Mackenzie District Council

Wastewater Activity Management Plan

2018 – 2028

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1.0 OVERVIEW

WASTEWATER	The wastewater activity is a core Council activity that contributes towards the provision of good quality infrastructure, helps to ensure public health and safeguards the environment. The wastewater system comprises pipes, pump stations, treatment facilities and other assets which represent a significant council investment over many years.
FOCUS	**New Capital and Growth** – to improve wastewater treatment and disposal across the district and comply with the environmental compliance framework. -to provide capacity to meet future demand and support the expansion of development areas as identified by Council. **Renewals** – to implement renewals strategy, including condition and criticality assessments. Ensure appropriate budgets are available to replace aging and/or deteriorating assets.
COMPLIANCE	**Resource Consents** - Council has a number of wastewater related resource consents and aims to achieve compliance with all resource consent conditions. Regular compliance monitoring and reporting is undertaken.
SERVICE DELIVERY	**Service Delivery** - the Wastewater activity is delivered via a combination of in-house resources and contracted services, including a major contract for the operation and maintenance activities of wastewater reticulation and facilities Operation and maintenance costs will increase to ensure compliance with resource consent conditions.
PERFORMANCE	**Performance** - a comprehensive performance monitoring and reporting framework ensures that legislative requirements and other KPIs are assessed and reported on.
RISK & RESILIENCE	**Understand** our communities, and the hazards and risks, acknowledging that failure will occur. **Ensure** early detection and recovery through connecting communities, supporting community organisations and robust infrastructure assets.

2.0 EXECUTIVE SUMMARY

2.1 What are we doing

We protect public health and the environment by providing four wastewater systems that collect, treat and dispose of liquid waste to acceptable environmental standards. These wastewater systems are located at:

- Fairlie;
- Lake Tekapo;
- Twizel; and
- Burkes Pass.

Council supports this service by:

- Providing, operating and maintaining wastewater infrastructure in compliance with New Zealand legislation, standards and resource consents;
- Responding to call outs and service disruptions quickly and efficiently; and
- Planning for future development and needs.

2.2 Why are we doing it?

Council has a legal obligation under the Health Act 1956 to improve, promote, and protect public health within the District. This includes identifying the need for wastewater services and either providing these directly or overseeing the service if it is provided by others. The Council sees the provision of reliable wastewater collection and treatment services to the community as a major contribution to the District's economy and to resident's wellbeing. The Local Government Act 2002 (LGA) requires ongoing wastewater services unless specific approval is sought to withdraw from this.

Council's wastewater activity contributes primarily to the following community outcomes:

Community outcome	How it contributes
A fit and healthy community	Providing community reticulated wastewater systems in agreed areas thus protecting the communities from wastewater related health issues
Safe, effective and sustainable infrastructure	Providing a sustainable, efficient and effective wastewater service
An attractive and highly valued natural environment	Providing a wastewater service that acknowledge and incorporates the natural environment in design, construction, operation and maintenance
A thriving economy	Timely response to system failures Maintaining quality and continuity of service

Council has not found any significant negative effect that the wastewater activity may have on the well being of the community. However, negative effects include odour and sludge disposal from treatment plants. The wastewater network is operated under the resource consent framework which requires that any adverse environmental effects associated with the discharges be mitigated. Sludge disposal options will be investigated for treatment plant sludge. The quality of treated effluent is continually monitored for compliance with resource consent conditions.

2.3 Where are we headed?

Council's principal goal for wastewater over the next ten years is:

- To ensure that wastewater assets are managed to measures minimise damage and inconvenience to property and there are no environmental ill effects arising from wastewater protection work

The main issue facing Council over the next ten years for the wastewater activity is likely to be meeting existing and new requirements of regional rules and standards that place greater emphasis on protecting the environment.

The wastewater system represents a significant community investment. With age, asset condition and service potential reduces and an important aspect of asset management is determining the right time and right level of renewals investment in order to maintain the agreed levels of service over the long term. Council will continue implementing the appropriate intervention strategies i.e. a combination of maintenance, repair and renewal activities to maintain the service.

Generally, the wastewater network is in a fair state of repair and, provided it is maintained and renewed regularly, the service can be expected to last indefinitely without any significantly abnormal costs having to be incurred.

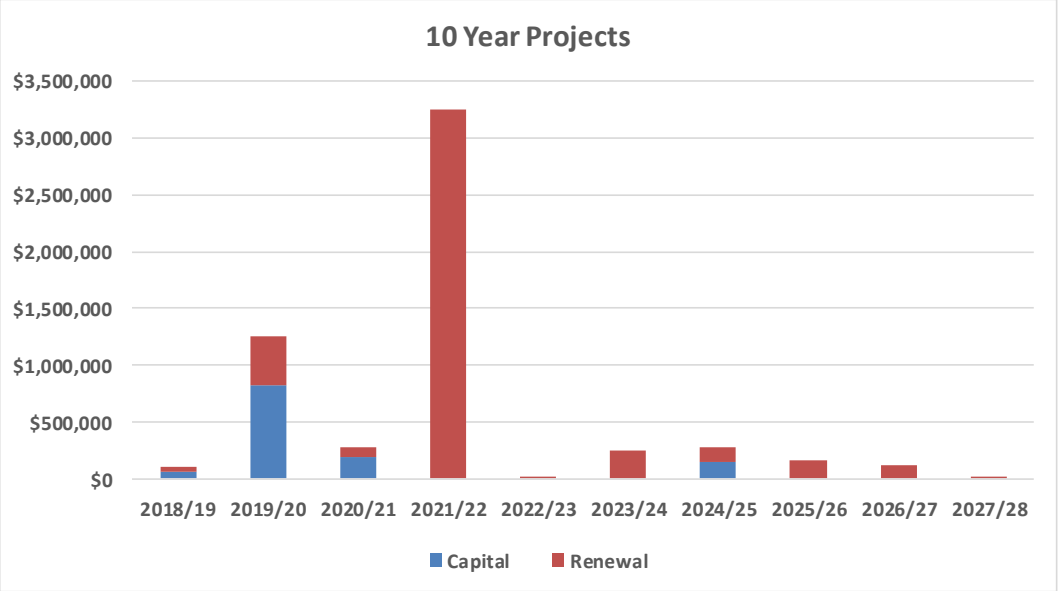
2.4 How will we get there?

Council plans to maintain current levels of service for the life of this plan, unless legislation, consent conditions, or community expectations change. Over the next ten years Council plans to:

- Continue to collect, treat, and dispose of wastewater
- Upgrade treatment facilities to comply with resource consent conditions
- Plan for future development and needs
- Consult with the community on issues such as health and legislative compliance issues

This vision is supported by this detailed wastewater activity management plan. Significant projects and their funding sources are summarised in the following table and chart:

Project Description	Year	Amount
New Capital works -		
Effluent disposal (Twizel), meter installation, SCADA installation	2018/19	$70,000
Effluent disposal (Twizel), SCADA installation	2019/20	$900,000
Desludge pond (Fairlie)	2020/21	$189,000
Desludge pond (Twizel)	2024/25	$150,000
Total		**$1,234,000**
Renewals		
Infiltration investigation, manhole lids replacement	2018/19	$34,000
Pipe, pump station equipment, resource consent & valuation renewals	2019/20	$159,000
Aerators & manhole lids replacement	2020/21	$92,000
Pipe renewals	2023/24	$250,000
Valuation	2022/23	$20,751
Pipe renewals	2024/25	$250,000
Pipe renewals	2025/26	$127,000
Pipe, pump station, SCADA, valuation renewals	2025/26	$167,751
Pump replacements & SCADA renewals	2026/27	$115,000
SCADA renewals	2027/28	$5,000
Total		**$1,220,502**



Key projects:

- Twizel effluent disposal upgrade estimated at $900,000 in 2019/20
- Twizel AC pipe renewals estimated at $850,000 in 2021/28
- renewals – refurbishment, replacement of pipes and facilities equipment for wastewater systems is estimated to be $1.2m over the next 10 years. All wastewater system renewal work will be funded by the annual depreciation provision where funds are available

To ensure on-going affordability of the wastewater service Council will continue to consider options in delivering the service, including collaboration with other local authorities.

2.5 How well are we doing and how well do we measure progress?

Council plans to take all practicable steps to comply with the New Zealand legislation and standards. Council will continue to report on its non financial performance measures in accordance with 261B of the LGA, as this covers the key expectations in terms of the delivery of the service.

The Council has reviewed and updated its systems and processes to ensure alignment and compliance with these rules.

The linkage between community outcomes, how the activity contributes, levels of service and performance measurement is shown in the following table.

Community outcome	How it contributes	Level of Service	Performance Measure
A fit and healthy community	Providing community reticulated wastewater systems in agreed areas thus protecting the communities from wastewater related health issues	Wastewater is managed to without risk to public health	Number of dry weather wastewater overflows
Safe, effective and sustainable infrastructure	Providing a sustainable, efficient and effective wastewater service	Safe discharge of wastewater	Compliance with resource consent conditions
An attractive and highly valued natural environment	Providing a wastewater service that acknowledge and incorporates the natural environment in design, construction, operation and maintenance	Sewage is able to be disposed of without significant disruption	Compliance with resource consent conditions Response & resolution
A thriving economy	Timely response to system failures Maintaining quality and continuity of service	Safe discharge of wastewater	Response & resolution Wastewater complaints

2.6 What resources do we have and what resources do we need?

People –
The Essential Services Group has five full time equivalent staff. The Essential Services Group provides management and engineering expertise to the Water, Wastewater, Stormwater, Solid Wastes and Roading activities. The Unit utilises contractors to maintain, renew, and construct assets through various contractual agreements. The Unit augments its skill base through the engagement of specialist consultants as required to undertake specific projects and works.

It is likely that a shortage of technically skilled people to design, construct and manage wastewater assets will continue to have an impact on this activity in future years. This is a global issue which is also affecting other local authorities.

Physical Assets -
Council manages four wastewater systems made up of collection, treatment and disposal systems. The collection systems consist of pipes, manholes and pump stations.

- Length of sewer mains 71km
- Number of pump stations 4
- Number of manholes 846

The latest valuation, July 2016, estimates the replacement value of the treatment plants, pump stations and reticulation to be $25m.

2.7 Who pays for it?

This activity is funded by targeted rates from properties that have access to wastewater systems.

3.0 INTRODUCTION

This section sets out the purpose of this Activity Management Plan (AMP) and shows the plan framework.

3.1 Purpose

3.1.1 Purpose of this Activity Management Plan

The purpose of this AMP is to outline and summarise in a coordinated manner the Council's long-term asset management approach for the provision and intergenerational management of water throughout the District. This may also be considered the overall objective of Asset Management.

This AMP is intended to be read in conjunction with the LTP and fulfils requirements of the LGA (and amendments), - Schedule 10.

3.1.2 Purpose of Asset Management

The International Infrastructure Management Manual 2015 (IIMM) states the purpose and scope of AM as:

1. *The objective of asset management is to meet the required level of service, in the most cost effective manner, through the management of assets for present and future customers. As highlighted by ISO 55000, good AM is about achieving best value through the right balance between cost, risk and performance*
2. *Lifecycle asset management encompasses all practices associated with considering management strategies as part of the asset lifecycle. The objective is to look at lowest long-term cost (rather than short term savings) when making decisions*

Activity Management Planning is a management tool that provides the link between strategic planning and managerial areas of Council's business and community's desired outcomes.

3.2 Goals and Objectives of asset ownership

3.2.1 Purpose of Ownership

Council provides a safe, effective and sustainable wastewater system:

- to ensure that adequate wastewater treatment and disposal systems are provided (private or public) for all dwellings; and
- to provide and maintain reliable and affordable wastewater systems which protect public health, property, safety and the environment and which recognise cultural values, both now and in the future.

The Council's overriding goal is:

"***The outcome desired by the community is to have safe, effective and sustainable water, waste communication, energy and transport systems in place when required, through sound long term planning and funding***".

3.2.2 Review of Activities and Funding

The LTP identifies planned activities, defines the rationale for justifying these activities, and identifies the appropriate funding source.

3.2.3 Legal Authority for Council Action

The LGA gives local authorities the full capacity, and full rights, powers and privileges, to carry on or undertake any activity or business, do any act, or enter into any transaction wholly or principally for the benefit of its district.

Along with these wide sweeping powers comes the requirement to identify all reasonably practicable options before making a decision, and to assess the benefits and costs of each option against the likely economic, environmental, social and cultural impacts.

Local authorities are also required to consult widely, effectively and appropriately with the community to determine the communities' wishes and to seek feedback on all potentially significant activities – not only when a particular course of action is proposed, but at the various stages of the decision-making process.

A significant aspect of this consultation process is the development of the LTP, which forms the long-term (not less than ten years) direction for all Council's activities.

Section 6.9.5 - Council Strategies, Plans, Bylaws and Policies discuss the links with other planning documents and processes such as the LTP.

3.3 Links to Council Vision, Mission, Goals and Objectives

3.3.1 Vision

Mackenzie will be a district in which:

- We foster the unique attributes and strong sense of community that makes the Mackenzie District special.
- Our natural environment is protected and enhanced in balance with achieving social and commercial objectives.
- A dynamic economy provides employment and investment opportunities consistent with the quality of life aspirations of existing and future generations.
- Democracy is respected and equal opportunity and the rights of the individual are upheld.
- A variety of sporting, recreational, cultural, spiritual, welfare and educational resources are available to enrich the lives of our people.
- Safe, effective, sustainable water, waste, communication, energy and transport systems are in place.
- People are encouraged to use their skills and talents for the benefit of the community.

Council's outcomes and objectives for the wastewater network are stated in the LTP 2018–2028.

These outcomes and objectives have been translated into various targets for maintenance and renewals to be achieved in each financial year. The outcomes are reported in each Annual Report.

The principal goal is to provide an effective, efficient, accountable and sustainable range of services that meet the actual needs of the residents. The wastewater network provides the means to collect and convey sewage away from properties and dispose of it in an environmental and sustainable way.

The over-riding management strategy is that the wastewater infrastructure as it presently exists will be maintained in the same state in perpetuity.

The Community Outcomes, Levels of Service and Performance Measures are discussed in Section 8.

3.4 Asset Management Drivers

The business drivers which define the need, priority and scope for improved AM practices within Council may be summarised as follows:

3.4.1 Customer Service

Customers expect that agreed levels of service be delivered reliably, efficiently and economically. The use of AM techniques provides the following benefits in satisfying these demands:

- focuses on identifying and satisfying customer requirements
- provides a basis for customer consultation when determining levels of service preferences by identifying the range and cost of service level and service delivery options
- enhances customer confidence that funding is being allocated in an equitable and cost effective manner; that assets are being well managed and improves understanding of service level options and requirements

3.4.2 Financial Responsibility

The LGA requires Council to:

- prepare and adopt, every three years, a long term (10 years plus) financial strategy for all infrastructural assets which takes into account asset creation, realisation, and loss of asset service potential
- determine their long term financial strategy, consider all relevant information and assess the cost/benefit of alternatives
- adopt a financial system consistent with generally accepted accounting practices
- manage assets prudently in the interests of the district and its inhabitants
- fund or otherwise provide for loss of service potential (deferred maintenance or depreciation) from July 1999

The implementation of the optimised work programmes and resulting long-term cash flow projections contained in AMP's will aid compliance with these requirements.

AMP's (supported by appropriate processes, systems and data) should provide clear justification for forward works programmes (and associated funding programmes) and provide the ability to even out peak funding demands and account for changes in asset service potential.

The LGA requires a local authority to prepare and adopt, as part of its LTP, an Infrastructure Strategy for a period of at least 30 consecutive years to guide decision-making. This is detailed in Section 6.9.5 Council Strategies.

3.4.3 Environmental Responsibility

Asset Management (AM) Planning demonstrates how Council is addressing sustainable management of its physical resources while enhancing the protection of the environment as required under the provisions of the Resource Management Act 1991 (RMA).

3.4.4 Safety

AM planning addresses Council's safety obligations through:

- adoption of appropriate design standards for the creation of new assets
- development of risk management practices

3.4.5 Economic Efficiency

The techniques incorporated into this AMP support economic efficiency by:

- providing a basis for monitoring asset performance and utilisation
- enabling asset managers to anticipate, plan and prioritise asset maintenance and renewal expenditure
- identifying under-funding of asset maintenance and renewal
- quantifying risk, leading to minimisation of high impact (financial and service level) failures and environmental effects and resulting in savings where asset renovation is less than the cost of replacement
- extending the life of an asset by optimising maintenance programmes and demand management

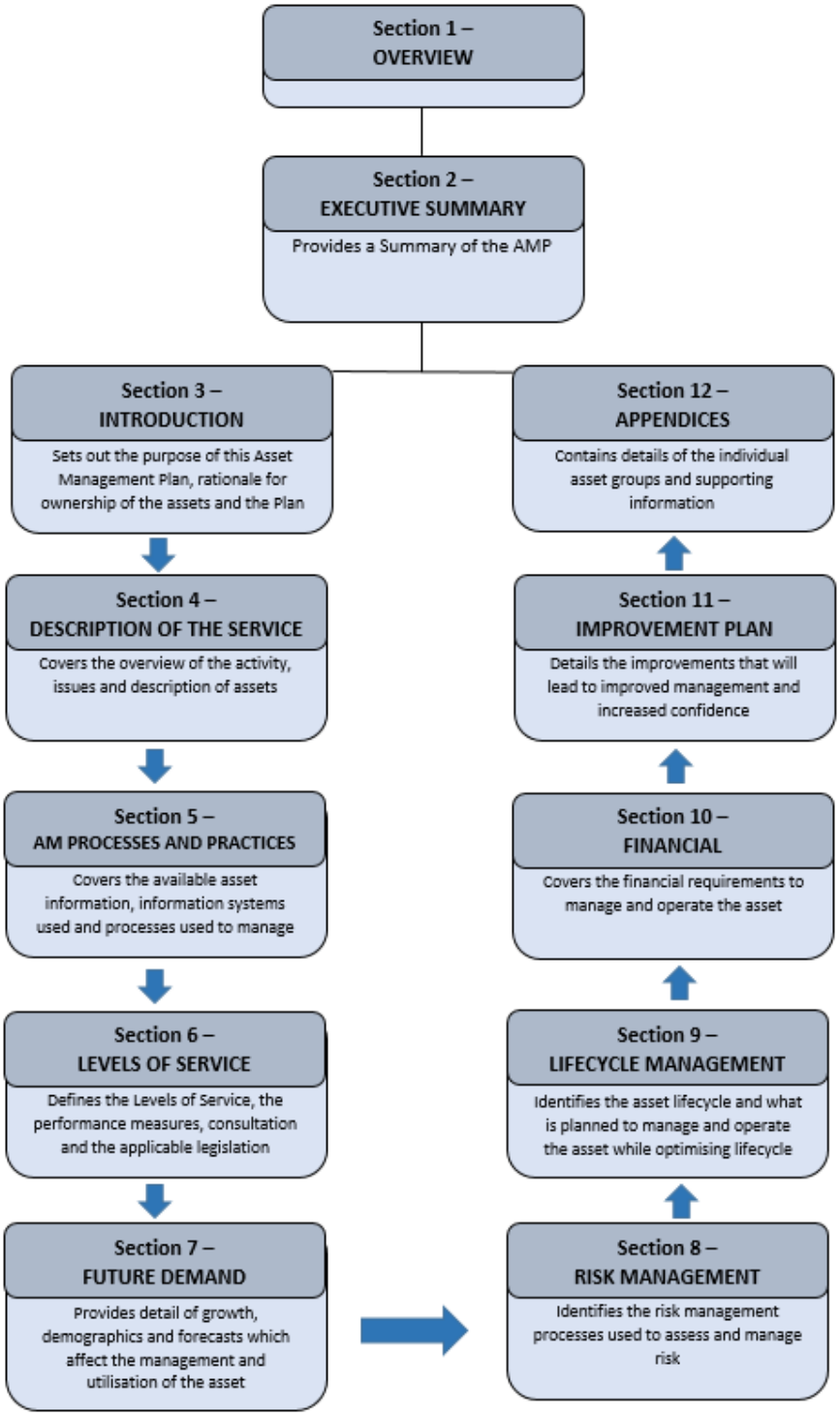
3.4.6 Achieve Strategic Goals

The Council's goals relate to growth, building communities, protecting the environment, supporting the economy and providing quality customer service.

3.5 Plan Framework

The AMP structure is graphically represented below:

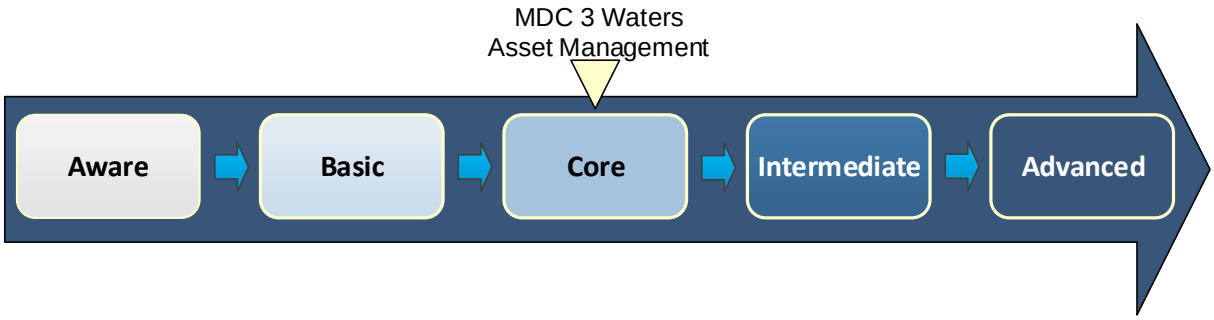
Figure 3-1: AMP Framework



3.6 Appropriate Level of Asset Management

The International Infrastructure Management Manual (IIMM) provides a summary of the different levels of asset management maturity: Aware, Basic, Core, Intermediate and Advanced. The degree of complexity differs according to an organisation's corporate needs. The level of complexity of Asset Management is dependent on the following:

- The costs and benefits to the organisation
- Legislative and other mandated requirements
- The size, condition and complexity of the assets
- The risks associated with failures
- The skills and resources available to the organisation
- Customer expectations



A core Activity Management Plan will meet minimum legislative and organisational requirements for financial planning and reporting. It provides basic technical management outputs such as statements of current levels of service, forward replacement programmes and associated financial projections.

Council considers the required sophistication of their plan in the short to medium term need not progress beyond a "Core" planning level, as:

- the cost at this time to move to an advanced plan would provide little significant benefit to Council or its' customers
- the size, complexity and use of the assets is consistent with a rural sparsely populated district
- the risks associated with failure are low

The current Activity Management Plan generally meets "**Core**" requirements. By implementing improvement planning Council can assess the asset management performance and identify gaps to drive the improvement actions.

4.0 DESCRIPTION OF SERVICE

This section of the Plan covers the overview of the activity and the description of assets covered under it.

4.1 Overview of the Activity

The Council is a provider of "core" activities, which are the delivery of water (urban and rural), wastewater (sewerage), water races and stormwater services.

Council has consistently regarded the provision of these services as vital to maintaining the community's health and well-being. The wastewater assets are fundamental to Council's statutory responsibilities and strategies for conserving public health in pursuit of its mission to enhance the quality of life of residents in the District.

