards.

Developers installing water and wastewater infrastructure in new development areas are required to comply with the Watercare Engineering Standards for design and construction. These assets are then vested to the Auckland Council following inspection and sign-off by Watercare's operations staff. Watercare purchases the assets from Auckland Council via a share transfer.

Currently where local networks are operated by external contractors under legacy contracts, the legacy standards and practices are enforced. These will be rationalised over time into region-wide standards, as appropriate.

Use of new technology

Water and wastewater collection and treatment technologies are continually developing, offering higher efficiencies and enhanced treatment. Watercare keeps informed of emerging technologies through:

- Membership to local and international technical organisations such as the Water Environment Research Foundation, New Zealand Water Association and International Water Association
- Supporting individual membership of staff to professional bodies relevant to their role such as the Institution of Professional Engineers for New Zealand
- Maintaining open relations with specialist consultants and water treatment contractors

New technologies that are currently being considered include:

- The management of water quality issues such as taste and odour, cyanobacteria, plumbosolvency and trihalomethanes
- Real-time control for the trunk wastewater network (currently working to improve the understanding of the dynamic performance of the trunk network through the refurbishment of its wastewater network model and the installation of flow and depth monitors at strategic locations)
- Trialling of a thermal dryer for treated biosolids at the Mangere Wastewater Treatment Plant. The dried biosolids produced from the trial are being applied to land to assess its value as a fertiliser and soil conditioner technologies to recycle effluent from the Mangere Wastewater Treatment Plant
- Side-stream treatment technologies that will treat the high nitrogen loads in plant recycles such as centrate

8.2.6. Emergency management

Incident management

Watercare manages emergency incidents concerning the water and wastewater services, using an incident escalation system, which defines roles, responsibilities and processes for responding to incidents. This system is documented in the Incident Management Plan (IMP) which is contained on the Watercare Intranet. The Incident Management Plan incorporates a number of plans including:

- Pandemic Response Plan
- Auckland Crisis Plan
- Watercare Operations Incident Management Plan

For the management of wider-scale incidents, Watercare is a participant in the Auckland Engineering Lifelines Group (AELG). The AELG is made up of all the essential utilities in the Auckland region who work collaboratively to improve the resilience of Auckland's infrastructure to major hazards such as volcanoes or earthquakes. Working with the AELG improves Watercare's understanding of the risks to the water and wastewater assets and services during major incidents. The AELG works alongside Civil Defence during emergencies of this magnitude, to restore essential services. Lifelines procedures are included in the Incident Management Plan.

Watercare also operates under the Regional Drinking Water Incident Co-operation Plan.

Contingency plans

At an operational level, Watercare has a number of contingency plans in place to manage specific planned or emergency events, or specific critical assets. These include:

- Drought Response Plan
- Shut-down procedures for bulk water mains

Watercare has developed Business Continuity Plans for each of its sites documenting procedures to be followed during an incident, crisis or emergency to ensure that service levels are maintained as much as possible and that impacts of the incident are minimised.

8.2.7. Health and safety

Watercare has a health and safety policy and safety management systems in place to protect staff, contractors and members of the public from the hazards associated with operating and maintaining the water and wastewater networks.

All contractors working on the networks must prepare, and operate under, specific health and safety plans and procedures for every project, with larger projects also requiring Accident Compensation Corporation accreditation.

8.3 Systems

Table 29 details the systems Watercare currently uses to support the asset management processes outlined in previous sections.

8.4 Data

Watercare holds asset data in a variety of systems as recorded in Table 29.

The local network asset data inherited from the former councils is of varying accuracy and completeness. Watercare are putting in place processes to improve data quality of existing data and the capture of new asset data.

8.5 Key Assumptions

The following general assumptions have been made in developing the asset lifecycle programmes and financial forecasts for the 10 year period of this AMP:

- Watercare will remain the owner of the water and wastewater assets and the provider of services throughout the planning period
- The requirements of the Statement of Corporate Intent will not change over this AMP period
- The population of Auckland is assumed to grow by 16% (medium growth projection) over the next 10 years
- Water demand forecast based on a 15% reduction in gross per capita water demand (includes residential and commercial) from 2004 – 2025
- Demand projections based on the assumption that existing levels of water leakage and stormwater inflow and infiltration will continue through the AMP period
- The Level of Service targets will apply throughout the period of this plan
- There will be no major changes to the Drinking-water Standards of New Zealand throughout the period of this plan
- Construction costs based on 2011 costs
- Maintenance and operational costs based on 2011 costs
- There will be the same levels of new assets, vested as a result of development, as has occurred over the last 5 years
- Asset lives used for depreciation are accurate
- Conditions of resource consents currently held by Watercare will not be altered significantly during the planning period
- That there will be no major natural disasters requiring additional funds
- That there will be no significant changes to Council policy that will impact on assets and services

- Watercare is currently in the process of implementing SAP as an integrated asset management / finance system. The Hansen and Finance 1 systems are running in parallel with SAP until it is fully integrated.