Council owns 4 separate wastewater systems at Fairlie, Tekapo, Twizel and Burkes Pass.

4.2 Description of Assets

Overall there are 71 kilometres of reticulation, 846 manholes, 6 pump stations and 4 treatment plants. The reticulation varies from 20mm to 375mmm in diameter.

Total operating costs are estimated to be $276,011 gradually increasing from 2018/19 over the ten years to $320,000 in 2027/2028. Replacement value of treatment plants, pump stations and reticulation is approximately $25,035,090 as at July 2016.

System	Population (UR)	Length of Reticulation (km)	Manholes	Pump Stations	Treatment Facility
Fairlie	**693**	12.7	103	1	Oxidation ponds
Lake Tekapo	**369**	17.1	274	3	Oxidation ponds
Twizel	**1,137**	40.6	453	2	Oxidation ponds
Burkes Pass	**30**	0.9	16	-	Oxidation pond
Total	**2,229**	71.4	846	**6**	**4**

4.3 Key Issues

The following key issues are associated with the Wastewater Systems:

- Stormwater inflow & infiltration
- Fat build up in pump stations
- Sanitary products causing issues within the wastewater system

The following table lists the key issues associated with each individual wastewater system.

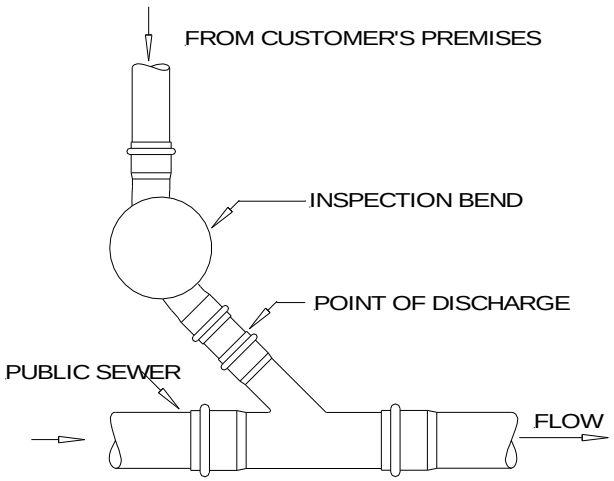
Issues	Resolution
Fairlie	
Earthenware mains CCTV	Replace
Groundwater Inflow& Infiltration	Investigate, consider resolution options and implement
Pond sludge levels	Monitor, consider options and desludge
Lake Tekapo	

Issues	Resolution
Inflow & Infiltration	Investigate, consider resolution options and implement
Some earthenware pipe at end of its life and poor condition	Replace
Disposal of effluent (consent limits)	Investigate, consider resolution options and implement
Twizel	
Condition of the AC pipe	Replace
Disposal at the Treatment Plant	Consider options and implement
Pond sludge levels	Monitor, consider options and desludge
Burkes Pass	

4.4 Wastewater Reticulation

The Council owns and maintains the wastewater network from the collector sewer mains to the treatment facility and disposal system. The “point of discharge” for the individual customer is where the property connection connects to the trunk main, not the property boundary.

Figure 4-1: Typical layout showing point of discharge

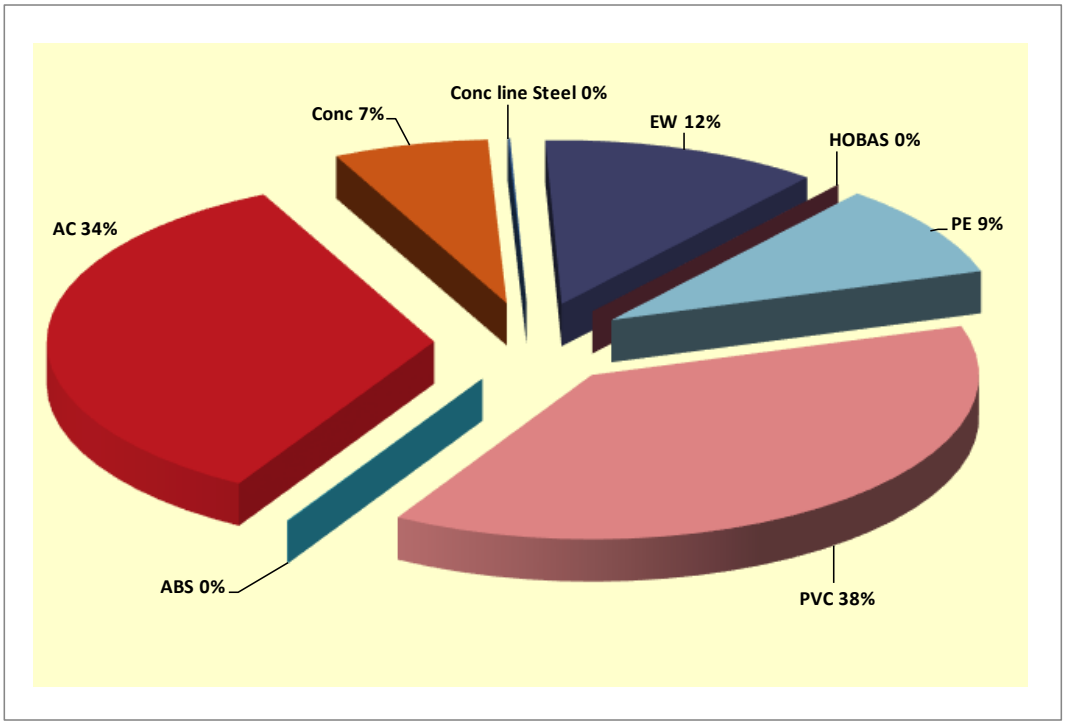


Once sewage leaves the household/private system it enters the public wastewater system. Flows are generally via gravity and pipes are normally only part full and have some air present.

The sewer reticulation consists of reticulation sewers, collector sewers and trunk mains, with manholes located throughout the reticulated system.

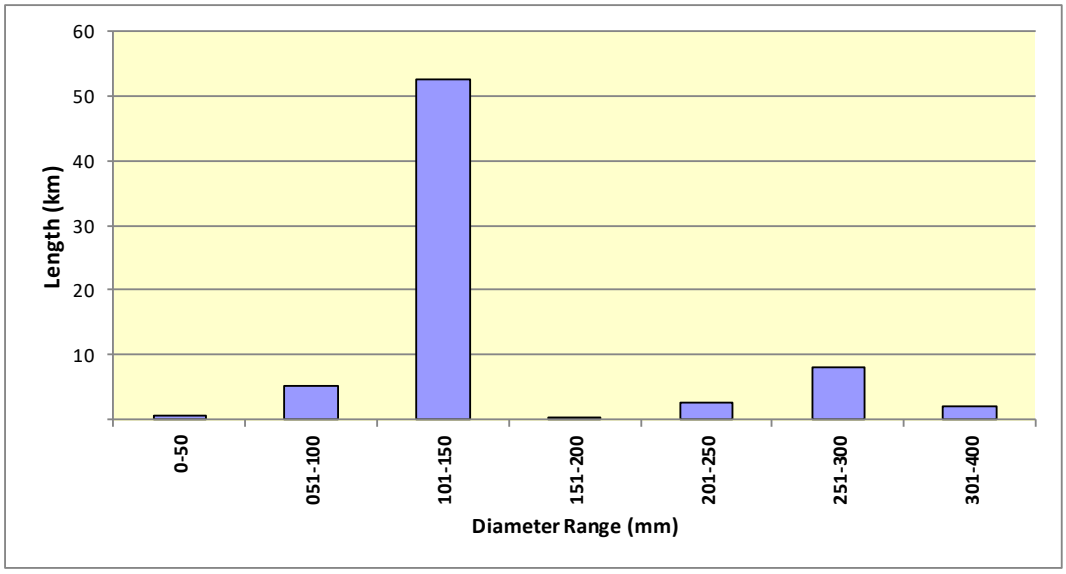
- Reticulation sewers are a network of pipes including property connections that receives wastewater from customer properties. Reticulation sewers are generally Ø150mm
- Trunk sewers connect to the reticulation sewers and transport the wastewater to the wastewater treatment plant. Trunk sewers are generally the largest pipes in the network

Figure 4-2: District wide waste water main material distribution



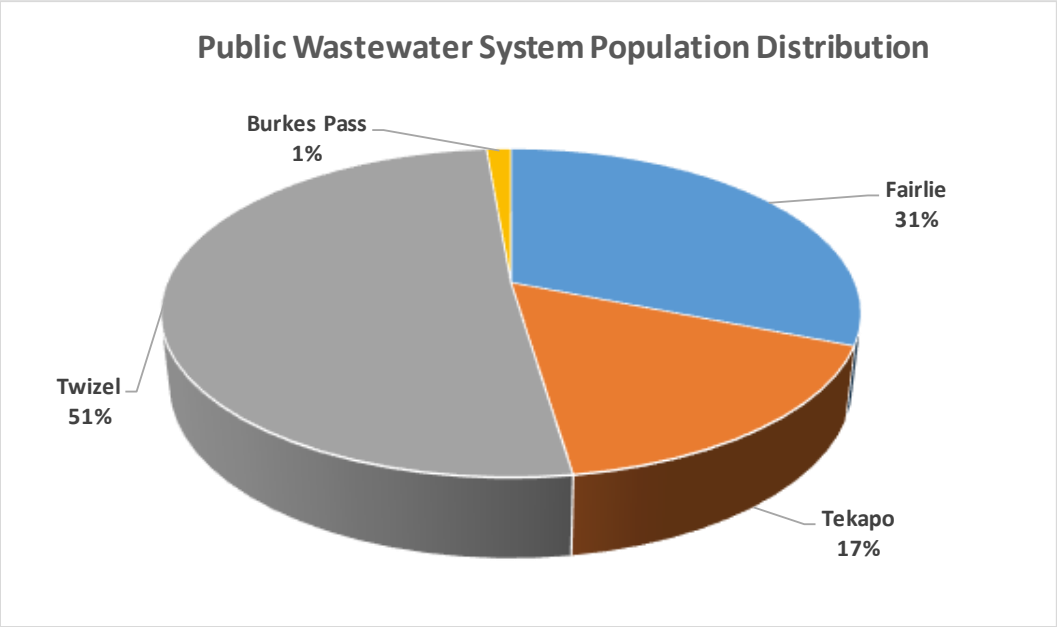
84% of the reticulation consist of three materials - PVC 38%; AC 34%; and EW 12%. The remaining 16% consist of Concrete (7%); PE (9%); HOBAS;ABS & Concrete lined Steel

Figure 4-3: District wide waste water main size distribution



74% of the reticulation is 101-150mm diameter. 18% of the reticulation is greater than 150mm diameter

Figure 4-4: District wide Public Wastewater System Population distribution



4.5 Manholes

A sewer manhole is a sewer access point with a removable cover which allows human and machine access to a (typically buried) sewer pipe.

The manhole provides several functions, such as to:

- conduct inspections
- connect two sewers when there is a change of grade or alignment or size
- provide a junction where two or more sewers meet

Manholes are usually constructed from reinforced concrete, either precast or formed in-situ. There are 846 manholes in the Council wastewater systems.

4.6 Pump Stations

A wastewater pump station is designed to pump wastewater from one location via a rising main to a remote location at a higher level.

Wastewater pump stations are an integral and vital component of the wastewater network. The integrity of the wastewater scheme is very dependent on the proper functioning of the wastewater pump stations where these exist. Failure of a pump station can potentially lead to wastewater overflows to land and natural waterways.

There are only wet well pump stations (no dry wells). The exact combination of components will vary from one pump station to another, but they are typically made up of the following basic components:

- Sump
- Intake pipe work
- Pumps
- Discharge manifold & pipework

The rising main is not seen as part of the pump station, but has a significant effect on the performance of the pump and therefore designed in conjunction with the pump station.

There are 6 pump stations within the Council wastewater systems.

4.7 Eversly Reserve Pump Stations

When the Council reticulated the Eversly Reserve in Fairlie with a small bore pressure pump system it was agreed that the Council would retain ownership of the individual pumps and control gear. This was because some of the residents did not want to deal with issues of pump break down etc.

4.8 Wastewater Treatment Plants

A Wastewater Treatment Plant is a facility for treating wastewater (sewage). The wastewater treatment plants forms an integral part and very important function in the wastewater system. Failure to treat the wastewater adequately will result in environmental contamination and associated public health risks.

The Mackenzie district wastewater treatment plants primarily treat domestic wastewater as there are no large industries contributing high contaminant loads to the wastewater system. The systems range from a basic oxidation pond to primary, secondary and tertiary treatment (pond systems).

Council has continued to maintain its wastewater treatment plants to a high standard and in good conditions with ongoing maintenance. Below is a detailed discussion of the treatment system under each scheme.

4.8.1 Discharge/Disposal

An important aspect of the wastewater treatment plant is to ensure that the district's natural water sources are manage responsibly. Resource consents are held for the various activities relating to the wastewater activity such as treatment (including odour) and the disposal of treated wastewater at the wastewater treatment plants.

Discharge/disposal is generally to land. The resource consent conditions set out sampling locations and frequency, and water quality parameters.

4.9 Buildings

There are no above ground buildings within the wastewater system. Usually buildings are recorded in the AssetFinda IMS with the building's age and replacement value. Buildings are treated as a component of the facility i.e. similar to a pump at a pump station.

Housekeeping of buildings forms part of the O&M Contract and O&M Manuals where these are available.

4.10 Critical Assets

Council engineers have not performed a documented formal criticality assessment of the infrastructure assets, but Council engineers use practical experience and skilled application of staff and service providers in consideration of critical assets. Development of a formal documented criticality assessment is included as an improvement item (**IP 1**).

5.0 ASSET MANAGEMENT PROCESSES & PRACTICES

This section covers the organisation structure, information systems used, data confidence and processes used to manage the asset.

5.1 Introduction

The organisation structure and Group structure is shown below.

Figure 5-1: Council Organisation Structure

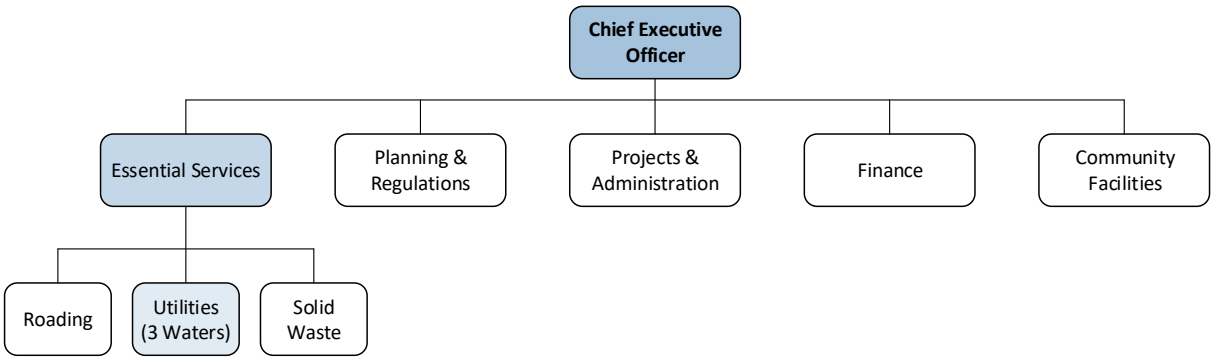
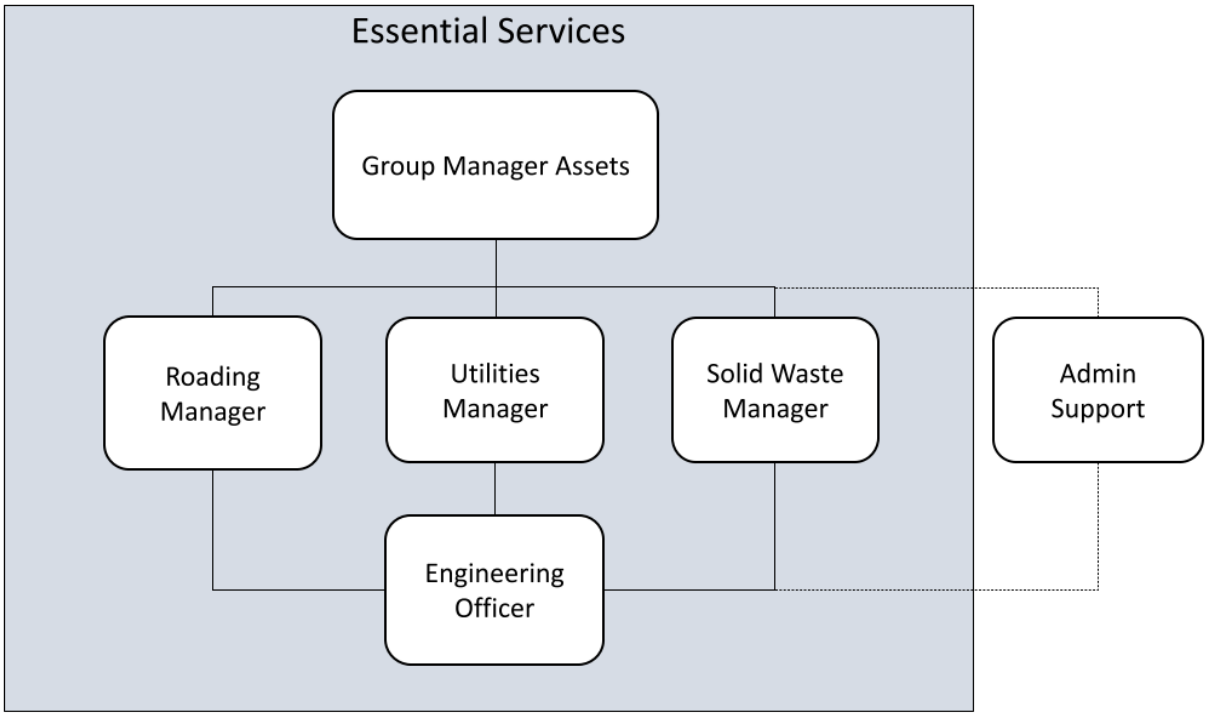


Figure 5-2: Essential Services Group Structure



Council has an Asset Manager, Utilities Manager and an Engineering Officer responsible for the maintenance management of the Utilities network. Occasionally some elements of the work are tendered to consultancy services to manage (e.g. Pipeline replacements etc). The Utilities Manager and the Maintenance Contractors regularly inspect and monitor the network. Any work identified is directly tasked to the incumbent maintenance contractor or, if it is beyond the scope of the maintenance contract, tendered using Competitive Pricing Procedure guidelines. This may or may not need the involvement of consultants depending on the nature or extent of the work.

Council accounts for revenue and expenditure on an accrual basis. All work under the Works Programme is identified through a job cost ledger with a significant level of breakdown using analysis codes. The costs are summarised into the general ledger where operational/maintenance costs are identified separately to capital/renewal items.

The majority of the work (physical works and professional services) carried out as part of the total management of all Utilities Asset functions is actioned under either physical works or consultancy contracts.

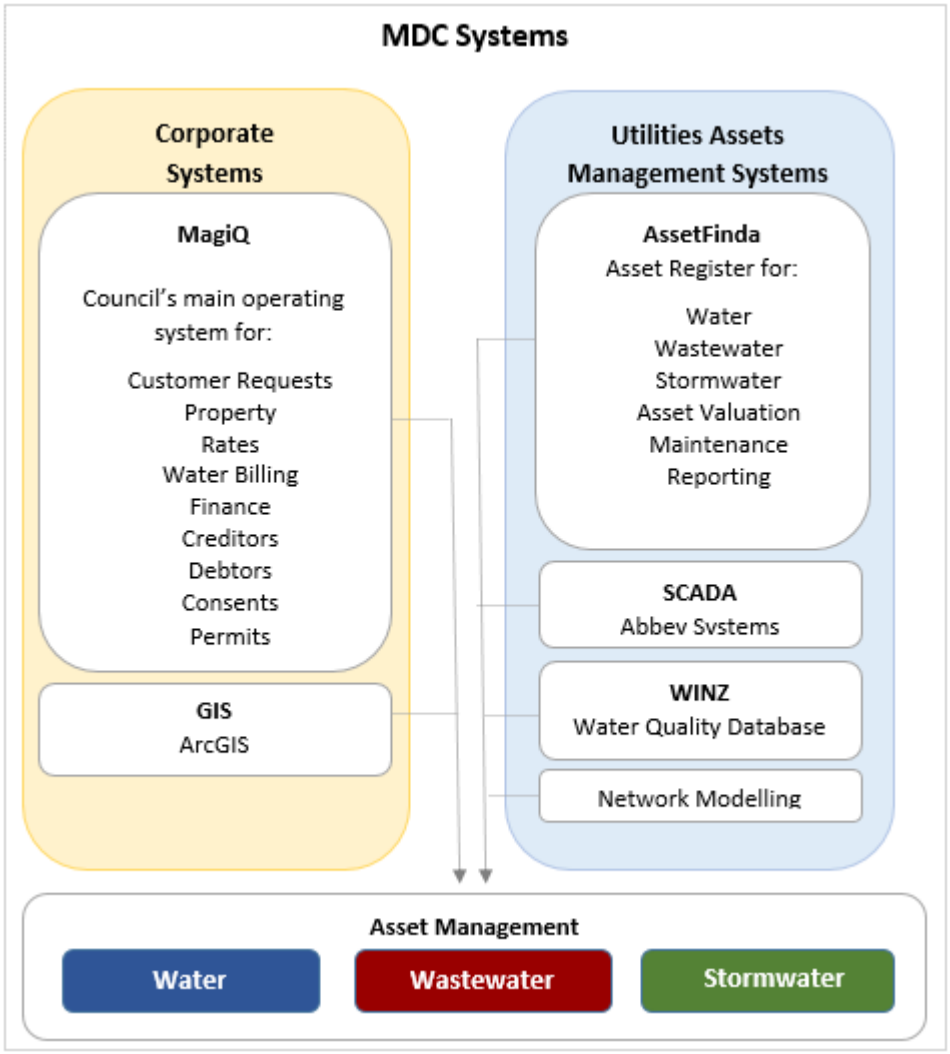
All contract works are claimed monthly against each of the contract item numbers by the physical works and professional services contractors. Council and/or consultants confirm the payment value for all physical works and the Council confirms the payment of any professional services. The accounts job number and account codes are included on the payment certificate. These certificates are forwarded to Council for payment. The types of work that this system relates to are maintenance, renewals and capital expenditure.

There are a range of reports prepared in order to comply with the requirements of Council, and the Auditors. All external reports are prepared in compliance with Generally Accepted Accounting Principles (GAAP).

5.2 Systems

Information and Data Systems provide Council staff with the ability to obtain, store, analyse and report on the significant quantities of data that is associated with the 3 Waters. The information and data systems available to Council staff are shown below and discussed within this section.

Figure 5-3: Council Systems



Council uses Asset Finda which is a complete system for designing and managing solutions through the application of geographic knowledge. Data can be manipulated within AssetFinda, ArcGIS or exported to excel to assist in the decision making process for wastewater network issues.

5.2.1 AssetFinda

AssetFinda is an advanced Assets Management System designed to assist Councils in whole of life management of their assets. AssetFinda is designed to meet Council's long term and statutory asset management requirements.

It is has three main components:

Asset Register: An accurate asset register is critical to any asset management system. It controls a database that utilizes GIS, Web and iPad to view, edit, analyse and add data – faster, easier and more accurately than ever before.

Asset Maintenance: Maximizes the useful lifespan of assets by managing past, present and future maintenance requirements of your assets.

Asset Reporting: There is wide variety of reports, including Asset Revaluations, Monthly & Annual Depreciation Calculations, and Predictive Modelling.

AssetFinda utilizes a Web front end, GIS interfaces and iPad apps, thus creates a flexible and user friendly interface that even the newest of users can navigate quickly. The iPad App is designed to give real-time access to data in the field. View, analyse, edit & add data, capture images, run inspections, complete works requests from anywhere in the field with in either Online or Offline mode.

Council uses AssetFinda to manage the following:

- Water
- Drainage
- Wastewater

The Asset Register contained within AssetFinda/ArcGIS (previously MapInfo) is contained within separate databases. Each database records the attribute of each asset to component level including age, condition, performance etc.

Depending on what type of asset is identified there are varying amounts of information recorded for that asset. There are gaps in the information for each asset, but we are continually gathering information on these to complete the Asset Register.

5.2.2 SCADA

SCADA (supervisory control and data acquisition) is a system operating with coded signals over communication channels so as to provide control of remote equipment. The control system may be combined with a data acquisition system.

The term SCADA (Supervisory Control and Data Acquisition) usually refers to centralized systems which monitor and control entire sites, or complexes of systems spread out over large areas. Most control actions are performed automatically by RTUs or by PLCs. Host control functions are usually restricted to basic overriding or supervisory level intervention.

Council is progressively rolling out SCADA to all its remote sites across the district. This will not only control the operation of the site but actively monitor and send the operational data back to the Fairlie in real time via telemetry.

Investigation of options found the best option for Council was to be part of the existing Timaru District Council SCADA system.

Table 5-1: SCADA

SCHEME	FACILITY	METER	SCADA REPORT										ALARMING	
			Pump Start/Stop	Pump hours	kW	Current	Power failure	Actuated Valves	Level (high/low)	Flow	Aerator	Intruder/ Operator	Outgoing alarms	Flashing Light
Fairlie	Camp Ground PS													
	Treatment	✓						✓		✓				
Lake Tekapo	Lakeside PS		✓	✓			✓		✓	✓			✓	
	Domain PS		✓	✓			✓		✓	✓			✓	
	Sealy Street PS		✓	✓			✓		✓	✓			✓	
	Treatment													
Twizel	Mackenzie Park PS		✓	✓			✓		✓	✓			✓	
	Pukaki Airport PS		✓	✓			✓		✓	✓			✓	
	Treatment													
Burkes Pass	Treatment													

5.2.3 Network Modelling

Network modelling is an effective tool to assist in the managing a wastewater reticulation network. Network modelling software aids Council staff in effectively managing the wastewater collection system through simulation of the existing and future networks. There are currently no models for any of the wastewater systems. Models are to be developed for the wastewater systems to provide a tool to maximise efficiency of all systems within the District (**IP 2**), with Twizel the highest priority.

5.3 Data Management

Key information comes into the Essential Services Group through work reports, as-builts, SCADA, consumers and contractors. Other information comes into the Unit via emails, journals, Government publications and the media.

Decisions on activity management, renewals and acquisitions are made in consultation with staff, council and the public as appropriate. Staff meetings are held regularly to discuss current and future plans and decisions.

Asset data integrity audits is an ongoing process and data is checked on a continual basis. As work orders are completed and submitted to be captured within the asset register the data recorded on site is compared with the asset register data. This is an ongoing process of ensuring a high level of data integrity.

General maintenance work is continuous throughout the year and responds to the needs of the network. The data from the repairs carried out is reported to Council and recorded in the Councils systems on a regular basis.

New subdivisions in the District result in additions to the pipeline infrastructure. In the past there have been difficulties in capturing the resulting updated and additional asset information. Processes are in place to ensure that this data is provided electronically so that it can easily recorded in the Asset Register and available for ongoing effective Asset management.

5.4 Data Confidence

Data confidence grades are held against each individual asset within the AssetFinda asset register. These grades indicate the type of data source and the confidence in the specific data source. A summary of the confidence levels in the attributes of the assets are detailed in the following table.

Table 5-2: Data Confidence

Valuation element	Wastewater
Asset register or database	H
Attribute details	G
Asset category	H
Optimisation information	A
Asset Lives	G
Condition	H
Where	
VH	Very High confidence
H	High confidence
G	Good confidence
A	Average confidence
P	Poor confidence

5.4.1 CCTV Inspections

The aim of asset management is to manage assets, such as sewer systems, in a way that provides the required level of service in the most cost-effective manner through the creation, operation, maintenance, renewal and disposal of assets to provide for existing and future customers.

CCTV inspections can help organisations gain an understanding of the existing condition of their piped assets. This understanding can help organisations make decisions such as which pipelines are:

- Undersized and need to be upsized to meet future flows.
- In risk of collapse.
- In need of maintenance works such, as root cutting.

Council is then able to prioritise works and prepare a timetable and budget for any required rehabilitation works. Pipelines are regularly internally inspected by CCTV.

Reasons for CCTV inspections include, but not limited to:

- General condition surveys to determine the areas in pipe networks that require attention and to develop long-term programmes for replacement and maintenance of the network.
- Responsive maintenance, e.g. to identify and repair faults in pipes that have caused overflows or flooding.
- Determination of rehabilitation requirements, e.g. to determine which pipes need to be lined to prevent too much water entering into the system. This can result in the pipes not having enough capacity to cope with the flow, thus causing overflows.
- Quality checks on new works or after the rehabilitation of pipes.

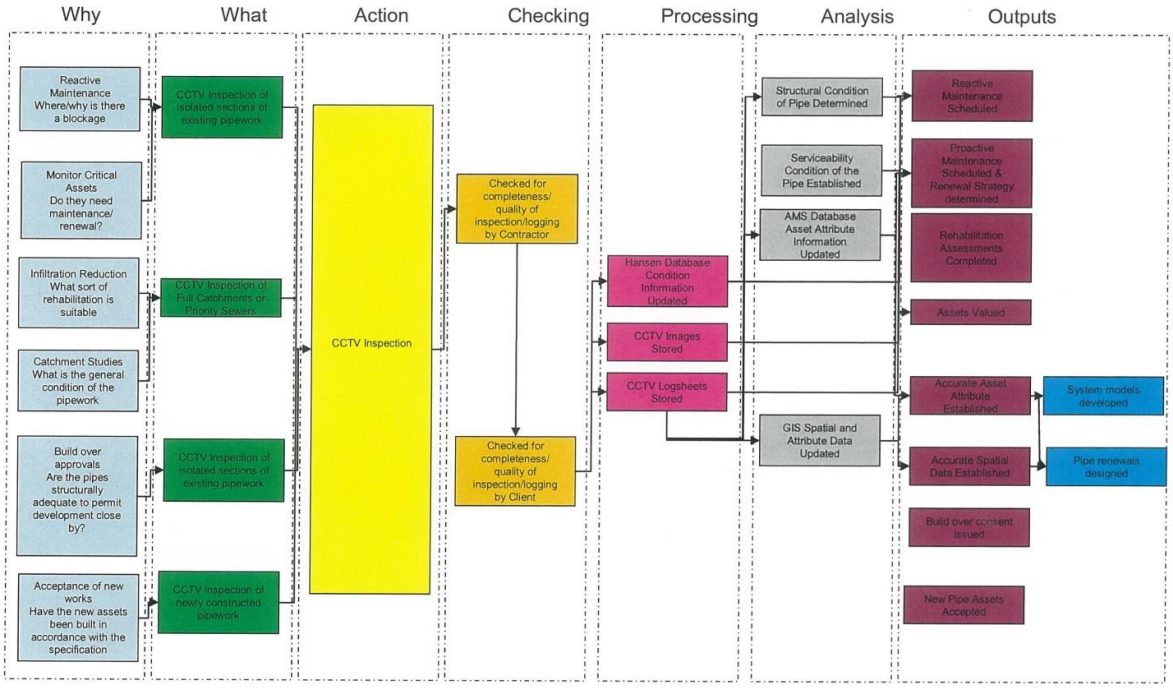
A CCTV inspection provides information for asset management, maintenance and rehabilitation purposes. CCTV inspections view the condition of assets, and provide information on attributes. Condition data can be used to:

- Determine the structural condition of pipes to enable rehabilitation works to be prioritised.
- Maintain a check on the structural condition and rate of deterioration of pipes to enable forward budgeting for maintenance and rehabilitation.
- Provide an overall inventory of the asset and a global picture of system problems.
- Check service conditions to enable regular maintenance planning.
- Provide miscellaneous information for additional uses, such as locating unused lateral connections for new housing developments.
- Provide a status of sewer and stormwater systems for industry benchmarking.

CCTV inspections also provide valuable information on the position and type/size of the pipes being inspected, such as:

- Connectivity, i.e. which manholes are connected by the pipe.
- The location of pipes and manholes can be determined by the length of the pipe surveyed and the position of the manholes noted when the CCTV camera was put into or retrieved from the pipe.
- The diameter of the pipe being inspected.
- The material of the pipe being inspected.

Figure 5-4: The CCTV Process



5.5 Information Technology

The responsibility for asset information security rests with the IT department administrators. The data is backed up daily and backup files are stored in a secure place. Data manuals are available that explain the various procedures.

5.6 AMP Preparation

Council engaged Waugh Infrastructure Management Ltd (WIML) to assist with the review and update of the AMPs. The review consisted of the following analysis:

- Review of Council Utilities AMPs against general industry practice as observed by Waugh Infrastructure in the past 12 months
- Review and commentary on the adequacy of the AMP structure against current industry practice and requirements
- Analysis of AMP individual section strengths and emphasis, including analysis of overall AMP 'message' versus issues identified
- ISO 55000 considerations in AMP updating, structure and messaging
- Analysis of the AMPs against LGA amendment requirements, both 2012, and 2014 – identification of any issues or 'misses'
- Provide review comments of AMP strengths and weaknesses identified, with commentary on any suggested priority changes to be completed as part of the 2018 LTP process

Following the review Council engineers consider review recommendations and use these as guidance where appropriate. The AMPS are then updated through a process of regular meetings between Council engineers and WIML staff to identify:

- Status and changes, including but not limited to:
    - Legislation
    - Levels of Service
    - Assets
    - Processes & Systems

- Demand & demographics
- Organisation
- Asset Values
- Projects
- Council direction

This information is then used to ensure the AMP demonstrates:

- all 3 Waters asset based activities of Council are supported through the AMP
- 3 Waters AMPs are easy to read, and follow the same agreed format
- the underlying activity management planning processes occurring for each activity, including improvements made as a result of the review
- levels of service, and show linkages to other Council planning documents
- a robust reflection of the future intentions of Council with respect to 3 Waters activities
- the financials arising from the plans reliably forecast the lowest lifecycle cost to deliver agreed levels of service for a period of no less than 10 years.

5.7 Quality Assurance

5.7.1 Audits

To establish and ensure the ongoing improvement of the quality of this Plan a series of audits are planned and includes Financial, Systems, Technical and Performance Audits.

- **Financial audits** - the LGA requires that independent annual financial audits be undertaken on the operations of Council; such audits may include all significant activities such as activity management planning. The auditor's opinions will be included in the Annual Report. All recommendations are for improvement are adopted and implemented as appropriate and resources permit
- **System audits** - are continuous and ongoing and incorporated in operational practices. However, as part of the LTP process, systems are discussed and reviewed every 3 years. This audit identifies the current status of asset management processes, systems and data and produce targets for Asset Management practices to be achieved in following years.
- **Technical audits** – include peer reviews undertaken at regular intervals to assess and identify compliance with statutory accounting requirements.
    - The quality of the Plan in terms of completeness, objectivity, logic, technical content and presentation
    - Perceived strengths and weaknesses for Plan improvement
    - Recommended specific areas for Plan improvement
    - Technical Audits may be undertaken using external or internal reviewers
- **Performance audits** establish whether the stated objectives for the operation of the asset have been achieved. Measurement of the success of the operation of the asset will be assessed using the results of:
    - Customer satisfaction surveys
    - Key Service Criteria objectives compliance

5.7.2 Knowledge of assets

The process of capturing as-built records for the on-going enhancement of asset registers is included as a requirement of the maintenance contracts. The information is supplied to Council staff for them to upgrade the relevant registers. Projects undertaken outside the maintenance contracts have a requirement within their contract for the relevant information to be collected and forwarded to Council for them to upgrade the registers. Council needs to be diligent in obtaining as built data (e.g. new subdivisions) to ensure infrastructural asset data is up to date enabling informed decision making. The Contractors staff use iPads in the field to check and capture data for updating the asset registers. This information is confirmed by Council staff prior acceptance into the asset register.

5.7.3 Accounting/Economics

Maintenance and renewal costs are recorded against broad activities in the general ledger. Valuations are currently based on straight line depreciation and assumed effective lives.

5.7.4 Risk Management

Although processes are in place for the monitoring of some critical assets (e.g. pump stations), risk management is generally practised informally based on the knowledge of experienced staff.

5.7.5 Operations

Operational processes are documented in service delivery contracts and are subjected to regular review.

5.7.6 Maintenance

Competitively tendered contract is entered into approximately every five years to deliver the maintenance of this activity. Major new pipeline construction or replacement is tendered individually for larger budget items.

5.7.7 Optimised Lifecycle Strategy

Work optimisation for other assets is based on the judgement of experienced staff, internal inspection of pipelines and renewal projections are based on assumed economic lives.

5.7.8 Design & Project Management

Council uses established procedures during the project evaluation and design phases. The Council and consultants use appropriate project management manuals such as NZTA Project Management Manual and other appropriate guidelines. Sound contract management procedures are in place. The supervision of assets constructed within sub-divisional development and subsequently taken over by Council is considered to be adequate.

5.7.9 Suitably Qualified and Trained Staff

An important measure of this Plan's quality is the ability, experience and qualifications of the individuals and companies involved in its preparation. The Council employs staff appropriately qualified to carry out the asset management function.

On-going training is available for staff involved in infrastructure asset management and includes attendance of:

- IPWEA sponsored workshops on Asset Management
- NAMS seminars
- Annual WaterNZ conference
- Asset Management conferences
- Water Managers (NZ wide) quarterly meeting.

Council engineering staff have the qualifications, skills and experience that are appropriate for carrying out the asset management function of the Council, provided specialised external support is available as the need arises.

5.8 Sustainable Practices

5.8.1 Overview

Sustainability can be defined as meeting the needs of the current generation without compromising the ability of future generations to meet their own needs.

The LGA 2002 requires local authorities to take a sustainable development approach while conducting its business. In doing this Council is required to take into account the following:

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

5.8.2 Sustainability and Lifecycle

Asset management is designed to improve decision-making about assets to enable the better management of existing and future assets. Effective asset management ensures that agreed levels of service are met and risks, including public health, financial and environmental are minimised, while costs are optimised. Evidence based decision-making is crucial to achieve asset management and sustainability goals. Having the correct asset information available is important to support the decision-making process. It is thus clear that lifecycle costs is part of and supports asset management and sustainability.

Asset management practices include action that recognise the need for environmental, economic, social and cultural sustainability, that is –

- The natural environment needs to be preserved for future generations and not degraded as a result of Council's asset management operations and development projects
- Financially, there is a limit to what ratepayers, developers, and therefore Council, can afford. Expenditure needs to remain within this limit and the costs need to fall equitably on the generations which derive the benefits
- Social relationships between individuals, interest groups and local government are valuable, and Council needs to facilitate and encourage this by providing infrastructure
- Our history, customs and creativity are valuable to us. Their preservation and enhancement over time is facilitated by providing venues where they can be practiced, preserved and displayed

Council considers the following under sustainability:

- Efficient use of energy within facilities
- Discharges are consented
- Efficient operation of facilities
- Improving effluent quality and/or improved disposal methods
- Collaboration with other Councils

Council also considers collaboration with other Council as sustainable practice. Sharing services/resources/systems/information is key to providing a sustainable service to the community, while maintain a district's own identity. SCADA is a good example in the 3 Waters area where we are part of the existing Timaru District Council SCADA system.

5.8.3 Significant Negative Effects

The negative effects that the wastewater activity may have on the social, economic, environmental or cultural well-being of the community is tabled below. It indicates how the existing approach or proposed action to address these in the future.

Table 5-3: Significant Negative Effects

Negative Effect	Impact on well-being				Comment
	Economic	Social	Environmental	Cultural	
Wastewater Treatment Plants					
Noise	None	None	None	None	Plants are generally outside or on the boundary of urban areas and generally don't have noise producing plant
Discharge of odour	Minor	Moderate	Minor	Minor	A high degree of odour control is provided
Discharge of treated wastewater to water/land	Minor	Moderate	Minor	Minor	Ongoing maintenance and operation of wastewater treatment plants and upgrade where required to meet increased consent conditions and ensure compliance with resource consents. All discharge is to land.
Pump Stations					
Noise	Minor	None	Minor	None	All pumps are contained within structures with appropriate sound proofing where required
Discharge of odour	None	Minor	Minor	Minor	Where reported, it is resolved within specific contract timeframes
Overflows	Moderate	Moderate	Minor	Minor	Pump station overflows are rare and resolved within specific contract timeframes. Emergency storage exist at all wastewater pump stations
Reticulation					
Overflows	Moderate	Moderate	Moderate	Moderate	Reticulation overflows are rare and resolved within specific contract timeframes.
Discharge of odour	None	Minor	Minor	Minor	Where reported, it is resolved within specific contract timeframes

There are no significant negative effects shown to occur for the wastewater activity.

5.9 Environmental Management

A very important aspect of the wastewater systems function is to ensure that the District's land and water sources are managed responsibly. Resource consents are held for various activities relating to the wastewater activity such as the disposal of treated water at the water treatment plants.

The Mackenzie District is under the authorisation of Environment Canterbury (ECan).

5.9.1 Schedule of Resource Consents

The following table lists the wastewater resource consents that are presently held:

System	Consent #	Description	Expiry Date	Allowable discharge
Fairlie	CRC992647	Discharge odour to air	17 December 2038	Not applicable

System	Consent #	Description	Expiry Date	Allowable discharge
	CRC992608.1	Discharge to land	17 December 2038	650m^3/day (average)
Lake Tekapo	CRC042914	Discharge to land	17 December 2038	1,100m^3/day (monthly mean) inflow
Twizel	CRC042915	Discharge to land	8 July 2020	1,500m^3/day (average)
Burkes Pass	CRC992607	Discharge to land	7 June 2040	8.1m^3/day

Discharge permits are required for the discharge of treated effluent to land or water, and the discharge of odours associated with wastewater treatment plants.

5.9.2 Consent Monitoring and Reporting

Consent reporting within Council for Water, Wastewater and Stormwater is the responsibility of the Utilities Manager. Information for consent compliance is provided by the Council Regulatory Department and the Contractor (information drawn from SCADA) and forwarded to Environment Canterbury.

Compliance with resource consents for wastewater systems is considered to be good with no abatement notices and only minor non compliance issues.

In the past ECan has indicated ongoing concern with the Tekapo disposal system. Council engineers are working on a replacement system that will provide certainty of disposal in the short to medium term. There will be a strategic study in Year 1 of the LTP which will review the future location and extent of the disposal system but any works to relocate the system (if required) will be outside of the term of this AMP.

6.0 LEVELS OF SERVICE

6.1 Defining the Levels of Service

Activity management planning requires a clear understanding of customer needs and preferences and the minimum obligations that must be met. A key objective of this activity plan is to match the level of service provided by the asset with the expectations of the customers given legislative, financial, technical and safety constraints. Service standards, set to meet this objective, provide the basis for the life cycle management strategies and work programmes identified in Section 7.

The service standards defined in this section will be used:

- to ensure legal and legislative requirements are met
- to inform customers of the type and level of service offered
- as a focus for the asset management strategies developed to deliver the required level of service
- as a measure of the effectiveness of this Plan
- to identify costs and benefits of the services offered
- to enable customers to assess the suitability, affordability and equity of the services offered

The Council levels of service for wastewater services reflect current industry standards and are based on:

- Customer Research and Expectations: Information gained from the community on their expectations of quality and price of services
- Strategic and Corporate Goals: Provide guidelines for the scope of current and future services offered, the manner of service delivery and define specific levels of service which the Council wishes to achieve
- Legislative Requirements: Environmental standards, regulations and acts that impact on the way assets are managed (i.e. resource consents, building regulations, health and safety legislation, LGA)
- Demands on the Network: Service demands that are placed on the network.

6.2 Activity Goals and Objectives

The wastewater network must be operated to meet Council policy, objectives and various Environment Canterbury requirements. Council's goals and the community's expectations are stated in the LTP which provides the framework for the operation and development of the wastewater infrastructural assets.

6.2.1 Organisation Mission, Goals and Objectives

The Council's mission statement is: "**FOSTERING OUR COMMUNITY**". The particular aspects of the overall mission that relate to the wastewater activity are:

SERVICE
We are a service organisation. Providing efficient and cost-effective services is our prime responsibility.

SUSTAINABILITY
We are committed to the sustainable management of all the resources of the district.

6.2.2 Wastewater Activity Goal and Principal Objectives

As outlined in Council's LTP, the wastewater asset contribution to achieving Council's governance goal and the community outcomes identified in Section 2 is through the Wastewater Activity Goal:

> To ensure that Wastewater assets are managed to measures minimise damage and inconvenience to property and there are no environmental ill effects arising from Wastewater protection work

The specific Objectives of the Wastewater activity are as follows:

- To develop and activity management plan for effluent disposal;
- To contract cost effective service delivery;
- To identify and prioritise key areas for network improvements and progressively correct these;
- To ensure all resource consents conditions are met; and
- To ensure the maintenance of the public infrastructural assets in perpetuity, so that there is no diminution in value, and to forecast the estimated future cost of so doing

6.3 Current Levels of Service

Levels of Service:

- Define explicitly the standards required from the wastewater system
- Are an expansion of the corporate objective, as previously stated
- Will largely shape Council's detailed planning

In providing wastewater services to the community Council must balance the standard of service desired with the cost of providing the service. The Levels of Service are designed by Council to represent the best level of service possible for a cost that the community can afford and is willing to pay.

The levels of service that Council is aiming to achieve in future are shown in Table 6-1: Community Outcomes & Levels of Service linkage.

- It should be noted that the target Levels of Service are not intended as a formal customer contract. Rather Council's responsibility is initially to aim to achieve these levels and then to achieve them more cost effectively through a process of continual improvement

The Council is required to use a number of measures when reporting to our community. The aim is to encourage greater public participation in decision-making processes. The performance measures will do this through providing better information about the levels of service.

Table 6-1: Community Outcomes & Levels of Service linkage provides the linkages between the Community outcomes, Levels of Service and Performance Measurement.

6.3.1 Changes to Levels of Service

In accordance with 261B of the LGA, non financial performance measures were adopted on 12 November 2013. These Performance Measures require local authorities to report on the performance of the key activities of water supply, wastewater, stormwater, flood protection and roads annually.