Table 29: Asset Management Information Systems

Asset Management Process	Information System	Description
Customer enquiries / requests / complaints	Hansen/SAP*	Customer queries are stored against property addresses to provide a history for analysis
Environmental management	EMS	Records all Resource Consents
Demand forecasting and management	MS Excel	Water and wastewater demand forecast modelling
Network modelling	H2OMap Infoworks	Hydraulic and catchment modelling, water quality modelling, wastewater treatment plant modelling,
Treatment plant modelling	BioWin	Treatment plant modelling
Asset information	Hansen/SAP*	All assets are uniquely identified and attributes recorded in Hansen which links to GIS
Geographic information	ESRI and FLEX technology	Spatial representation of assets, used by planning, operations, projects, contractors and other utilities
Asset condition	Hansen/SAP*	Condition recorded from assessments and graded to inform renewal & maintenance programmes
	CCTV	Video recording of asset condition
Monitoring	Telemetry	Automatic consent monitoring
	Supervisory Control and Data Acquisition (SCADA) system	Simple controls and data acquisition
	WINZ	National database to record all water quality sampling results
Operations	Programmable Logic Controllers (PLC)	Real time operation of bulk network assets typically responsible for simple, one-off control and data acquisition
	Distributed Control Systems (DCS)	Real time operation of treatment plants. Complex sequencing and analog control of processes.
	PI Database	Stores SCADA data and presents outputs in and orderly fashion with trending
	Business Objects	Reporting of data
	ISMM	Integrated source management demand projected weekly
	Hansen/SAP*	Allocation and tracking of works programmes
Maintenance	Hansen/SAP*	Planned & unplanned maintenance recorded and allocated
Capital works programmes	Intranet	The Project Delivery Manual provides the procedures for the completion of capital works
Emergency management	Intranet	Incident Management Plan details procedures to be followed during incidents
Risk management	Microsoft Access database	Corporate and asset/activity risks are rated and recorded in risk registers
Finance	Finance 1/SAP*	
Water billing	Hansen/SAP	System for customer billing on metered consumption

8.6 Confidence Levels

This AMP adopts the confidence grading system outlined in Table 30 to describe the overall level of confidence in the accuracy of the asset data used in the preparation of this AMP.

Table 30: Data Accuracy Grading

Confidence Grade	Confidence Level Rating	Description	Accuracy
A	High	Reliable and accurate. Asset data and information is based on reliable source.	+/- 5%
B	Moderate to High	Reliable but minor inaccuracies. Asset data and information is based on some supporting documentation.	+/- 15%
C	Moderate to High	Significant data estimated. Asset data and information is based on local knowledge and experience.	+/- 30%
D	Low	All data estimated. Asset data and information is based on best guess or local experience.	+/- 40%

Table 31 provides the confidence grades that Watercare has attributed to the data and information provided in this AMP.

Table 31: Data Confidence

Data / Information	Confidence Grade			
	Water Supply		Wastewater	
	Bulk Supply Assets*	Local Distribution Assets	Trunk Assets**	Local Network Assets
Asset Data	**B**	**C**	**B**	**C**
Condition Data	**B**	**C**	**B**	**C**
Performance Data	**A**	**B**	**B**	**C**
Confidence in Data Confidence Assessment	**A**	**B**	**A**	**B**
Growth Forecasts	**B**	**C**	**B**	**C**
Cost Estimates	**C**	**C**	**C**	**C**

* Includes all dams, headworks, treatment plants and bulk watermains

** Includes all trunk sewers and treatment plants

Data confidence is expected to improve over the coming years as consistent, region-wide programmes are developed and implemented across the networks.

9 RISK MANAGEMENT

The enterprise risk management system supports the asset management process by ensuring that risk management disciplines are reflected in capital expenditure planning.

Enterprise risk management is an integral part of all Watercare business processes. It establishes reliable support for business decisions.

Watercare takes an enterprise wide approach to managing risks and opportunities through a formal enterprise risk management framework and supporting processes which align with AS/NZS ISO 31000:2009 Standard (Risk management – Principles and guidelines).

The continued application of risk management processes ensures that Watercare identifies the risks to achieving its business objectives. Risks are analysed; prioritised for treatment, and then appropriate risk treatments are applied.

Risk management is a key input to the prioritisation of projects in the AMP, i.e. higher risks are afforded priority in the AMP. In addition, the AMP is regularly reassessed to ensure that any new risks and significant changes to existing risks are considered and where required, the AMP is reprioritised accordingly.