The Council will only report on the mandatory measures as this covers the key expectations in terms of the delivery of the service.

6.3.2 Levels of Service

Table 6-1: Community Outcomes & Levels of Service linkage

Community outcome	How it contributes	Level of Service	Performance Measure
A fit and healthy community	Providing community reticulated wastewater systems in agreed areas thus protecting the communities from wastewater related health issues	Wastewater is managed to without risk to public health	Number of dry weather wastewater overflows
Safe, effective and sustainable infrastructure	Providing a sustainable, efficient and effective wastewater service	Safe discharge of wastewater	Compliance with resource consent conditions
An attractive and highly valued natural environment	Providing a wastewater service that acknowledge and incorporates the natural environment in design, construction, operation and maintenance	Sewage is able to be disposed of without significant disruption	Compliance with resource consent conditions Response & resolution
A thriving economy	Timely response to system failures Maintaining quality and continuity of service	Safe discharge of wastewater	Response & resolution Wastewater complaints
A democracy that upholds the rights of the individual	Not applicable to wastewater		
A supportive and contributing community	Not applicable to wastewater		

6.3.3 Secondary Levels of Service

These are technical measures included in the Infrastructural Services Contract.

Council Event	Service Standard
Response	Provide a 24 hour, 365 day per year call out service Complete administration functions in a timely manner
Response Time	Faults with potential to cause disruption of service – two working days Blockage in Public Sewer and Other Emergency Repairs: • During working hours - The service to be reinstated by temporary or permanent repairs within six hours of call out • Outside working hours - The service to be reinstated by temporary or permanent repairs within nine hours of call out
Availability/Disruption to Service	Maximum duration of one disruption - 24 hours Normal duration of one disruption - eight hours (*It should be noted the above duration would not apply for an extraordinary event such as a major earthquake or flood*)

The Council is committed to maintaining and improving the network where current levels of service may not be being met. Analysis of the network condition over time provides an indication of asset behaviour and performance achievement. The following table outlines the measures that will be used to determine the network condition and performance.

Measure	Explanation	Method of Measurement	Target values	Response times
All wastewater facilities function satisfactorily	Wastewater facilities, such as: -Pipelines -Manholes -Pump Stations -Treatment Facilities -Disposal systems	Visual inspection DO Monitoring	Oxidation Ponds – Clean out inlets. Measure and record DO Check aerators and disposal fields for effective operation. Pump Stations – Check and record water levels and pump hours. Wash down wells and test alarms Service all pumps Clear blocked wastewater mains	Weekly Inspected at least monthly Six monthly 6 hours in normal working hours and 12 hours to clear blockages at any other time

6.4 Levels of Service Development

The current LOS being provided has been established through Council's LTP process. This would suggest there is approval with the current regime, although this could also be interpreted as an over provision of service in the context of Council's broader service profile.

Options to further examine this issue in the future could include:

a) Monitor and interpret customer feedback through customer feedback and complaints. This information can be analysed for any trends or common factors related to current service levels (e.g. number of complaints received)

b) Engage customers in a formal process. There are a number of mechanisms to achieve this from public meetings to surveys to focus groups. This may include the use of documented feedback processes. In all methods the clear description of different LOS options, fully costed, is a prerequisite to meaningful feedback

c) Engagement with key stakeholders. These include the Regional Council, and others. Again good input information to these engagements will produce valuable feedback.

6.4.1 Levels of Service Definition

The current LOS are documented as a combination of:

- LTP LOS documentation based on real or perceived customer feedback
- Contract processes which describe some elements of the quality of service provided, mainly travelling surfaces and intervention levels

This can be improved by:

a) Augmentation of existing information e.g. clearer relationships between alternative service levels for quality, pressure etc and their associated costs.
b) Utilisation of a LOS model defining quality, quantity, location, and timeframe. This would be based on the IIMM and define the wastewater service in terms of Accessibility, Health and Safety, Quality, Reliability and Responsiveness, Sustainability, Functionality.

These would form the basis for a consultative process as outlined above.

6.5 Performance Measures

Council has suite of performance measures agreed with the community and reported on annually by the Annual Reports. This performance is measured as per contractual requirements and changes in indicators such as increased flooding or maintenance.

The mandatory performance measures have been adopted by Council for inclusion in the 2018 - 28 LTP and no other measures will be used.

Table 6-2: Levels of Service, Performance Measures, Targets

Levels of Service	Performance Measure	Actual 2013/14	Target 2015/16	Target 2016/17	Target 2017/18	Target 2018-2025
Wastewater is managed without risk to public health	The number of dry weather wastewater overflows from Council's wastewater system, expressed per 1000 wastewater connections to that wastewater system.*	New measure	≤5	≤5	≤5	≤5
Safe discharge of wastewater	Compliance with the Council's resource consents for discharge from its wastewater system measured by the number of: a) abatement notices b) infringement notices c) enforcement orders, and d) convictions received by the Council in relation those resource consents.*	New measure	a) Nil b) Nil c) Nil d) Nil	a) Nil b) Nil c) Nil d) Nil	a) Nil b) Nil c) Nil d) Nil	a) Nil b) Nil c) Nil d) Nil
Sewage is able to be disposed of without significant disruption	Where the Council attends to wastewater overflows resulting from a blockage or other fault in the Council's wastewater system, the following median response times measured: a) attendance time: from the time that the territorial authority receives notification to the time that service personnel reach the site, and b) resolution time: from the time that the territorial authority receives notification to the time that service personnel confirm resolution of the blockage or other fault.*	New measure	a) ≤1 hour b) ≤4 hours	a) ≤1 hour b) ≤4 hours	a) ≤1 hour b) ≤4 hours	a) ≤1 hour b) ≤4 hours
Sewage is able to be disposed of without significant disruption	The total number of complaints received by the Council about any of the following: a) sewage odour b) wastewater system faults c) wastewater system blockages, and d) the Council's response to issues with its wastewater system, expressed per 1000 connections to the Council's wastewater system.*	New measure	≤50	≤50	≤50	≤50
Sewage is managed without risk to public health	Percentage of ratepayers satisfied with the sewage treatment and disposal service.	96%	85%	85%	85%	85%

6.6 Affordability and Willingness to Pay

Hand in hand with the current LOS vs. Desired LOS is the issue of cost. This needs to be addressed at two levels:

a) Cost for different Levels of Service options within the Wastewater Activity
b) Cost of the Wastewater activity within the total Council programme.

The first level can be addressed using the options outlined above where fully described and costed service level options are consulted with the community.

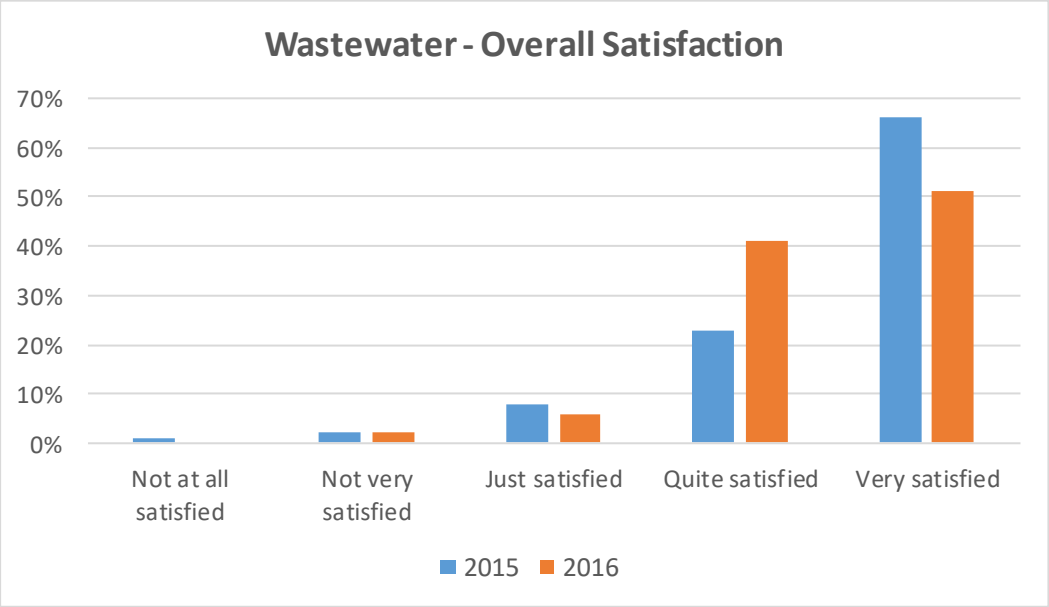
The second level needs to be addressed as an assessment of the relative contribution the Wastewater Activity makes towards the achievements of Community Outcomes at the current level vs. greater or lesser levels of service.

6.7 Reporting

Measurement and reporting of Customer Levels of Service shall be achieved through the customer satisfaction survey. This is undertaken annually and this can be used as a benchmark for the next year, and the trend across the results of each year's survey provides a long term view of Council's performance.

The Ratepayers Opinion Survey 2016 provides useful commentary on issues that concern residents.

Figure 6-1: Wastewater Service - Satisfaction Rates



The survey identified that 98% of the respondents were satisfied with the overall wastewater activity. This is a 1% increase in satisfaction levels from the 2015 survey.

Reporting on the achievement of Customer Levels of Service can be compared across different activity groups to provide internal benchmarking within Council, and combined to provide an indication of the contribution towards community outcomes and well-beings. Wastewater services consistently achieve very high satisfaction levels.

Measurement and reporting of Technical Service Standards is essential for the prudent management of the wastewater activity. With regard to wastewater discharge/disposal in particular, frequent monitoring and reporting is integral to meeting resource consent conditions.

6.8 Consultation & Communication

6.8.1 Consultation

There are a number of instances where Council will undertake consultation at a District wide or comprehensive level. This generally occurs when there is a requirement to use the Special Consultative Procedure as prescribed in the LGA. This occurs in the following situations:

- Adopting or amending the LTP. The LTP is reviewed every three years with the Annual Plan giving effect to that Plan in the intervening years. The Council must consult on community outcomes at least every six years.
- Adopting, amending or reviewing a Bylaw
- Proposing a change in the way a significant activity is undertaken
- Significant decisions not already provided for in the LTP
- Termination of a service

The Council will decide that some decisions are significant and will therefore require a more rigorous assessment of options and a more robust consultative process. Those decisions are treated as amendments to the LTP and can be dealt with either separately or as part of the Annual Plan process.

6.8.2 Communication

In operating and maintaining the Wastewater Service Council consults and communicates with the community in various ways.

- Significant projects are notified in the printed media by means of a formal media release in the local papers
- For the duration of significant projects a weekly/fortnightly/monthly advertisement maybe placed in the local papers. This may include a short update on progress, an accompanying map showing the work area
- all consumers associated with the service interruption maybe notified through a letter drop
- critical and key customers may be identified and notified 72 hours prior work affecting their service

This ensure customers stay informed of the project, its progress and how and when they will be affected.

6.8.3 Key Stakeholders

Mackenzie District Council has a history of actively communicating with the public via:

- Extensive public consultation;
- Annual Plan Submissions;
- Customer surveys;
- Project teams for specific significant community projects;
- Council website and facebook page.

This Plan recognises the following stakeholders:

Key stakeholders
The Council as the ultimate owner of assets. Other key stakeholders of the Wastewater network include:
Regional Council Owners and operators of inter-connecting or separate Wastewater networks
Funding Partners
Funding is provided by several parties and in particular the following are significant contributors:
Ratepayers – Rates provide funding for maintenance and operation of the networks Developers – By constructing infrastructure and vesting it in the Council plus providing the required financial contributions

Customer Groups	Description	Customers
Associated service providers	These are other service providers who rely on the wastewater network	Contractors Commercial operators
Users	Those who directly benefit from the service	Ratepayers Residents and holiday home owners Commercial properties Industrial users
The Wider Community	Non-users that are affected if the service is not provided	Ratepayers and residents Tourists Local businesses

6.9 Legislative Requirements

In providing wastewater services the Council monitors central government and industry direction for national infrastructure assets and public service provision. This is done through attending conferences and seminars, studying reports released by central government agencies and membership of industry organisations e.g. IPWEA, Water NZ, etc.

The following themes are signalled:

Theme	Source
Information • how local authorities identify the right information that provides the evidence on what they need to understand about their assets, and how they collect, capture, and share that information? • how well local authorities are managing and planning to provide services now and into the future? • how good is the knowledge on asset condition and how is it used to determine the nature and frequency of maintenance and renewals? • how is asset information used to make decisions and enable sustainable service delivery?	Office of the Auditor General (multi-year themed work programme 2016/17)
Water *Our proposed theme for 2017/18 is Water. We are interested in water because it is of significant and growing interest to Parliament and citizens here and internationally, in terms of both water quality and quantity. It is a broad topic that spans central and local government, the environment, the economy, and society.* *It therefore provides a focused and useful introduction to our proposed 2018/19 theme of Sustainable development. We are currently considering the scope of work under our proposed sustainable development theme. (*Source – OAG 2016/17 Annual Plan*)*	Office of the Auditor General (multi-year themed work programme 2017/18)
Improving New Zealand's Water, Wastewater & Stormwater Sector A position paper prepared by LGNZ identifies three areas for improvement within the Water Service area: • increasing need to renew and replace assets, • Service providers are being asked to meet higher standards of quality • There is not enough information on performance	Local Government NZ
Metadata Standards To ensure the correct asset data is collected and in the correct manner, LINZ and MBIE gained funding from Treasury to work with local councils and central government agencies to develop national metadata standards for the 3-waters (potable, waste and storm) network, and for residential and light commercial buildings. Draft standards have been developed for capturing, describing and storing data for potable water, and residential housing and light commercial buildings. The roll out of these data standards is expected to start mid 2017.	LINZ & MBIE
Earthquake damage & pipe renewals	Water NZ

Theme	Source
The 2011 Canterbury earthquake has led to a major project which could impact on cost of replacing water pipes. A joint venture between Water New Zealand, the Institute of Public Works Engineering Australasia (IPWEA) and the Quake Centre based at Canterbury University, is aimed at providing tools to enable better and more nationally consistent decisions on where and how to renew and replace water piping. This venture may result in significant savings through improved decision-making. The first stage aims to bring together guidance documents and tools to enable Council staff to make evidence based decisions relating to the management and renewal of their drinking, storm and wastewater pipe networks. The programme covers inspection, maintenance and renewal strategies	

6.9.1 National Strategies & Plans

National policy statements are issued by the government to provide direction to local government about matters of national significance which contribute to meeting the purpose of the RMA.

National Infrastructure Plan
The National Infrastructure Plan 2015 (NIP 2015) is the third National Infrastructure Plan to be released by the Government.

The NIP 2015 confirms the Government's long term vision for infrastructure and is designed to reduce uncertainty for businesses by outlining the Government's intentions for infrastructure development over a 20 year timeframe. It provides a framework for infrastructure development rather than a detailed list of projects and it includes a series of actions.

The NIP provides a Vision for New Zealand's Infrastructure that:
"By 2045 New Zealand's infrastructure is resilient and coordinated and contributes to a strong economy and high living standards."

The NIP 2015 is the first Infrastructure Plan that details a comprehensive suite of actions that will be undertaken to deliver on the new approach. The actions are focussed on what central government, local government and infrastructure peak bodies will do, reflecting the collaborative effort required to change how infrastructure is planned, developed and managed in New Zealand. Significant policy work and consultation will be required to develop the detail. The following list of actions are taken from the NIP 2015.

The Action Plan for **Asset Management** means:'

- Local government will have a long-term view of their investment requirements to make more informed decisions. The Local Government Amendment Act 2014 is a step towards this, requiring an infrastructure strategy for at least a 30-year period;
- Infrastructure providers will develop a more sophisticated approach to understanding the condition of those assets, the timing of renewals, and how they are performing in comparison to similar networks. This be will progressed through the establishment of shared metadata standards across roading, the three waters, and government built assets
- Infrastructure providers will be able to understand how their networks interact with other infrastructure networks as well as the implications for land use planning and the end user of infrastructure services.
- Individual sectors will progress specific programmes to improve their asset management maturity including:
- the establishment of a programme to enhance the capability, productivity and leadership in asset management throughout the public sector in New Zealand by IPWEA New Zealand and the NIU (National Infrastructure Unit);

The Action Plan for the **3 Waters** (water, wastewater and stormwater) means:

The sector will be recognised for its mature asset management practices across all providers, underpinned by reliable and accurate data on the state and performance of the network to support better decision-making. A key focus is optimising the existing three waters network. This will be achieved through:

Developing national metadata standards for water infrastructure to ensure a consistent base to build evidence, undertake forecasting, deepen capability (LINZ, NIU, local authorities, and sector bodies).

- Establishing centres of excellence responsible for collating the data obtained through the shared metadata standards, providing the necessary analytics and supporting local decision-making (NIU, sector bodies, and local authorities).
- EquiP LP, Local Government New Zealand's centre of excellence, is developing a Governance Development programme and an Organisational Performance programme to assist councils in raising the standard of governance, performance and asset management (LGNZ).
- The LGNZ 3 Waters project to lift the performance of our potable water, wastewater and stormwater services and infrastructure. The project established a National Information Framework survey in 2014 and the issues paper released in October 2014 explores the issues facing New Zealand's three waters sector. LGNZ will be releasing a position paper in 2015 to outline what a well performing three waters sector should look like and propose options for a sector led approach to improving performance in the future.

Infrastructure providers collaborate more effectively within and across regions, taking a long-term view and ensuring adequate investment in high-growth communities. This will be achieved through:
Investigating options to support long-term integrated regional infrastructure plans, potentially with legislative recognition incorporating central, regional and local government objectives (NIU).

- Recognising the importance of aligning infrastructure delivery with planning
- Investigating how to manage water, wastewater and stormwater services across the sub region

National Policy Statement for Freshwater

The National Policy Statement for Freshwater Management 2014 (NPS-FM 2014) sets out the objectives and policies for freshwater management under the RMA.

The NPS-FM 2014 came into effect on 1 August 2014.

The NPS-FM is one of the initiatives developed as part of the Government's programme of water reform. The NPS-FM:

- requires regional councils to set freshwater objectives for fresh water, and provides a process for setting them
- requires councils to account for freshwater takes and contaminants, which will provide information for setting and managing to freshwater objectives and limits
- provides for Councils to set the limits and methods which will affect how water is used, and this may require water resources users to adjust their practices
- requires regional councils to involve iwi and hapū in the management of fresh water, and to work with them to identify tāngata whenua values and interests, and reflect these in the management of, and decision-making about, fresh water.

National Policy Statement for Urban Development Capacity

The National Policy Statement on Urban Development Capacity 2016 (NPS-UDC) sets out the objectives and policies for providing development capacity under the RMA. The NPS-UDC came into effect on 1 December 2016.

The NPS-UDC directs local authorities to provide sufficient development capacity in their resource management plans for housing and business growth to meet demand.

Development capacity refers to the amount of development allowed by zoning and regulations in plans that is supported by infrastructure. This development can be "outwards" (on greenfield sites) and/or "upwards" (by intensifying existing urban environments).

Sufficient development capacity is necessary for urban land and development markets to function efficiently in order to meet community needs. In well-functioning markets, the supply of land, housing and business space matches demand at efficient (more affordable) prices.

The NPS-UDC contains objectives and policies that local authorities must give effect to in their resource management decisions that provide direction on:

1. the outcomes that urban planning decisions should achieve
2. the evidence underpinning those decisions
3. responsive planning approaches
4. coordination between local authorities and providers of infrastructure.

Within these four, the NPS-UDC targets the more challenging requirements for urban areas experiencing the most significant growth.

The New Zealand Productivity Commission

The New Zealand Productivity Commission (NZPC) is an independent Crown entity, that provides advice to the Government on improving productivity in New Zealand. The NZPC conduct inquiries and productivity research to expand knowledge about productivity and identify areas for improvement.

Local Government Regulation

During May 2012 and inquiry was commissioned to contribute to the Government's 'Better Local Government' initiative to improve the legislative framework for New Zealand's councils.
The Commission was asked to:

- develop principles to guide decisions on which regulatory functions are best undertaken by local or central government;
- identify opportunities to improve the regulatory performance of local government; and
- recommend options for regularly assessing the regulatory performance of the local government sector.

Amongst the Commission's recommendations for improving regulation are:

- a tool for helping to decide what regulations, and which parts of implementing regulation, are best performed by Government or councils;
- use of standardised formats and increased transparency to better demonstrate how key council regulatory decisions have been made;
- more focus by government departments, when preparing new regulation intended to be implemented by councils, on the costs and benefits of the proposed regulation, where those costs and benefits will fall, whether or not councils have the capability and capacity required to effectively implement the new regulation, and the likely costs of building that capability and capacity where it does not exist;
- the development of a 'Partners in Regulation' protocol to better guide Government/council engagement;
- the development of new or enhanced joint Government/council forums for overseeing improvements; and
- greater use of risk-based approaches to monitoring and enforcement of regulation by councils, together with enabling greater use of infringement notices to support regulations in place of more costly formal prosecutions.

Urban Planning

During 2015 the Productivity Commission was tasked to look at ways of improving New Zealand's urban planning system. This is a follow up on the Commission's findings that New Zealand's urban planning laws and processes were unnecessarily complicated, slow to respond to change and did not meet the needs of cities.

The report found the following deficiencies:

- the current planning system is slow to adapt and is risk averse.
- Processes for updating land use rules are slow and uncertain.
- There is too much unnecessary, poorly-targeted regulation.
- Resistance to change from local residents and barriers to funding new infrastructure also inhibit a city's ability to grow and respond to change.
- Ambiguous and broad language in current planning laws has led to overly restrictive rules in urban areas, 'scope creep', and an under-emphasis on the natural environment.
- The relevant primary legislation does not give prominence to urban issues, and it is difficult to set clear priorities for the natural environment.
- The lack of central government guidance has led to decisions that suit local interests, but which have negative wider impacts such as rising land and housing prices.

The report recommends:

- a more restrained approach to land use regulation,
- infrastructure that is delivered at the right time and at the right place, and
- infrastructure pricing and funding that more accurately reflects actual costs, use and impacts.
- a clearer distinction between the built and natural environment and unambiguously state the important priorities, especially at the national level.
- stronger professional capabilities at both the local and central government level is required, along with an organisational culture that is fit for purpose to meet the new demands of a future planning system.
- a different relationship between both levels of government will be required, one that is based on mutual understanding, collegiality and effective interactions, as both are mutually dependent on each other for their success.

It is important for Council to stay abreast of any local government related inquiries conducted by the Productivity Commission. These may inform or effect policy changes from central government.

6.9.2 Key Legislation

Council must comply with any relevant legislation enacted by Parliament. Significant legislation and regulations affecting the Water activities are provided in the table below.

Key Legislation
Biosecurity Act 1993
Building Act 2004
Civil Defence Emergency Management Act 2002
Climate Change Response Act 2002
Energy Efficiency and Conservation Act 2000
Environmental Protection Authority Act 2011
Epidemic Preparedness Act 2006
Fire Service Act 1975
Hazardous Substances and New Organisms Act 1996
Health Act 1956
Health and Safety at Work Act 2015
Infrastructure (Amendments Relating to Utilities Access) Act 2010

Key Legislation
Land Drainage Act 1908
Local Government Act 2002
Local Government Act 1974
Local Government Rating Act 2002
Local Government Rating Act 1979
Local Government (Financial Reporting) Regulations 2011. Renamed to Local Government (Financial Reporting and Prudence) Regulations 2014
Marine and Coastal Area Act 2011
Ngai Tahu Claims Settlement Act 1998
Public Works Act 1981
Resource Management Act 1991
Telecommunications Act 1987
Utilities Access Act 2010
WorkSafe New Zealand Act 2013

The legislation that has or is expected to have the most effect is described below:

Building Act 2004
Provides a regulatory framework for building work, establishes a licensing regime and sets performance standards to ensure buildings have attributes that contribute to the health, safety, physical independence and well-being of people. All Council buildings have to meet the requirements of the Building Act.

Civil Defence Emergency Management Act 2002
Under the CDEM Act 2002 there is an expectation that Council's services will function at the best possible level and extent during and after an emergency, including no change from normal operation. Council has established planning and operational relationships with regional CDEM groups to deliver emergency management within Mackenzie district boundaries.

Water supply and wastewater are regarded as critical services requiring attention during adverse events and are given special consideration within Council emergency management procedures. Every effort will be given to restore services immediately after an event to at least provide adequate water for sanitation and health needs. Supply quantity and quality may be limited.

Health Act 1956
Places an obligation on Council to improve, promote and protect public health within the District. The provision of water services conserves public health and helps to protect land and waterways from contamination.

The Health Act requires Council to provide the Medical Officer of Health with reports on the level, rate and mitigation measures of diseases, and quality of water.

Health and Safety at Work Act 2015
The Health and Safety at Work Act 2015 (HSWA) was enacted on 4 April 2016. Working Safer is aimed at reducing New Zealand's workplace injury and death toll by 25 per cent by 2020.

The HSWA:

- reinforces proportionality – what a business needs to do depends on its level of risk and what it can control
- shifts from hazard spotting to managing critical risks – actions that reduce workplace harm rather than trivial hazards
- introduces the "reasonably practicable" concept – focusing attention on what's reasonable for a business to do
- changes the focus from the physical workplace to the conduct of work – what the business actually does and so what it can control
- supports more effective worker engagement and participation – promoting flexibility to suit business size and need.

A guiding principle of the HSWA is that workers and other persons should be given the highest level of protection against harm to their health, safety, and welfare from work risks as is reasonably practicable. The HSWA shifts the focus from monitoring and recording health and safety incidents to proactively identifying and managing risks so everyone is safe and healthy.

The HSWA identifies four duty holders:

persons conducting a business or undertaking (PCBUs) – these may be individuals or organisations	have the primary responsibility for the health and safety of their workers and any other workers they influence or direct. They are also responsible for the health and safety of people at risk from the work of their business
officers	(company directors, partners, board members, chief executives) must do due diligence to make sure the business understands and is meeting its health and safety responsibilities
workers	must take reasonable care for their own health and safety and that their actions don't adversely affect the health and safety of others. They must also follow any reasonable health and safety instruction given to them by the business and cooperate with any reasonable business policy or procedure relating to health and safety in the workplace.
other persons at workplaces	who come into the workplace, such as visitors or customers, also have some health and safety duties to ensure that their actions don't adversely affect the health and safety of others

Local Government Act 2002
The LGA defines the purpose of local authorities as enabling local decision-making by and on behalf of the community, and allows local authorities the power of general competence. It also contains provisions relating to Council infrastructure, funding, and governance.

Local Government Act 1974
Part XXVI Wastewater and Stormwater, sections 440-469 provide council with authority to construct, maintain and operate the wastewater and stormwater systems.

Local Government Rating Act 2002
Provides Council with flexible powers to set, assess, and collect rates to fund Council activities while ensuring that rates are set in accordance with decisions that are made in a transparent and consultative manner and providing for processes and information to enable ratepayers to identify and understand their liability for rates.

Resource Management Act 1991
The RMA governs all water takes and discharges. Resource consents obtained for discharge activities require parameters such as volume and quality to be monitored as well as taking steps to mitigate any adverse effects that may occur through the activity. The RMA also requires compliance with regional and national planning standards.

Utilities Access Act 2010
The Act establishes a framework for the National Code of Practice to govern how corridor managers and utility operators coordinate their activities within transport corridors.

The purpose of the Code is to:

- Maximise the benefit to the Public while ensuring that all Utility Operators are treated fairly;
- Ensures that disruptions to Roads, Motorways, and railways caused by Work by Utility Operators are kept to a minimum, while maintaining safety; and
- Provides a nationally consistent approach to managing access to Transport Corridors.

The Code is a mandatory requirement for all road and rail controlling authorities and utility network operators under the Utilities Access Act 2010, and came into effect on the 1st January 2012. The Code was reviewed during 2016.

The initial KPI data identified several issues including a lack of consistency, along with the fact that not all reporting entities had sent in their returns, meaning that any comparisons were incomplete. The situation was exacerbated by the fact that only 1 year's results are available, with any real value to come from analysis of changing trends over time. Refining of the data collection requirements will be a major focus moving forward, resulting in a more comprehensive reporting and analysis to be provided following the receipt of 2016-17 KPI data.

6.9.3 Standards, Codes of Practice & Guidelines

National Environmental Standards
National environmental standards are regulations issued under the RMA. They prescribe technical standards, methods and other requirements for environmental matters. Region and local councils must enforce these standards (or they can enforce stricter standards where the standard provides for this). In this way, national environmental standards ensure consistent minimum standards are maintained throughout all New Zealand's regions and districts.

National Environmental Standards for Sources of Human Drinking Water (2008)
The National Environmental Standard for Sources of Human Drinking Water came into effect on 20 June 2008 and is intended to reduce the risk of contaminating drinking water sources such as rivers and groundwater. It does this by requiring regional councils to consider the effects of activities on drinking water sources in their decision making. Specifically the NES require Councils to:

- Decline discharge or water permits that are likely to result in community drinking water becoming unsafe for human consumption following existing treatment
- Be satisfied that permitted activities in regional plans will not result in community drinking water supplies being unsafe for human consumption following existing treatment
- Place conditions on relevant resource consents requiring notification of drinking water suppliers if significant unintended events occur (e.g. spills) that may adversely affect sources of human drinking water
- work with Regional Council to place conditions on applicable new consents for the protection of its public supply sources

AS/NZ Standards
Where possible, relevant AS/NZS standards are used as the basis for determining standards of design and construction. The Code for Subdivision and Development AS/NZS: 4404 is the principal document defining design requirements. New works within the urban areas are constructed in general accordance with NZS4404 Land Development and Subdivision Infrastructure which sets minimum standards for reticulation construction, including the provision of firefighting water.

Asset Management Standards
NAMS International Infrastructure Management Manual 2006
NAMS International Infrastructure Management Manual 2011
ISO 55000 International Standards for Asset Management 2014
PAS 55-1:2008 Asset Management (British Standards)
NAMS Developing Levels of Service and Performance Measures Guidelines 2007
NAMS Optimised Decision Making Guidelines 2004
NAMS Infrastructure Asset Valuation and Depreciation Guidelines 2006
NZWWA New Zealand Pipe Inspection Manual 2006
NZWWA The New Zealand Infrastructural Asset Grading Guidelines 1999

6.9.4 Regional Strategies & Plans

Under Section 30 of the RMA Regional Councils are required to provide policies and methods to achieve integrated and sustainable management of the regions natural and physical resources. The Regional Plans of Otago and Canterbury provides a framework for the sustainable management of the regions water resources. These resources include groundwater, rivers, lakes and wetlands.

Canterbury Land and Water Plan
The Land & Water Regional Plan (LWRP) is a new planning framework for Canterbury and aims to provide clear direction on how land and water are to be managed and help deliver community aspirations for water quality in both urban and rural areas.

The LWRP identifies the resource management objectives for managing land and water resources in Canterbury to achieve the purpose of the RMA. It identifies the policies and rules needed to achieve the objectives, and provides direction in terms of the processing of resource consent applications.

6.9.5 Council Strategies, Plans, Bylaws and Policies

Mackenzie District Council Long Term Plan
The LGA requires local authorities in New Zealand to prepare a LTP that sets out Council's intentions over a ten-year period. The Act is very clear on how Councils should prepare their plans and what should be included in the final document. Consultation with the community is a very important part of this process. This is to ensure the people who effectively pay for the services delivered in the plan have the opportunity to feedback on what they want to see and how much they are prepared to pay. Wastewater is considered to be a core activity.

The LTP provides information on all Council activities, how these will be delivered, how much they will cost and how they will be paid for. The first year of the LTP is also the Annual Plan for the first year of the ten year LTP period and as a result there is no separate Annual Plan process for that year.

Annual Plan
In accordance with the LGA local authorities in New Zealand must prepare and adopt an Annual Plan for each financial year. The Annual Plan must support the long-term plan in providing integrated decision-making and co-ordination of the resources of the local authority; and contribute to the accountability of the local authority to the community. The Annual Plan process provides an opportunity to adjust the direction of Council and the community for the twelve months following. It also provides an opportunity for Council to highlight the key issues it faces and update the community on achievements and plans for the following year.

Mackenzie District Plan
Section 73 of the RMA requires the Mackenzie District Council to have at all times a District Plan for its District.

The District Plan sets out in a systematic way the manner in which the Council intends to deal with its functions under the Act. In doing this, the District Plan specifies objectives, policies and methods, in relation to resource management issues in the District, to achieve the integrated and sustainable management of the District's resources. To achieve the objectives and policies of the Plan, rules are included which prohibit, regulate or allow activities.

The Council has adopted the principle of zoning. This technique recognises that different areas of the District will have different resources, character and levels of amenity and that the community will seek different environmental results for these areas. The zones provide opportunities for future development in keeping with the character and amenity sought for these different areas. Any particular activity must comply with the rules applicable to the zone in which it is situated, as well as general district rules covering a range of matters such as subdivision, heritage values and transportation.

30 Year Infrastructure Strategy
Councils are required to prepare and adopt, as part of the LTP, an Infrastructure Strategy for a period of at least 30 consecutive years.

The task of building, operating and maintaining infrastructure assets in an affordable manner is becoming increasingly challenging in view of:

- Demographic changes
- Environmental impacts
- New technologies
- Continually changing legislative environment (Central & Regional Government)
- Infrastructure resilience
- Aging of infrastructure

Council considered these impacts and assessed these in the Infrastructure Strategy, which will be used to guide decision-making.

Delivery of Services Review
Section 17A of the Local Government Amendment Act 2014 requires that a local authority must review the cost-effectiveness of current arrangements for meeting the needs of communities within its district or region for good-quality local infrastructure, local public services, and performance of regulatory functions.

Section 17A has a number of triggers that apply to the application of the Section:

- Significant change in service levels
- Within two years of the completion of a relevant contract (before renewal of contract)
- At Councils discretion with a maximum time between reviews of six years
- The first review is required within three years (clause 1A of new Schedule 1AA)

Exceptions for review are:

- Circumstances where the services cannot be reasonably altered within the two years
- The local authority is satisfied that the potential benefits of undertaking the review do not justify the costs of undertaking the review

The review:

1. Must consider options for
    a. Governance
    b. Funding
    c. Delivery

2. Options for the responsibility for governance, funding and delivery is exercised by

a. The local authority
b. A Council controlled organisation of the local authority
c. A Council controlled organisation where the local authority is one of several shareholders
d. Another local authority
e. Another person or agency

At the time of writing no Section 17 A review has been completed.

Activity Management Plans
Asset Management has been described as applied common sense. Therefore, documenting applied common sense results in an Activity Management Plan (AMP). In essence there is limited funding and competing priorities. The Activity Management Plan helps staff/Council decide where and how to spend the limited funds to achieve the desired results.

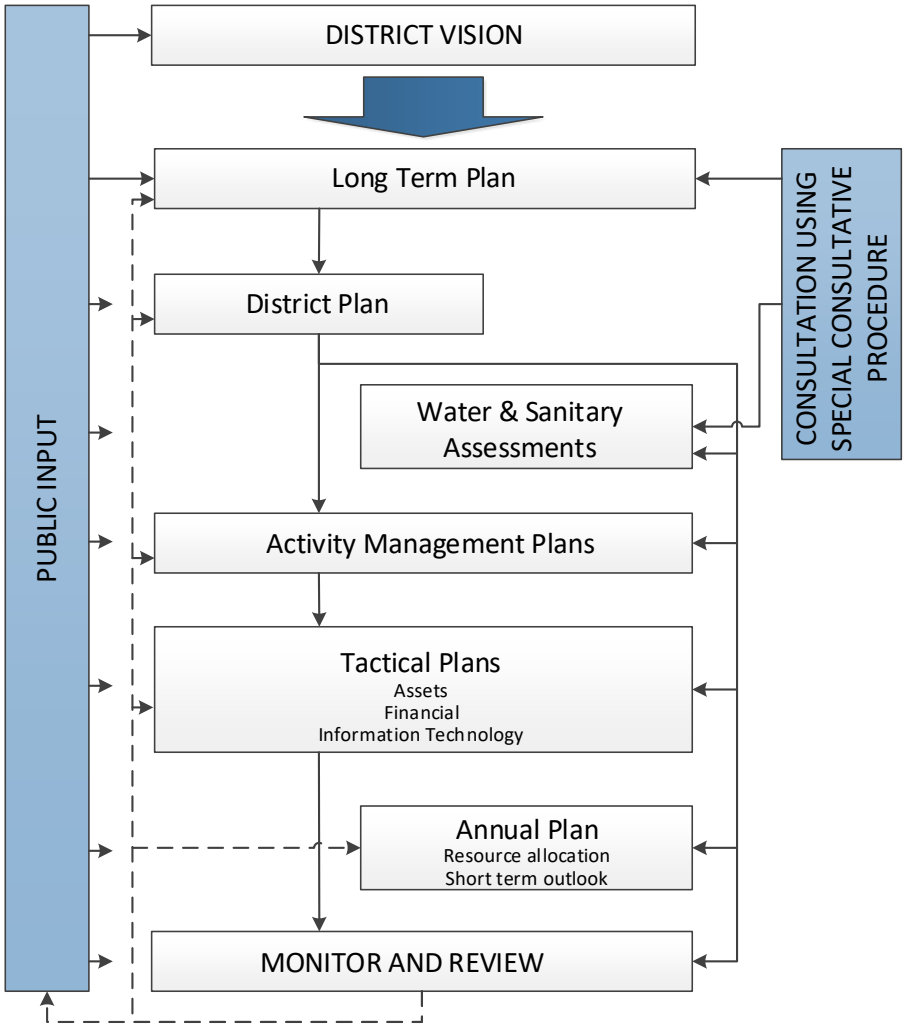
AMPs are a key component of Council's planning process. They are prepared within the context and framework of the LTP, District Plan, Annual Plan and Funding Policy. Figure 6-2: Corporate links to AMPs depicts the links and information flows with the Activity Management Plan, other corporate plans and public consultation.

As part of the LGA requirements (Schedule 10) the LTP must, for the ten years of the Plan, identify for each group of assets the costs for any additional asset capacity required and the maintenance, renewal, and replacement costs for the assets.

This statement of cost for the 10-year period includes the accounting for asset depreciation in accordance with The New Zealand Equivalents to International Financial Reporting Standards, and the recording of all significant assumptions in preparing the financials.

This AMP will provide the basis for identifying service potential and any losses, and determining the long-term financial strategies for Council's water network assets. This AMP is part of a suite of AMPs and forms part of Council's LTP for the period 2018-2028.

Figure 6-2: Corporate links to AMPs



This AMP is intended to be read in conjunction with the LTP and fulfils requirements of the LGA (and amendments) – Schedule 10, which states:

1) The purpose of local government is—
    a. to enable democratic local decision-making and action by, and on behalf of, communities; and
    b. to meet the current and future needs of communities for good-quality local infrastructure, local public services, and performance of regulatory functions in a way that is most cost-effective for households and businesses.
2) In this Act, good-quality, in relation to local infrastructure, local public services, and performance of regulatory functions, means infrastructure, services, and performance that are—
    a. efficient; and
    b. effective; and
    c. appropriate to present and anticipated future circumstances.

In order to demonstrate that the delivery of services is efficient, effective and appropriate; the Council has developed a suite of Activity Management Plans (AMP) for its Core Infrastructural Services as part of this LTP process. These AMPs provide comprehensive account of the efficiency, effectiveness and appropriateness of Council's Core Infrastructural Assets, asset management practices and knowledge.

6.9.6 Bylaws

There is one bylaw that apply to the Wastewater service:

- The Wastewater Bylaw 2014

The review of this bylaw is programmed for December 2019.

6.9.7 Policies

Significance and Engagement Policy 2014
The purpose of the Council's Significance and Engagement Policy is to:

- To enable Council and its communities to identify the degree of significance attached to proposals relating to issues, assets, and other matters
- To provide clarity about how and when communities can expect to be engaged in decisions made by Council
- To inform Council from the beginning of a decision-making process about the appropriate extent, form and type of engagement that may be required

This Policy identifies the wastewater reticulation and treatment systems at Burkes Pass, Fairlie, Lake Tekapo and Twizel as strategic assets.

Earthquake Prone Buildings Policy
In accordance with Section 131 of the Building Act 2004 Council is required to adopt a policy on earthquake prone, dangerous and insanitary buildings. The Mackenzie District Council Policy on Earthquake Prone Buildings was consulted on and adopted during 2006.

This Policy reflects Council's determination to reduce risk over time in a way that is acceptable in social and economic terms to the community. A flow chart in the Policy details the process for assessing Earthquake prone buildings.

Council's 3 Waters buildings needs to be assessed and this is included as an Improvement item (**IP 3**)

6.9.8 Procedures

Procedures include legislation, regulation, standards and guidelines. There are numerous standards and guidelines which Council refers to. These include Standard Operating Procedures and Operation and Maintenance/Management Manuals/Plans. The following details the Key Standards and Guidelines that are used in the management and operation of the Mackenzie District Council 3 Waters Systems.

Standards and Guides
Legislation as listed in Section 4.9.2 – Key Legislation
Drinking Water Standards for New Zealand
NZS/AS3725: 1989 – Loads on buried pipes
NZS 7643: 1979 – Code of Practice for the installation of unplasticised PVC pipe systems
The New Zealand Building Code
New Zealand Fire Service Fire Fighting Water Supplies Code of Practice – SNZ PAS 4509:2008
NZS 1477 7602, 7643 – PVC Pipes
NZS 4765:2007 m PVC pipes
NZS 4441: 2008 o PVC pipes
NZS 4442 – "Welded Steel Pipes and Fittings for Water, Sewerage and Medium Pressure Gas"
BS 5163 – Cast iron fittings (valves)
NZS 3910: 2003 – "Conditions of Contract for Building and Civil Engineering Construction"
Worksafe - Good Practice Guidelines Excavation Safety
Worksafe - Good Practice Guidelines Working at Height
Worksafe - Good Practice Guidelines Electrical Safety on Small Construction Sites
Worksafe - Good Practice Guidelines Conducting Asbestos Surveys
Worksafe - Good Practice Guidelines ACOP – Management and Removal of Asbestos
International Infrastructure Management manual – 2002
Creating Customer Value from Community Assets Manual – 2002
New Zealand Pipe Inspection Manual – 1999
New Zealand Infrastructural Asset Grading Guidelines" – 1999
New Zealand Infrastructure Asset Valuation and Depreciation Guidelines 2001

7.0 FUTURE DEMAND

This section provides details of growth forecasts, which affect the management and utilisation of all wastewater assets and details demand management strategies.

7.1 Overview

The future demand for services will change over time in response to a wide range of influences, including:

- Local population trends
- Local economic trends
- Changing technology
- Changing legislation requirements
- Land use changes
- Resource issues
- Climate change

7.2 Demand Drivers

The future demand for reticulated water services in the Mackenzie District will be driven by:

- Growth in the District
    - Trends in population and visitor growth or decline give a good indication of future growth and in turn demand on the network
- Economic changes
    - Changes in land use, industry, economic climate and tourism can all affect the demand on the Wastewater asset
    - E.g. developments such as motels/hotels and subdivisions where the properties are purchased as holiday homes do not increase the resident population but have a significant effect on the peak tourist population capacity.
- Improvement to Levels of Service
    - Advances in available technology
    - A greater understanding of customers' perceptions and expectations
    - A higher level of public expectations
    - Changing legislative requirements
    - Government organisations setting higher standards

Increasing demand for a service may generate a requirement for the development of additional infrastructure. Expenditure programmes need to be planned to fund the capital works and associated on-going operational expenditure. Alternately, it may be possible to manage demand within the existing system capacity.

Where a reduced demand is forecast it may be appropriate to renew assets with a lesser capacity, operation expenses may decrease, or an asset may become surplus to requirements.

7.3 DEMAND FORECASTS

7.3.1 Growth Trends –

Population Projections

Mackenzie's population growth is expected to follow the medium projection issued by Statistics NZ in December 2016. It is anticipated that over the next ten years (2018-28) Mackenzie District will have a growth in population of around 13%, from around 4,300 at present to 4,880. Like much of New Zealand, the proportion of people aged 65 years and older will grow within the district. It is anticipated that

projected population growth will not impact significantly on the operation and maintenance of our wastewater activity.

Household Growth
It is projected that over the next ten years Mackenzie District will have:

- A growth in household numbers consistent with the population growth trajectory;
- Household numbers are projected to increase to 2,200 (+16 per cent) by 2028 (Statistics New Zealand) - the higher percentage increase in households relative to population increase in 2028 reflects a projected increased in single person households;
- With a greater number of older people living alone, a reflection of structural ageing, one-person households are projected to increase by 15 percent by 2028 (Natalie Jackson Demographics Ltd, Sept 2014);
- Future demand in the Mackenzie District will be increasingly driven by one-person households and couples without children, characteristic of population ageing.

Development
Analysis of the future urban and rural residential subdivision over the next 4 years shows an average of 10 sections per year, along with associated infrastructure, to be vested in Tekapo and an average of 46 per year in Twizel.

During the 2015/17, 2355m of Wastewater network, including sumps and manholes, was vested in Council. Whilst developers have to construct this to Councils standard before vesting, the ongoing maintenance and depreciation costs have to be allowed for.

7.3.2 Economic Changes -

Changes in Land Use, Practices and Resource Use
The change in rural land use will not adversely affect the districts Wastewater systems.

In Twizel, change in land use around the oxidation pond could affect their continued use. There is a no build zone of 150m for rural residential building around the oxidation ponds and 50m adjacent to the disposal trench. The proposed consolidation of the discharge from the oxidation pond will see the trench de-commissioned, a 150m buffer around the ponds purchased by Council and a further 150m no build zone established.

In the past ECan has indicated ongoing concern with the Tekapo disposal system. Council engineers are working on a replacement system that will provide certainty of disposal in the short to medium term. There will be a strategic study in Year 1 of the LTP which will review the future location and extent of the disposal system but any works to relocate the system (if required) will be outside of the term of this AMP.

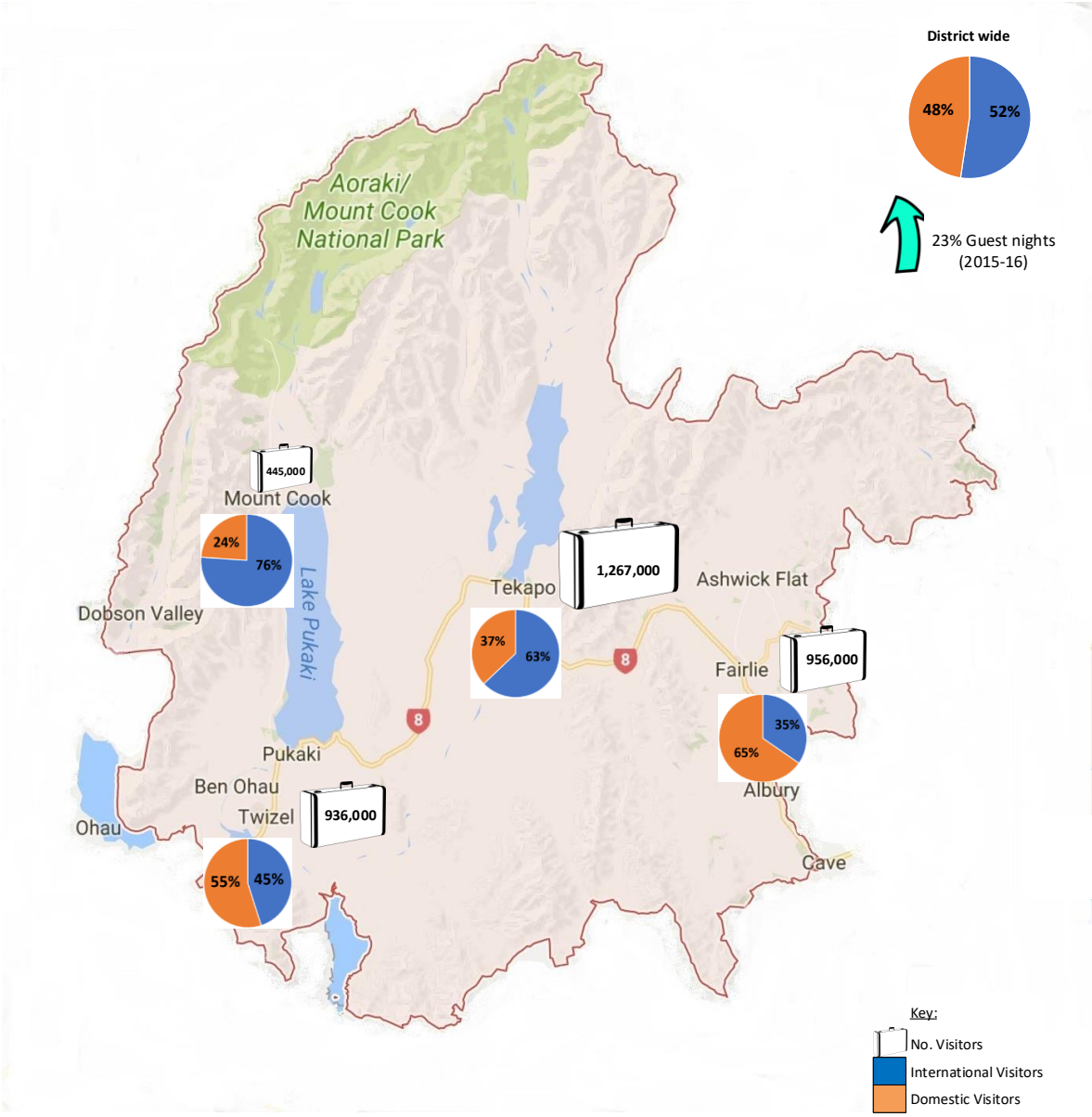
Tourism
Mackenzie has experienced unprecedented growth in visitor numbers (both domestic and international) in recent years, as indicated by a range of data, including the Statistics New Zealand Commercial Accommodation Monitor, which for the year ended September 2016 compared with the year ended September 2015 reported:

- Guest nights rose 23.1 per cent to 705,316
- International guest nights rose 19.9 per cent to 489,769
- Domestic guest nights rose 31.1 per cent to 215,547
- The average length of stay rose from 1.32 nights to 1.33 nights
- The overall occupancy rate rose from 44.4 per cent to 50.2 per cent
- Accommodation capacity, excluding holiday parks, rose 3.1 per cent

International tourism numbers are expected to continue by 5.4 per cent per annum from 2016 until 2022. Based on this, there could be nearly 6 million tourists visiting New Zealand by 2028. Council is assuming average growth in international visitors to the district will be at least equivalent to or greater than the growth in international visitors forecast for NZ. Growth in domestic visitor numbers is also expected to occur at a similar rate.

Tourism growth is expected to impact on Council's wastewater activity but the networks are considered to have sufficient capacity to cope with projected numbers over the term of this LTP. The influx of domestic holiday-makers into the district, particularly the Mackenzie Basin, has little impact on the wastewater network. As development occurs, the developers are required to develop their own wastewater system to connect to the Council system.

Mackenzie District Visitors



7.3.3 Climate Change

The Mackenzie District is likely be affected by climate change. In preparing the LTP, the Council has reviewed Ministry for the Environment climate reporting[1] and regional projections calculated for the period from now to 2100[2]. The LTP assumes that climate change is happening, and while the impacts are expected to be relatively minor within the period covered by the Plan, they will increase in future.

Influences of climate change on our wastewater activity and possible effects are outlined below.

Function	Affected Assets or Activities	Key Climate Influences	Possible Effects
Wastewater	Infrastructure	– Reduced mean annual rainfall – Increased mean annual temperature – Increased frequency & severity of extreme weather events (rainfall)	– More intense rainfall (extreme events) will cause increased inflow and infiltration into the wastewater network. – Wet weather overflow events will increase in frequency and volume. – Longer dry spells will increase the likelihood of blockages and related dry-weather overflows.

7.3.4 Improvements to Levels of Service

Changes in Customer Expectations
In recent years there has been an increasing awareness on the part of owners with respect to Wastewater issues. It is anticipated that the following issues will become an increasing priority for Council in determining design and operational standards.

- Extended areas being connected to reticulated wastewater systems
- Improved response times

Changing Levels of Service Demands
The intended Levels of Service defined in Section 3 are considered to be representative of the service demands of the current and the future community. With rate of growth in the rating base reducing, the following factors may need to be considered:

- reduction in maintenance of some facilities that have little impact on the overall service delivery (if possible)

Policy or Management Changes
Changes to Wastewater policies may be driven from a number of directions. They could be internally driven (e.g. Development Impact Levy policies) or externally driven (e.g. changes driven by regional or national organisations like Environment Canterbury). Monitoring and being aware of possible implications of these changes enables the impacts of such changes to be anticipated and predicted. While there is no certainty, it is important to consider them when developing asset management risk forecasts and strategies.

National Infrastructure Plan
Refer to Section 6.9.1 detailing the National Infrastructure Plan and the implications for Asset Management and the 3 Waters Utilities.

Financial Contributions
Financial Contributions are another means of funding network infrastructure, reserves or community infrastructure. Mackenzie District Council has prepared a 'Financial Contribution Policy'. The

[1] Ministry for the Environment & Stats NZ (2017). New Zealand's Environmental reporting Series: Our atmosphere and c*limate 2017*. Retrieved from www.mfe.govt.nz and www.stats.govt.nz.
[2] Ministry for the Environment (2016). *Climate change projections for New Zealand: Atmosphere projections based on simulations undertaken for the IPCC 5th assessment*. Retrieved from www.mfe.govt.nz.

contribution policy includes a methodology for calculating the equity in the existing specific infrastructure network including Wastewater. This ensures that the Developer pays their fair share of that network, installed previously, that allows the development to connect to that service and proceed to completion.

The policy uses the following formula to calculate the level of contribution:
(Asset Valuation – Debt Loading)/the number of connectable properties to the Scheme

For 2017/18, the financial contribution payable on each lot created at the time of subdivision is calculated at $3,948. This amount is GST exclusive.

The financial contribution figures are reviewed annually. Council acknowledges that the ability to levy financial contributions will be removed from the RMA effective 22 April 2022. During the term of this AMP, Council will adopt a development contributions policy prior to this date.

7.4 Demand Impacts on Assets

Overall implications for the network of continual demand for improvement in levels of service are:

- A requirement for increasing level of treatment as driven by external agencies
- An increasing focus environmental controls/requirements
- An increased level of expenditure to attain those desired controls/requirements
- A limited ratepayer base to fund Council's contribution to the wastewater budget

7.5 Demand Overview

7.5.1 Current Demand

The following townships have a public water supply and public wastewater collection system:

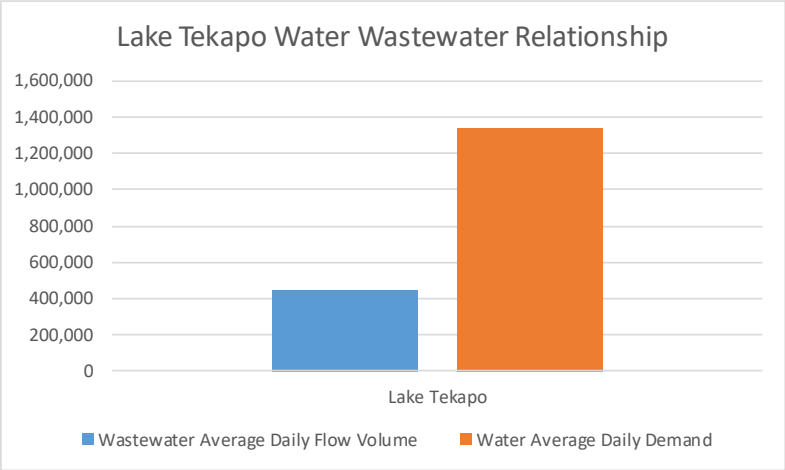
- Fairlie;
- Lake Tekapo;
- Twizel; and
- Burkes Pass.

With the exception of water supplied for irrigation and unaccounted for water most water supplied by the Mackenzie District public water supply systems listed above is subsequently discharged into the wastewater reticulation. Changes in water consumption patterns are therefore likely to be largely reflected in corresponding changes in discharges to the wastewater system.

Industry standard guidelines indicate that wastewater flows are usually in the order of 70% to 80% of water demand flows. Water demand flows can be used for guidance on the extent of inflow/infiltration and or capacity requirements.

Fairlie wastewater was 120,044 cubic metres of discharge in 2016 and water consumption was 296,823 cubic metres in 2016.

Figure 7-1: Lake Tekapo Water Wastewater Relationship



The above graphs shows that 34% of the daily water demand ends up at the wastewater treatment plant, indicating that there may be a significant amount of water used for other uses i.e. garden irrigation or significant losses.

7.5.2 Wastewater from other sources

Discharge from Septic Tanks - A formal process for septic tank operators to dispose of wastewater into the Council system is in place. In Twizel discharge is at the manhole closest to the treatment plan and in Fairlie and Tekapo approved contractors have access to the treatment plant to discharge into the system.

7.5.3 Inflow/Infiltration

The rate of inflow and infiltration of rainwater into the wastewater network is a key factor in future wastewater demands. Most urban systems across New Zealand experience inflow/infiltration with stormwater making up between 20% to 40% of wastewater volumes.

However, the inflow/infiltration will continue to contribute to the future wastewater volumes as the system continues to deteriorate with age. The inflow/infiltration rate will depend on the changes in climate conditions, which are expected to produce more intensive and frequent rainfalls.

The Ministry for the Environment has released a report on the impacts of the changing climate in New Zealand which concludes:

- Temperatures in New Zealand are likely to increase faster in the North Island than in the South Island, but generally less than global average temperatures
- Rainfall is projected to increase in the west of the country and decrease in many eastern regions. But dry periods will increase in some regions
- Many climate models indicate a greater future variability of rainfall with an increased risk of droughts (quantitative predictions are not possible at this stage)
- Other expected changes in climate extremes are, on average, fewer frost days during winter and more hot days during summer

Most of the impacts characterised in this report are expected to occur over the next 20 to 100 years. The longer dry spells and higher temperatures may lead to a decrease in infiltration and inflow into the wastewater system. However higher intensity rainfall events can increase inflow into the sewer as flooding around gully traps and manholes can occur. The actual effect of climate change on flows in the wastewater system cannot be quantified at this point.

Although infiltration/inflow strategies are expected to progressively reduce the entry of stormwater into the wastewater reticulation it has been assumed for the purposes of estimating the future demand for wastewater.

The Council employs the following strategies to minimise inflow and infiltration:

- Investigate inflow and infiltration and develop programmes to reduce the entry of stormwater to the wastewater system in private properties (infiltration/inflow programmes)
- Repair or renewal of pipelines where there is excessive entry of stormwater and or groundwater through defects in the pipes
- Providing additional capacity in parts of the wastewater system

7.6 Demand Management Plan

There are two recognised components to a demand management strategy:

7.6.1 Asset Based Demand Management

Asset Based demand management on the system really can only be focused on removing stormwater or ground water infiltration.

In Fairlie there are private drains that require repair to correct the infiltration of groundwater when the water table is high. These will be identified as part of an ongoing monitoring programme and owners will be asked to repair the offending drains.

In Tekapo we are aware of stormwater infiltration into the pipe network caused by roof water being plumbed into the on property sewer pipework. Council began a programme in 2012 to identify those properties and have their stormwater redirected to the appropriate location.

There are minimal asset based demand options that do not have a significant cost attached.

Upcoming issues during the next ten years
Oxidation ponds (Waste Stabilisation Ponds) in the district have been in operation for more than 30 years and have accumulated significant amount of wastewater sludge. These ponds are now nearing a period where the capacity of the facility is affected by the volume of sludge build up and require removal of the sludge. This is an issue faced by many councils across New Zealand. Options will be investigated for removing, dewatering and disposing of the sludge.

Fairlie - The oxidation pond was surveyed for sludge build up in September 2013. The average sludge depth was 0.50m and with a pond depth of 1.73m there is enough water depth to control odour. A liquid depth of 1m over the sludge is enough to control odour release.

The sludge depth will be checked periodically for accumulation, but this would only need removing if the sludge depth was to increase by another 300mm. Potential desludging is programmed for 2020/21.

Tekapo – The oxidation pond was surveyed for sludge build up in September 2013. The average sludge depth was 0.57m and with a pond depth of 1.67m there is enough water depth to control odour.
A liquid depth of 1m over the sludge is enough to control odour release.

The sludge depth will be checked periodically for accumulation, but this would only need removing if the sludge depth was to increase by another 200mm. Potential desludging is programmed for 2024/25.

The present capacity of the Tekapo WWTP with the existing aerator assistance can meet a BOD demand for a population of approximately 1,800 people. Capacities are for monthly average populations because the load is buffered by the long retention time.

Should the population increase beyond 1,800, the capacity of the WWTP could be increased by installing additional brush aerators on the oxidation ponds and extending Pond 1A. This could increase the pond capacity to meet a BOD demand of 2,100 people.

For any further growth above 2,100 people, the Tekapo WWTP will require the addition of a dedicated aeration basin at the inlet with all oxygen being supplied by aerators. This can increase plant capacity to about 3,500 people. If the population of Tekapo increases above 3,500, alternative means of treatment and disposal will have to be investigated and new resource consents applied for.

The most pressing issue facing Tekapo is the disposal system. There will be a strategic study in Year 1 of the LTP which will review the future location and extent of the disposal system but any works to relocate the system (if required) will be outside of the term of this AMP.

Twizel – Council has an agreement to acquire land adjacent to the oxidation ponds and construct rapid infiltration basins and consolidate the disposal in them. This will retire the existing disposal trench. This project has been accelerated and is planned for completion by 2019/20. The driver for this change is that in 2010, Council was granted a resource consent for the discharge to ground of the effluent that expires on the 8th July 2020. It is unlikely that Council will be able to renew this consent for the current disposal system.

Twizel continues to show steady growth in holiday homes and in order to understand the total demand Council will model the network so that it will be better able to predict when pipes need to be upsized or aeration installed at the oxidation ponds to improve treatment and when a new rising main will have to be constructed directly to the oxidation ponds from the pump station in Mackenzie Park. This work is provisionally programmed for 2029/30, but may have to be bought forward if demand puts pressure on the current systems to the point they cannot cope. This project will be funded largely by developers.

Burkes Pass - The pond will be checked for sludge accumulation periodically. This will only need removing if the sludge depth is much greater than 150mm.

As the current population is small (and unlikely to increase substantially), the existing pond appears to be more than adequate for continuation of wastewater treatment at Burke's Pass.

The Demand Management Plan involves implementing strategies to reduce effluent flows and promote more efficient network operations. These strategies involve altering or repairing the asset to achieve the target. The effluent flow reduction strategies used by Council are outlined in the table below:

Strategy	Description
Inflow/Infiltration	Removal of stormwater ingress into the wastewater system through smoke testing, property inspections, CCTV and remedial action
Response time	Prompt response and rectification of reported blockages
Replacement/Rehabilitation Programme	A Renewal Programme to ensure assets are not utilised beyond their useful life when the risk of unidentified failure is greatly increased in consideration of asset criticality
Codes of Practice	Ensure all maintenance is carried out to the relevant standards by enforcement of appropriate Engineering Codes of Practice
Technical Standards	Ensuring new assets are constructed to the correct standards and tested appropriately before being commissioned
Standard Materials	The use of standard (high quality) materials.
Quality Audits	To ensure all standards above are being met
Infiltration reduction	Continue infiltration reduction programme (**IP 4)**

7.6.2 Non - Asset Based Demand Management

There are few options to affect reduced demand on the wastewater network that are not asset based. Loading on oxidation ponds can be reduced by requiring more on property treatment, in particular for high BOD loading industries.

Infrastructure Improvements
SCADA installation is ongoing with $20,000 programmed for 2018/19 and $25,000 for 2019/20.

Fairlie - There are 7,100 metres of earthenware pipe in Fairlie. These were originally condition rated in 2000 as 4 and 5. Over the past three years the sewer mains have been inspected through CCTV. A replacement programme will be developed based on the CCTV records, condition, criticality, etc. Preliminary programming allows for $877,000 over the period 2019/20 to 2024/25 starting with $250,000 in 2019/20. This replacement programme may extend beyond the term of this Plan. Replacement options include dig and relay with new pipe or in-situ refurbishment using relining techniques or pipe bursting.

Tekapo - There are 1,070 metres of earthenware pipe in Tekapo. These mains have been inspected by means of CCTV. If analysis of the CCTV records confirms significant deterioration, then the 1,070m of sewer main will be programmed for replacement or refurbishment. The replacement programme will likely be scheduled outside the term of this Plan. Replacement options include dig and relay with new pipe or in-situ refurbishment using relining techniques or pipe bursting.

The aerators replacement is programmed for 2020/21 at an estimated cost of $78,000.

Twizel – development of a network model is required to help staff understand the total demand and model future growth scenarios. This will aid in predicting network upgrades or rising main upgrades.

The Twizel sewer network was constructed in the 1970s using the Asbestos Cement (AC) pipe. In service these pipes have shown to deteriorate both from the inside, due to normal service, and the outside due to aggressive soil and ground water conditions. However, in Twizel there are no aggressive soils or groundwater surrounding the AC pipes so the deterioration is only from the inside. Nationally studies have shown that the deterioration model is very irregular throughout the networks where AC pipe is used so it is necessary to have a programme of sampling to get a better understanding when these pipes will have to be replaced and by default adjust the depreciation charged accordingly.

There is 21,311m of AC pipe in the Twizel sewer network and the current replacement cost (2016) of $4.7m. Due to known performance of the AC pipe the base life of the pipe has been set at 80 years leaving a remaining life of 40 years. This figure is based on knowledge to date but further work should be done on a specific deterioration model for the gravity sewers in Twizel to more accurately predict the replacement date. There is $627,000 programmed for 2023/26.

Disposal Consolidation and Retirement of Disposal Trench: Effluent from the Oxidation Ponds in Twizel currently discharges to ground via a 1,700m long disposal trench that meanders across private property. The trench has been in existence for many years and performed well during that time.

Council has an agreement to acquire land adjacent to the oxidation ponds and construct rapid infiltration basins and consolidate the disposal in them. This will retire the existing disposal trench. This project has been accelerated and is planned for completion by 2019/20.

It will also require a land subdivision, land purchase, new resource consent and construction of the physical works along with the de-commissioning of the existing disposal trench. The budget for this work is $900,000.

Rising Main: The wastewater network from the new subdivisions to the south of Twizel were not able to be gravity fed to the existing network and as such discharge to a new pump station on Batcher Road. Due to the low initial flows from this pump station, a rising main was constructed from it to the existing network on Ostler Road where the pumped effluent discharges. At some stage in the future, growth in the area will overload the 100mm rising main and a new main will have to be constructed directly to the oxidation ponds. Budget has been provisionally allowed for this work in the year 2029/30 at an estimated costs of $400,000. The timing of construction of this new main is dependent on actual building constructed and occupied in the area served. It may be accelerated or could equally be delayed.

The Demand Management Plan also involves implementing non-asset strategies to manage the demand for a service. Non-asset solutions for current and future use by Council are outlined in the table below:

Strategy	Description
New technology	Encourage the adoption of new technologies in the home such as low flow showerheads and dual flush toilets
Water conservation/Public education	Encouraging water conservation (within the household) and understanding the issues concerning the wastewater system through public education and advertising campaigns
Property inspections	Encouraging property owners to comply with Council's Bylaws and stormwater discharge requirements

7.7 Future Capital Programme

The following table details proposed capital requirements for the period 2018/19 to 2027/28. It can be seen that the new capital is primarily driven by effluent disposal as a result of environmental compliance requirements.

Table 7-1: Future Capital Programme

		Wastewater System	Project	Funding	Current LTP cycle			2018 -2028 LTP period									
					Financial Year												
					2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Capital		Fairlie	CCTV - EW pipe	Capital/Depreciation	x	x	x										
		Fairlie	Desludge pond	Capital/Depreciation						$189,000							
		Lake Tekapo	Effluent disposal	Capital	x	x	x										
		Twizel	Effluent disposal	Capital	x	x	x	$30,000	$800,000								
		Fairlie	Mag Flow	Capital	x	x	x	$20,000									
		All schemes	Scada	Capital	x		$10,000	$20,000	$25,000								
		Tekapo	Desludge pond	Capital	x	x	x							$150,000			
		Twizel	New rising Main	Capital	x	x	x										
		Twizel	Desludge pond	Capital	x	x	x										
		Total			**$0**	**$0**	**$10,000**	**$70,000**	**$825,000**	**$189,000**	**$0**	**$0**	**$0**	**$150,000**	**$0**	**$0**	**$0**
Renewal		Fairlie	EW Pipe	Depreciation	x	x	x		$250,000		$250,000		$250,000	$127,000			
		Lake Tekapo	EW pipe	Depreciation	x	x	x										
		Twizel	AC pipe	Depreciation	x	x	x				$3,000,000						
		Fairlie	Eversley res Pumps														
		Fairlie	Manhole lids	Depreciation	x	x	x	$10,000		$10,000							
		Fairlie	Actuator valve	Depreciation	x	x	x	$4,000	$4,000	$4,000	$4,000						
		Tekapo	Pond Aerators							$78,000							
		Tekapo	Pump station upgrade						$99,000						$132,000	$105,000	
		Twizel	Pump station upgrade														
		All schemes	Infiltration investigation	Depreciation	x	x	x	$20,000									
		All schemes	Infiltration investigation	Depreciation	x	x	x	$20,000									
		All schemes	Scada renewal	Depreciation	x	x	x								$15,000	$10,000	$5,000
		Fairlie RC Renewal	CRC992647/992608.1	Depreciation	x	x	x										
		Lake Tekapo RC Renewal	CRC042914	Depreciation	x	x	x										
		Twizel RC Renewal	CRC042915	Depreciation	x	x	x		$60,000								
		Burkes Pass RC Renewal	CRC992607	Depreciation	x	x	x										
				Depreciation	x	x	x										
		All schemes	Revaluation	Depreciation	x	$20,751	x		$20,751			$20,751			$20,751		
				Depreciation	x	x	x										
				Depreciation	x	x	x										
				Depreciation	x	x	x										
		Total			**$0**	**$20,751**	**$0**	**$34,000**	**$433,751**	**$92,000**	**$3,254,000**	**$20,751**	**$250,000**	**$127,000**	**$167,751**	**$115,000**	**$5,000**
		GRAND TOTAL			**$0**	**$20,751**	**$10,000**	**$104,000**	**$1,258,751**	**$281,000**	**$3,254,000**	**$20,751**	**$250,000**	**$277,000**	**$167,751**	**$115,000**	**$5,000**

8.0 RISK MANAGEMENT

This Section identifies the risk management processes used to assess and manage risk. This involves the systematic application of management policies, procedures and practices to the tasks of identifying, analysing, evaluating, treating and monitoring those risks that could prevent a Council from achieving its strategic or operational objectives or plans, or from complying with its legal obligations.

8.1 Overview

A systematic and consistent approach to risk assessment improves Council's ability to manage its assets within resource limitations and to prioritise expenditure and actions that can avoid or mitigate the effects of an identified event. Risks can be grouped into financial, operational, or organisational categories. Their negative consequences can seriously impact public health and safety, incur financial loss or adversely affect public image. The risks identified might be relevant to many activities and be of concern at corporate level, or they might be localised, at an asset specific level.

This section describes the risk management processes used for the wastewater service. Assessment and management of risk within the Assets Group provides defensible tools for the communities and Council to develop prudent work programmes that support sustainable development.

The risk management processes described here are developed in the absence of a common adopted Council risk management framework.

8.2 Risk Events

The risk events that might impact on assets include but are not limited to:

Risk Event	Description	Examples
Natural events	Where there is no control over the timing or the extent of the event	Earthquake Floods Droughts Tsunami (lakes)
External Impacts	Organisations not providing services, such as material supply failures or transport failures	Power supply Telecommunications Fuel Vandalism Contamination
Physical failures	Where the condition or performance of the asset could lead to failure	Structural Capacity Mechanical components Electrical components
Operational	Where the management or operational activities might impact adversely on an asset	Training Maintenance Management Pollution during O&M

8.3 Current Approach

Various asset risk management tools and techniques, based on practical experience and the skilled application of its staff and service providers, have been used over a number of years at Council. This approach has generally been sufficient. As the value of the built asset increase, levels of service

expectations rise, and threshold limits for cultural and environmental impacts tighten, the need for more formal risk management practices increases. Mitigation strategies need to be put in place and reviewed continuously to achieve improvement to levels of service. A new Risk Management Schedule will be developed as part of project/improvement item (**IP 5**). This Risk Schedule will include and consider the various mitigation Plans including but not limited to Emergency Management Plan, Contingency Plan, Pandemic Plan, Operational Risk Plan, Business Continuity Plan, etc.

If the levels of service are achieved, in tandem with legislative compliance, prudent investment and good financial management, then minimisation of exposure to public and general liability and risks derived from operation of assets, should also occur.

Risks are considered to arise from many areas of the wastewater service management. They can be derived from the use of physical assets (e.g. a pump or a pipe failure) and management of the services provided (e.g. failure to formalise procedures and reporting of incidents).

8.3.1 Risks Assessed and Mitigated

There are numerous examples where risks have been identified, considered and appropriate mitigation performed. Examples include:

- CCTV inspections – are used to assess the condition of the piped collection system. This provides valuable information on whether the collection system is performing as expected or whether there is water ingress or potential contamination of the surrounding water table. This information is then used in the renewal plan
- Pump stations – the risk of overflows from pump stations includes consideration of the most likely receiving environment (surface water or groundwater). Maintenance and renewal programmes are aligned to ensure these risks are eliminated or minimised. All sewer pump stations have emergency storage to minimise the risk of overflows

This process is ongoing and it is important to note that risk management is not simply about the downside of events such as financial loss or legal proceedings. It also refers to the upside and opportunities that exist for the Council to do things more innovatively, sustainably, and effectively. However, Council engineers acknowledge that this needs to be formalised and documented through the Risk Schedule identified above (**IP 5**).

8.3.2 Integration of risk management approach

Council risk management is also integrated with other processes, often driven by legislative requirements. However, they are all integrated with the risk management approach that has been outlined above and can be used as sources for the definition of risk events.

Criticality - The criticality of an asset reflects the consequence of the asset failing (not the probability). High criticality assets are best defined as assets which have a high consequence of failure (not necessarily a high probability of failure).

Criticality of assets is identified as an improvement item (**IP 1**) and will allow the assets to be clearly identified and then the asset can be managed more proactively in order to mitigate the risk associated with their failure.

The criticality assessment will aid:

- Prioritising condition assessments
- Adjusting economic lives with respect to renewal profiles
- Prioritising/deferring renewals
- Prioritising expenditure
- Operation and maintenance planning
- Priorities for collecting asset information to the required level of confidence

8.3.3 Health and Safety

The Council is responsible for providing a safe work environment for its staff and public. The Council has aligned its Health and Safety practices with the Health and Safety at Work Act 2015. A voluntary Health and Safety group meets regularly, acting as a point of contact for staff, providing feedback to management on any issues, carrying out some monitoring and audit duties in relation to the Council

office buildings. Health and safety is also a standing item on the Audit and Risk Committee agenda and at management meetings.

The Council's Utilities staff, by the nature of their work are exposed to risks outside the office environment that are associated with the utilities services (reticulation and facilities). Council provides training in general and specific safety areas as required, examples for the utilities services are:

- Confined space requirements for supervisors and engineering staff that are associated with reticulation
- Traffic control at work sites via the code of practice
- Facilities Health and safety register and associated sign in/out procedures

Council contractors are required to complete all works in accordance with safety guidelines as set out under regulation, Council's Health and Safety Manual and their own health and safety plans.

8.3.4 Business Continuity Plan

No business, financial & operational continuity plan has been developed for the wastewater activity within the Mackenzie District (**IP 5**).

8.3.5 Civil Defence & Lifelines

The Civil Defence Emergency Management (CDEM) Act 2002 requires local authorities to coordinate plans and activities related to CDEM across the areas of Risk Reduction, Readiness, Response and Recovery. It also encourages cooperation and joint action within regional groups. Management systems for civil defence emergencies are detailed in the Council's CDEM plans.

The Canterbury CDEM Group Plan (June 2014) is a strategic document for the region that provides direction on how comprehensive, risk-based emergency management will be implemented in the Canterbury region. In implementing this plan, the Canterbury CDEM Group will work towards its vision of "A Resilient Canterbury — Waitaha Tukaha".

The Canterbury CDEM Group Plan is structured around the 4 Rs — the model used for comprehensive risk management in New Zealand. In each chapter of the Plan, the mechanisms for achieving risk reduction, readiness, response and recovery are outlined. These are supported by key principles identified at the beginning of each chapter.

8.3.6 Emergency Management

Operational Risks are those associated with the day to day operation of the District. The most prevalent of these are snow events followed by flooding and serious wind events. Initial response to all these events is managed through the Utilities Services Maintenance Contract, and is covered in our specifications. These specifications covers response times, liaison, notifications, plant and personnel requirements.

Council has held discussions on the "Life Lines" philosophy with the various groups that provide services within the district and is reviewing its "Disaster Resilience Summary". Council has participated in an Engineering Lifelines project, Earthquake Hazard Assessment, and the summary of the assessment is discussed in the following section.

8.3.7 Earthquake Damage Assessment

The Earthquake Hazard Assessment, Report to Environment Canterbury, May 2008, (Ecan Report no. U/08/18) prepared by Geotech Consulting Ltd identifies the following faults in the Mackenzie basin:

- Ostler Fault Zone: This significant fault system crosses through the middle of the Mackenzie Basin
- Irishman Creek Fault: This complex and relatively poorly studied fault consists of series of short fault traces that are very close to Lake Tekapo and the Tekapo Canal.
- Fox Peak, Albury and Opawa Faults: These faults are located further to the east & southeast of Mackenzie Basin and along the hills and mountains adjacent to Fairlie and the Opihi Valley

The report further states that there are many other active faults within the district that represent a significant earthquake hazard but also some very large potential earthquake sources that are not very far away. The Alpine Fault in particular has a very high probability of generating a large earthquake and is located only 15km from the north-western boundary of Mackenzie District. A large earthquake (Magnitude 8) on the Alpine Fault would result in serious simultaneous impacts over a wide area of the central South Island and is likely to have a major impact on lifelines and other infrastructure in parts of Waimate, Mackenzie and northern Waitaki districts. It is widely accepted by geologists that it is unlikely that the Alpine Fault can continue to accumulate stress at the current rate without an earthquake rupture in the next 100 years. It is therefore important to consider a large Alpine Fault earthquake in the design and management of all lifelines in the central South Island and this event forms the basis of one of the earthquake scenarios outlined in this report.

Ground shaking - The majority of Waimate, Mackenzie and northern Waitaki districts is underlain by harder basement rocks of the foothills and mountains that will not amplify earthquake shaking. Most of the remaining areas are on relatively dense older sediments such as alluvial gravels or glacial moraine. These materials will generally not cause much amplification and will behave as “average” foundation materials during earthquake shaking.

Tsunami - The lakes in the study area could all be subject to tsunami (waves created by the displacement of a large volume of water) and seiche (standing waves created by oscillation of lake water following a tsunami or by the earthquake ground shaking). The most likely cause of tsunami and any seiche large enough to be damaging, is a large landslide into a lake, or submarine landslide, particularly in the delta areas at the head of the lakes. The lakes most likely to be subject to these hazards are Ohau, Pukaki and Tekapo.

Liquefaction - overall there is only limited potential for liquefaction occurring in the study area.

The report includes a ‘damage assessment chart’ (tabled below) based on three shaking zones. The three shaking zones are - areas underlain with strong rock at shallow depth, intermediate ground conditions with a shallow to moderate depth of soil overlying soft rock, and areas underlain with deep soils The ‘damage assessment chart’ is intended to assist lifeline engineers in their appraisal of the vulnerability of various lifelines located in these three zones.

Zone	Shaking Intensity	Structures	Fixing designed for seismic loads	Equipment not fixed or fittings not designed for seismic loads
Structures				
1	MMVI	Slight damage to Type I buildings	Little or no damage	Movement probable, 10% failure
	MM VII	Minor damage except for poorly constructed weak material Type I buildings	Minor damage	Movement expected, 30% failure
	MM VIII	Well designed structures serviceable, but with at least minor damage. Many non seismically designed structures damaged and unserviceable. Some settlement damage possible	Considerable damage, 30-40% failure	80% failure
	MM IX	Damage and distortion to even modern, well designed structures, some may be unserviceable. Non seismically designed structures likely to be seriously damaged and poorly constructed weak material structures collapse. Settlement damage probable	Widespread damage, 50-60% failure	90-100% failure
2	MMVI	Slight damage to Type I buildings	Little or no damage	Movement probable, 10% failure
	MM VII	Minor damage except for poorly constructed weak material Type I buildings	Minor damage	Movement expected, 30% failure
	MM VIII	Well designed structures serviceable, but with at least minor damage. Many non seismically designed structures damaged and unserviceable.	Considerable damage, 25% failure	70% failure
	MM IX	Damage and distortion to even modern, well designed structures, some may be unserviceable. Non seismically designed structures likely to be seriously damaged and poorly constructed weak material structures collapse.	Widespread damage, 40% failure	90% failure
3	MMVI	As for Zone 2, with some small reduction in severity possible		
	MM VII			
	MM VIII			
	MM IX			

Zone	Shaking Intensity	Welded Steel, Polyethylene	Moderately ductile pipes Concrete with rubber joints Steel and cast iron with rubber joints	Non ductile pipe Ceramic with cement joints Brick
In ground pipework				
1	MMVI	Should be okay	Occasional mains damage and entry and junction failure	Minor mains damage 10% entries and junctions fail
	MM VII	Should be okay	Some mains damage, 25% of entries and junctions failure	Mains damage possible 40% entries and junctions fail
	MM VIII	Should be okay, minor damage and permanent distortion	Mains damage probable 60% entries and junctions failure	Mains damage widespread
	MM IX	Distortion to mains, damage possible at entry to structure and at junctions	Mains damage 80% entries and junctions failure	Major mains damage
2	MMVI	Should be okay	Occasional mains damage and entry and junction failure	Minor mains damage 5% entries and junctions fail
	MM VII	Should be okay	Little mains damage, 10% of entries and junctions failure	Mains damage possible 20% entries and junctions fail
	MM VIII	Should be okay, minor damage and permanent distortion	Mains damage likely 40% entries and junctions failure	Mains damage widespread
	MM IX	Distortion to mains, damage possible at entry to structure and at junctions	Mains damage probable 60% entries and junctions failure	Mains damage
3	MMVI	As for Zone 2, with some small reduction in severity possible		
	MM VII			
	MM VIII			
	MM IX			

It is important to remember that the Earthquake Hazard Assessment Report was develop din 2008, prior to the 2011 Canterbury earthquakes and 2016 Kaikoura earthquake. More information would be available now after these earthquakes which **may** influence the overall assessment.

8.3.8 Alpine Fault 8

Project AF8 is a cutting edge risk scenario-based earthquake response planning project, informed by thorough earthquake source, expression, and consequences science. The focus of the project is New Zealand's South Island Alpine Fault. Project AF8 commenced in July 2016, with funding from the Ministry of Civil Defence & Emergency Management's Resilience Fund, and is managed by Emergency Management Southland on behalf of all South Island CDEM Groups.

Emergency response planning in New Zealand, and most other comparable nations, takes an "all hazards" approach, where response resources and coordination arrangements are assumed to be sufficient to meet the needs of any hazard that might occur. The "all hazards" planning provides broad and solid basis for response planning, but it lacks specificity about the sorts of impacts and consequences that individual, large-scale or complex hazards, like major earthquakes, will bring with them, or the community, organisation, and government agency responses that are likely to be required to reduce damage, loss or suffering.

Project AF8 has been initiated to introduce outline planning for response actions, resources, and overall coordination within and between CDEM Groups across the South Island. Council will continue to monitor results from the project and any response actions.

8.4 Resilience

The districts residents and ratepayers have a high expectation of continuing functionality and service delivery. Recent high profile natural disasters have raised public awareness, but there is still a significant need to increase actual preparedness – both in general (e.g. household plans and emergency supplies) and for specific circumstances (e.g. tsunami preparedness in lake communities).

Resilience is based on a design philosophy which acknowledge that failure will occur. Resilience requires early detection and recovery, but not necessarily through re-establishing the failed system.

Resilience is not only applicable to natural hazards, but also needs consideration at an operational level where an asset failure is not necessarily a service failure.

Redundancy (duplication) does not provide Resilience.

Robust systems are designed to prevent failure. Resilience is about early detection and fast recovery. Resilience is defined as the intrinsic ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.

Resilience is about the ability to plan and prepare for adverse events, the ability to absorb the impact and recover quickly, and the ability as a community to adapt to a new environment.

Council acknowledge that resilience is not only about physical assets. It is about the people. It includes but are not limited to:

- connecting people and communities (neighbour to neighbour; educate; access to household resilience items, etc.);
- supporting community organisations
- the built environment and asset systems which are robust

Adverse events/natural disasters/climate change and the related impacts cannot be avoided and as a result Council have to factor this into long term planning, civil defence planning and determining the infrastructure requirements moving forward to ensure the community's expectations are met with regard to safe and reliable services and general wellbeing.

In order to improve resilience Council approach will be to:

- Actively participate in CDEM planning and activities, at both regional and local levels
- Investigate options for alternative service provision and system redundancy

- Identify critical assets and ensure mitigation methods are developed
- Obtain insurance where this is deemed to be the most cost effective approach

8.5 Insurance

All above ground infrastructural assets are currently insured by Council. The below ground assets are not insured. Council keep a $3M cash reserve balance to part fund any repairs and relies on Central Government assistance for repairs as a result of any natural event. In addition, Council is relying on its strong balance sheet to borrow sufficient funds to replace those assets in the unlikely event that there is widespread damage to those assets.

8.6 Assumptions and Uncertainties

The LGA 2002 - Schedule 10, Part 1 (11) requires the Council to clearly define all the significant forecasting assumptions and risks that underlie the financial estimates, assumptions concerning the useful life of significant assets and an estimate of the potential effects of the uncertainty on the financial estimates provided.

Forecasting assumptions and uncertainties are essential in the operation of Council's assets to indicate the levels of risks associated with those assumptions. Where necessary, additional strategies can be implemented to reduce the risk.

Table 8-1: Significant Forecasting Assumptions

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
Population Growth It is assumed that growth in the district's population will generally be consistent with the medium projections issued by Statistics NZ in December 2016, which are that the district's population will grow by a little over 4 percent from 2018 to 2028 (from 4680 to 4880 people). It is not expected that this level of population growth will have any significant impact on demand for infrastructure or services.		✓		Population change occurs within the district at a higher or lower rate than predicted.	A significant, consistent decline in population may adversely affect Council's ability to set rates at a level affordable to the community. A significant, consistent increase in population could adversely affect Council's ability to deliver some services to existing service levels.	Council will continue to monitor population measures within the district and respond to meet needs where possible.
Demographic Changes Most population growth within the Mackenzie District is expected to be at older ages (55+ years), with the proportion of over 65s living in the district projected to be slightly higher than the NZ average. Twizel and Fairlie have a higher proportion of older people (65+) than other areas in the district and this is not expected to change over the life of the plan.		✓		Demographic changes occur at a higher or lower rate than expected.	Changes to the projected demographics may place pressure on some Council services due to increasing demand, which may lead to a lower level of service in these areas or a requirement for additional investment.	Council will continue to monitor demographic changes within the district and respond to meet needs where possible.
Household Changes It is anticipated that changes to household numbers and composition will generally reflect population projections and forecast changes to demographics (that is, an ageing population). This is not expected to create any significant impact on demand for infrastructure and services, given the relatively small increase in total population projected to occur.		✓		Household changes across the district occur at a higher or lower rate than expected.	A slower rate of household growth may mean that some service activities have overinvested in infrastructure (too much capacity too soon).	Council will continue to monitor household changes within the district. Where rapid growth occurs, this is likely to be within existing subdivisions where servicing provision has already been made or, where growth requires additional infrastructure, developers can be required to meet this demand through the payment of financial contributions.

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
Dwelling Numbers It is assumed that growth in dwelling numbers will primarily be driven by demand for short-stay visitor and holiday accommodation due to year-on-year increases in both domestic and international visitor numbers to the district. Growth in demand for private holiday accommodation is predicted to have an impact on the availability of residential housing. However, the large proportion of unoccupied dwellings in the district, particularly in Tekapo (75%) and Twizel (66%), is not anticipated to change or increase significantly.		✓		Dwelling changes across the district occur at a higher or lower rate than expected.	A higher or lower rate of dwelling growth may impact on provision of services, such as the issue of resource and building consents.	Council will continue to monitor dwelling growth in the district and adjust provision of supporting services as required.
Tourism Growth It is assumed the average growth in international visitors to Mackenzie District will be at least equivalent to, or greater than, the growth in international visitors forecast for New Zealand over the coming ten years (an average increase of 5.4% per annum). This is based on current data which indicates growth in international visitors to Mackenzie District is occurring at a rate higher than the national average and forecast growth. It is also assumed growth in domestic visitors to Mackenzie District will continue to occur at a rate similar to international visitor numbers. However, there is more uncertainty around this assumption based on the lack of current domestic visitor survey data.		✓		Change to tourism occurs at a rate significantly above or below the growth levels assumed.	Increases in projected visitor numbers may place pressure on supporting services and infrastructure. Conversely, a drop in tourism to the district may mean that service activities have overinvested.	Council will continue to monitor tourism numbers to the country and district and respond to meet needs where possible.
Climate Change It is assumed that climate change is happening, and the Council will take into account the predicted impacts of climate change as it plans, builds and renews its infrastructure. The impacts are expected to be relatively minor within the period covered by the Long Term Plan, but increasing in the future.		✓		There is a risk that climate change will happen more quickly than expected and require changes to the Council's activities.	If climate change happens more quickly, the Council may need to carry out work on its infrastructure assets. Additional costs may be incurred to mitigate impacts. Council's business units may not recognise climate change in the delivery of their services. Decisions	Council activities will build appropriate mitigation responses into resilient infrastructure development. The Council will continue to monitor climate change science and the response of central

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
					made now without these considerations may have intergenerational effects on land use decisions, environmental policy and infrastructure decisions e.g. relying on undersized assets and resources in highly vulnerable parts of the district.	government and adapt its response where required.
Natural Hazards / Local Natural Disasters It assumed that there will be no major adverse events during the period covered by this Long Term Plan. *Note: the district is at risk from natural hazards such as flooding, earthquake, and storms. These events can occur at any time, without warning.* While events may occur at any time, Council's planning will focus on operational resilience and Emergency Management.	✓			A major adverse event occurs resulting in a significant impact on the district and Council's services.	A disaster has the potential to cause significant, unbudgeted impact on the Council and the community. In the event of a major disaster, Council has assumed additional central government support will be forthcoming. Council would need to borrow additional funds to make repairs and meet the costs of restoration.	The Council seeks to mitigate this risk through its Civil Defence, Risk Management and Insurance Policies. Council keeps appropriate levels of cash reserves ($3.0m) and sufficient head room in its borrowings to enable it to undertake any repairs on its underground assets. Central government has a role in disaster recovery after a natural disaster.
New Technologies There will be no new technologies deployed within the period covered by the Long Term Plan that will significantly change the demand for or provision of services.			✓	Technologies may become available which significantly change the demand for or provision of services.	Inefficient of ineffective provision of services in the traditional manner when other alternatives maybe available.	Council will regularly monitor existing and proposed technologies as they relate to service provision.
Service Delivery Modes & Contracts It is assumed that there will be no significant changes to current modes of service delivery for each service area or variations in terms of contract prices (above inflation and inventory adjustments) for current operations and maintenance contracts.		✓		Maintenance contracts may be re-tendered during the plan period. If maintenance and service contracts are consolidated and/or	This would require Council to either increase rates and/or operating revenue if efficiencies cannot be found or it may consider reducing levels of service.	

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
Council will continue to consider collaboration opportunities and assess changes to service delivery on a case by case basis.				re-tendered there is a possibility contract prices will be higher than anticipated.		
Planning Horizons It is assumed that the planning horizon for growth (30-45 years) and asset lifecycles (30 years plus) are sufficient to inform the ten year forecasts included in the LTP.			✓	The planning horizon for growth and asset life services differ from that assumed.		
Legislative Demands As an organisation that is created and derives its powers from statute, changes to legislation have a direct impact on the way we conduct our business. The speed and scale of review of legislation depends largely on the policy direction and priorities of the government of the day. While we anticipate changes to the Resource Management Act 1991 and Local Government Act 2002 during the life of this Long Term Plan, we have assumed that these and any other changes to legislation will not have a significant effect on our business. The LTP assumes that existing legislation will remain in place and that the structure and responsibilities of the Council will remain the same over the period covered by the plan. It also assumes the Council will remain an independent unit of local government during the next 10 years. The Council sees merit in continuing with shared services where this allows more efficient use of skills and resources.			✓	The impact of government legislation is more or less than expected. New legislation is enacted that alters the activities Council undertakes or provides.	Unrealised impacts of legislative changes may create greater impacts on Council operations, including operating budgets, workloads, time and resource availability. These pressures may lead to additional costs for ratepayers. Where legislative changes require Council to provide additional services or increased levels of services, this may impact fees and charges for cost-recovery activities.	Most changes to legislation are known in advance, giving councils the ability to prepare for implementation. Council will monitor existing and potential legislative changes as they move through parliamentary process. Where appropriate, Council will submit on legislation to encourage reduced or improved impacts on Council operations and limit costs to ratepayers. Historical trends have been for services transferred from central government to local government. The cost and impact on our activities as a result of future legislative changes cannot be quantified at this stage as it would be dependent on the specific services affected by the legislative change. Financial uncertainty in this area would generally impact the cost of introducing changes, and the

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
						mechanisms required to fund any new services.
Legislation Change – Development Contributions It is recognised that the ability to levy financial contributions under the Resource Management Act 1991 will be revoked, effective from 18 April 2022. Council will then recover development contributions. For financial forecasting purposes the Council has assumed that development contributions will provide a similar level of funding and outcomes to financial contributions when this change occurs.			✓	The ability to levy development contributions is not comparable to existing financial contribution provisions.	Council does not recoup costs associated with meeting infrastructure demands of development.	Council will review its Development Contributions and Financial Contributions policy prior 18 April 2022. This work will involve clearly determining the demand for services and the costs of meeting that demand.
Inflation To develop a consistent approach for local government to account for inflation, the Society of Local Government Managers (SOLGM) contracted Business and Economic Research Limited (BERL) to construct forecasts for inflation. It is assumed that long term inflation will be consistent with BERL's Local Government Cost Index (LGCI) forecasts.		✓		Inflationary costs in some areas may increase at a rate different to that forecast.		In preparing the LTP, the Council is required to use best estimates in determining the level of costs to be budgeted in the future. As a result, Council is required to account for the effect of price changes or inflation that is expected to occur over the ten year period. Council has endorsed the rates produced by BERL and has used these rates as the assumption for accounting for inflation for the preparation of the LTP. Some types of costs (eg roading and transport costs) have been subject to fluctuations in recent years, so it is inherently difficult to predict trends with accuracy. However, these costs will be mitigated through the annual plan process where the annual adjustment can be made.

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
Interest Rates and Borrowing Borrowing costs are assumed to be as included in Financial Forecasts. Council assumptions on interest rates are based on the Official Cash Rate (OCR). That rate will be used for calculating interest rates and will be adjusted annually.		✓		Forecast interest rates are higher or lower than forecast.	The movement in interest rates has a wide ranging effect on the Council. The Council's cash investments have derived interest at the market rates and the Council's internal financing policy bases the interest paid to or charged to individual communities on the Official Cash Rate. The level of works and services rates levied is dependent in part on the interest rate used in Council's internal funding policy.	Any exposure to interest movement will be managed by a preference for a higher percentage of fixed term rates.
Insurance It is assumed that an appropriate level of insurance will be secured by Council. There is less certainty that Central Government will provide a sufficient share for post event works. Underground assets will be partly self- insured and that sufficient emergency funding will be available from NZTA for damage to roading assets caused by extraordinary events. It is also assumed that increases in Insurance Premiums will be larger than CPI.	✓			There is a risk that insurance will be difficult to secure and that NZTA will not provide adequate emergency funding to reinstate damaged services. There is a risk that insurance premiums will rise more rapidly than expected.	Council's assets may not be able to be insured in a similar manner to the current approach and different options may need to be considered. This includes increasing reserve funds and higher excess sums. Premiums will exceed budget allocation and savings will be required in insurance policies or funds will need to be reallocated from other areas of expenditure.	
Timing & Level of Capital Expenditure The Long Term Plan assumes that the timing and cost of capital projects and associated operating costs are as determined through the Council's activity management planning process.	✓			There is a risk that capital projects may not occur as planned, or actual costs may vary from the forecast therefore may have an impact on the costs.	If projects do not occur as planned, capital expenditure in any year may differ from that forecast and delay may also change the cost of individual projects.	The Council will consider the impact of any change as part of the annual budget process and consider the funding implications of any cost changes.

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
				Transport projects seeking subsidy will need a Business Case approach to NZTA which may change originally anticipated outcomes.		
Resource Consents It is assumed that the conditions of resource consents held by Council will not be changed significantly and that the Council will be able to renew and obtain the necessary resource consents for its planned projects.			✓	Resource consents are changed through reviews, or applications for Council projects are not approved or have significant compliance or monitoring costs.	Projects will cost more if compliance requirements are significant, or may not proceed as planned if consents are not obtained.	The Council will consider the impact of any change as part of the annual budget process and consider the funding implications of any cost changes.
Effects of Assets Vested to Council It is Council policy to accept the vesting of the assets in the year that the Council is able to rate the individual sections created. To determine the value of the assets to be vested, the Council made assumptions based on an analysis of the costs of recent subdivisions in the District. The average costs were assumed as follows: (TBC) • Roading (incl Footpaths) $5,406 per section; • Sewer $8,300 per section; • Stormwater $3,120 per section; • Water $5,500 per section. These amounts will be applicable to all three townships and the amounts will be multiplied by the numbers of urban sections created in each year to arrive at the total assets to be added to the Council's asset register. This will also be inflation-adjusted each year according to the BERL inflation forecasts as described in the assumption for inflation			✓ ✓	The assumption has based the level of assets vested to Council on an analysis of recent major subdivisions carried out in the District. Some subdivisions may not result in any further assets to be vested in the Council as there has already been adequate capacity provided for the new sections and some subdivisions may have a greater amount of assets vested into Council as there may be a greater per property		

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
Each addition to the asset register will be depreciated by any appropriate depreciation charge. No vested assets will be applied to rural sections. To balance the books, the introduction of the asset value needs to be reflected in income, therefore, there will be a corresponding income line called "Vested Assets Income". This income will be treated the same as financial contributions as it is deemed to be capital income rather than operational income. The amount of this income plus the amount of the vested asset will be accounted for in the capital reserve of each asset.			✓ ✓ ✓	costs associated with the subdivision.		
Sale or Transfer of Assets It is assumed throughout this plan that we will retain ownership of our significant assets and continue with the current Council Departments.			✓	That the objectives whether financial or non-financial of holding strategic assets are not achieved.	Should specified returns not be attainable, we would review our investment. Such a review may have a financial impact.	Any decision to sell or partially sell would be significant and a full proposal with options to be considered would be provided to the community for feedback as part of a special consultation process.
Asset Revaluations The Council has a policy of revaluing its buildings, land and infrastructural assets on a three yearly basis. The Long Term Plan assumes that the book values of the relevant assets as at the revaluation dates will be increased by inflation rates as per the BERL inflation forecasts as described in the Inflation assumption above.			✓	Inflationary costs in some areas may be different from that forecast. The condition of the assets may be different to that assumed and the value of the asset may differ accordingly.	There may be a higher or lower asset value and a lower or higher depreciation charge.	The Council will consider the impact of any change as part of the annual budget process and consider the funding implications of any cost changes.
Sources of Funds for the Future Replacement of Assets It is assumed that funding for the replacement of existing assets will be obtained from the appropriates			✓	A particular funding source is not available.	Depreciation is used to fund renewals and is funded mainly through rates and user charges. Should other sources of capital funding such as subsidies or	

Assumption	Level of uncertainty *(High/Medium/Low)*			Risk	Impact of variation to assumption	Management of risk
	H	M	L			
sources as detailed in Council's Revenue and Financing Policy.					development/financial contributions differ from levels forecast in a particular activity, Council is able to access borrowings through its central treasury function.	
Useful Lives of Assets The useful lives of assets have been assumed as set out in the following table, which matches the depreciation policy under the Statement of Accounting Policies:		✓		Assets last longer than the lives assumed, or assets deteriorate at a faster rate that the lives assumed.	Assets require replacement earlier or later in their life cycle.	Ongoing assessment of the quality of assets means this information is updated regularly and work programmes adjusted to minimise the chance of asset failure. In the event of assets wearing out earlier than anticipated, capital projects could be brought forward. This may affect borrowing and depreciation expenses. Negative impacts are likely to be at least partially offset by some assets lasting longer than estimated. Mitigation may also involve reprioritisation of the capital expenditure programme.

Operational assets	Depreciation method	Life (years)	Operational assets	Depreciation method	Life (years)
Sewage			**Sewage**		
Mains	Straight line	60-80	Box culverts	Straight line	100
Pumps	Straight line	15	Manholes	Straight line	80
Oxidation ponds	Not depreciated	-	**Resource consents**	Straight line	Over the life of the consent

9.0 LIFECYCLE MANAGEMENT

This section of the AMP outlines what work is planned to keep the assets operating at the current levels of service defined in Section 5 while optimising lifecycle costs. The overall objective of the Life Cycle Management Plan is:

> To maintain performance measures to ensure that the current strategies do not consume the asset leading to an unexpected increase in maintenance/renewal expenditure in the future.

9.1 Overview

Lifecycle asset management focuses on management options and strategies from initial planning through to disposal, while considering all relevant economic and physical consequences. The effective application of asset management principles will ensure the reliable delivery of service and reduce the long-term cost of ownership and in this way reduce service costs. A well-structured lifecycle management plan will reduce the long term costs of ownership and in so doing reduce the service cost.

The Lifecycle Management Programme cover five key categories of work necessary to achieve the required outcomes. These key categories and goals are:

Table 9-1: Lifecycle Management Categories

Lifecycle Categories		Aim
Management Plan	Management functions required to support the other Programmes	To maintain the assets to ensure that the assets achieve their service potential
Operations and Maintenance Plan	To ensure efficient operation and serviceability of the assets so that they achieve their service potential over their useful lives. This includes the day-to-day work to keep the assets operating	
Renewal Plan	To provide for the progressive replacement of individual assets that have reached the end of their useful lives (restores the original capacity)	
Development Plan	To improve parts of the system currently performing below target service standards and to allow development to meet future demand requirements	To meet future demand and close any service gaps
Disposal Plan	To better plan for disposal of assets through rationalisation of asset stock or when assets become uneconomic to own and/or operate	To dispose of assets appropriately

9.2 Management

Management and monitoring strategies set out the activities required to support the maintenance, operations, cyclic renewal and asset development programmes. These activities include:

- Strategic planning
- Data management and evaluation
- Business processes
- Monitoring
- Financial management.

The following management activities are used to achieve the desired outcomes.

Table 9-2: Management Activities

Activity	Objective
Strategic Planning	This AMP supports the achievement of the relevant Community Outcomes and Infrastructure Strategy
	To develop Levels of Service aligned with strategies and plans
	To develop the professional skills of the staff through adequate training and experiences
Data Management	To develop and optimise the asset register and develop functionality in line with business needs
	Appropriate data collection programmes (condition, performance, asset registers) closely aligned with business needs implemented in accordance with documented quality processes
	To ensure the asset data are subject to defined quality assurance processes
Business processes	To ensure the AMP is s strategic 'living' document through regular updating and 3 yearly reviews
	Risk Management is an essential part of Asset Management and will be managed by the implementation of risk mitigation measures to maintain risk exposure at acceptable levels including but not limited to maintaining emergency response planning, condition monitoring of critical assets, preventative maintenance, development and implementation of operations manuals and standards
	To document, review and implement quality processes
Monitoring	To ensure agreed service levels and appropriate for demand
Financial	To ensure expenditure programmes are in accordance with funding and budget preparation policies and procedures
	To ensure systems are managed in a financially sustainable manner over the long term

9.3 Operations and Maintenance

This covers planning for on-going day to day operation and maintenance to keep assets serviceable and prevent premature deterioration or failure. This plan includes:

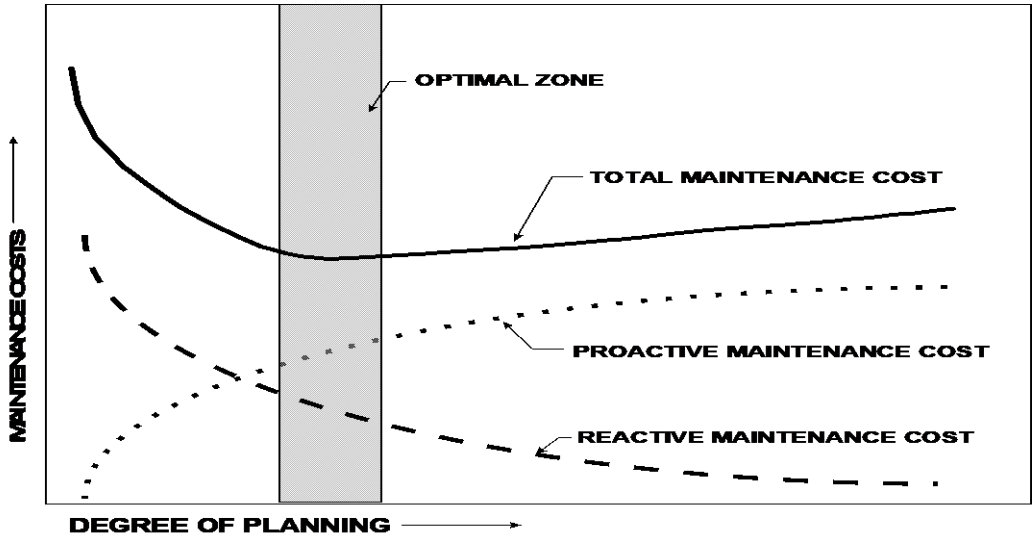
- Current trends and issues
- Maintenance decision making process
- Strategies required to meet levels of service
- How tasks are prioritised
- Summary of future costs
- Any deferred work and associated risks

Two categories of maintenance are carried out:

- Unplanned Maintenance: Reactive work carried out in response to reported problems or defects (e.g. repair broken water mains, respond to low chlorine alarms or pump failure alarms)
- Planned Maintenance: Proactive work carried out to a predetermined schedule (e.g. water main replacement, chlorine plant refurbishment, routine pump inspections and refurbishment etc).

A key element of activity management planning is determining the most cost effective blend of planned and unplanned maintenance as illustrated in Figure 9-1.

Figure 9-1: Balancing Proactive and Reactive Maintenance



9.3.1 Service Delivery

Council staff manage the Wastewater network with some assistance from consultants. The maintenance on the network is maintained through a competitively tendered multi-year contract. The current contracts let are included in Table 9-3.

The Utilities Services contracts (3 year + 1 yr + 1 yr) place considerable onus on the contractors to self-manage all utilities maintenance activities; this involves regular inspection of the various components of the networks, locating maintenance requirements and carrying them out.

Table 9-3: Current Contract

Contract # and Name	Term	Responsibilities	Contractor
1213 - Utilities Services Contract 2013-2016	3+1+1	**Water Supplies** The contract includes the complete operation and maintenance of the following water supplies • Fairlie • Lake Tekapo • Twizel • Burkes Pass • Allandale **Wastewater Systems** The contract includes the complete operation and maintenance of the following waste water systems • Fairlie • Lake Tekapo • Twizel • Burkes Pass • Mt Cook Lookout **Stormwater System** The contract includes the complete operation and maintenance of the following stormwater system • Fairlie • Lake Tekapo • Twizel	Whitestone Contracting Ltd

9.3.2 Management & Maintenance History

Historical data is used to make an assessment of past performance and to see if future trends can be applied. At a network level, these trends can indicate if the condition of the network is deteriorating or improving. The different forms of historical data and their location are outlined in Table 9-4.

Table 9-4: Historical data

Type	Location	Comment
Visual Inspection	Asset Register	Pipelines are inspected whenever a pipeline is excavated for repair and rated for condition
Past Maintenance Costs	Contractor's database	Pipelines are inspected whenever a pipeline is excavated for repair and rated for condition
Past History	MDC	

9.3.3 Maintenance and Operational Strategies

Wastewater maintenance work is included under the main utilities services maintenance contract and covers:

- minimum maintenance standards
- frequency of routine inspections
- response times to correct defects

Wastewater maintenance is achieved by employing the following asset strategies:

Table 9-5: Asset Strategies

Asset	Activities	Comment
Treatment	Inspection	Weekly and as appropriate
Pump Stations	Inspection	Weekly and as appropriate
Pumps	Tested	As appropriate
SCADA	Check signal	Yearly
Working Load Limits on Lifting Gear	Certification/Inspection	Annually
Switchboards	Inspection by Electrician	Annual inspection by electrician
Critical Mains	Inspection	Annually or as appropriate
Selected Mains	Condition Assessment by Pipe Sampling	Selected mains targeted by condition/age/material etc. are sampled during repairs
Low grade/ Low Points	Cleaning	As appropriate
Manholes	Condition inspection	During maintenance and as required
Connections	Inflow inspection	Programmed smoke testing
Unplanned Maintenance		
All	When a defect has been identified, remedial work is programmed before the risk and consequence of failure become unacceptable	
All	Priority is given to defects which are a safety hazard, likely to cause premature failure or severe economic deterioration	
All	Remain alert and prepared for emergency situations	
All	Respond to and repair failures by the most economic method available, making temporary repairs if major repairs or renewals are required	

Maintenance Strategy
Condition inspections: The maintenance contractors are required to report any defects observed during day to day maintenance activity.

Unplanned condition assessment of critical drainage assets are required after each heavy downpour to assess the number of culverts, drains and sumps affected by blockages.

The Contractors are required to maintain an effective communication system and level of preparedness to ensure emergency works are undertaken within the specified response timeframes.

Planned maintenance includes Preventive Maintenance, Servicing and Condition Monitoring. Planned Maintenance is usually carried out at a given frequency either at fixed intervals or 'on condition' to preserve the required levels of service at a minimum cost. On Condition means that once an asset has degraded to a certain condition (detected through condition monitoring) a decision as to the most appropriate maintenance must be made. This does not mean once an asset has failed.

Damaged and malfunctioning wastewater assets identified by public complaint or contractor reports are programmed for repair according to the following priority:

- Loss of Service
- Environmental impact
- Public safety
- Accelerated deterioration

Maintenance Standards
The maintenance standards to be achieved are set out in Council specifications contained in the utility services maintenance contract.

All critical wastewater assets are required to be inspected and maintained regularly.

Maintenance Programme
The majority of the wastewater maintenance is reactive so budgets have been based on historical expenditure.

The following non asset strategies are employed:

Table 9-6: Non-Asset Strategies

Strategy	Description
Alternative Technologies	Alternative technologies are considered as appropriate
Approved Materials	Only approved materials shall be used in the wastewater system to ensure the quality and longevity of the asset
Energy Efficiency	Energy savings and management carried out in a logical manner for the facilities
Health and Safety Audits	Audits undertaken randomly to ensure all work completed by Council and Contractor staff complies with the Health and Safety at Work Act and Traffic Management Regulations
Monitoring Planned vs Unplanned Maintenance	The mix of Planned vs Unplanned Maintenance will be analysed periodically to allow optimising of the activities
Supervision of Facilities	Supervision of Facilities to ensure these buildings and critical assets are maintained appropriately
Telemetry System	The telemetry system will be utilised to assist in monitoring the wastewater system, controlling operations and increase the knowledge of the asset operation therefore enabling efficiencies to be introduced
Effluent Quality	Routine sampling of effluent quality to comply with Resource Consent requirements

Strategy	Description
Sludge Monitoring	Annual sampling of sludge depth to monitor operational performance of ponds

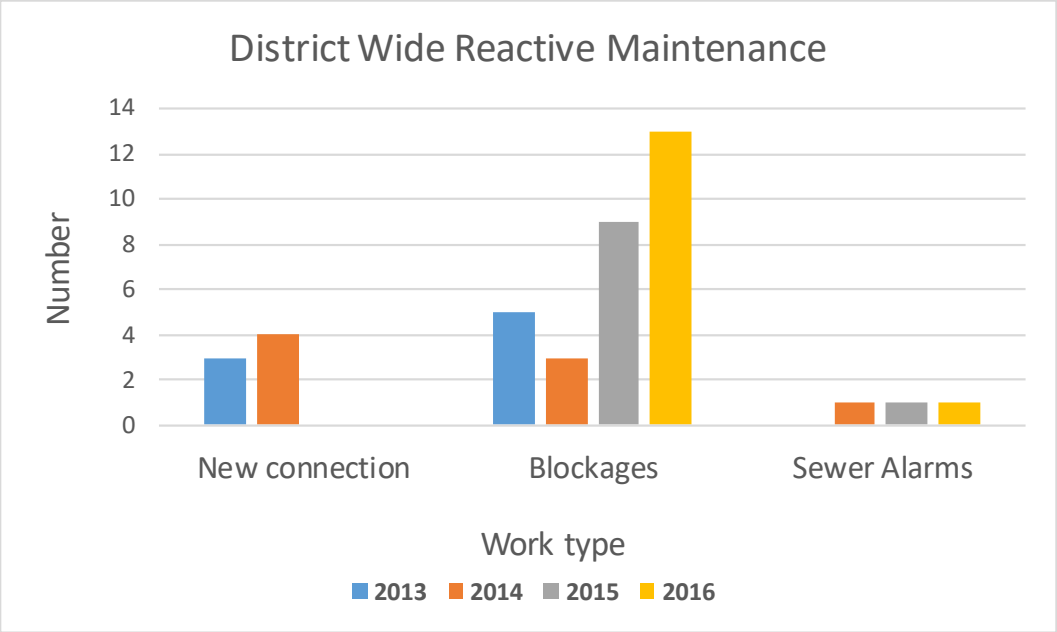
9.3.4 Current Condition

Council rates the condition of the wastewater pipelines and manholes. There is an ongoing inspection and maintenance regime under the routine maintenance contract. Council has a programme of internal inspection of the pipeline by CCTV to also monitor and record condition and performance. This information is used to estimate the condition of similar types of pipe in similar ground conditions.

9.3.5 Current Performance

The four sewer networks are performing well with limited blockages. These are generally tied to tree root intrusion. Specific condition for each asset is not currently measured but internal inspections of representative sections of the network are carried out and the results extrapolated across the network. There is good condition information for Wastewater assets with the majority of assets graded at 2 or better (88%). Only 1% of the network is graded as having a rating of 4 and no asset is graded as 5 (unserviceable).

Figure 9-2: District Wide Reactive Maintenance



The above reactive maintenance records show that blockages have increased over the last three years. The increase in blockages is associated with an increase in a number of areas:

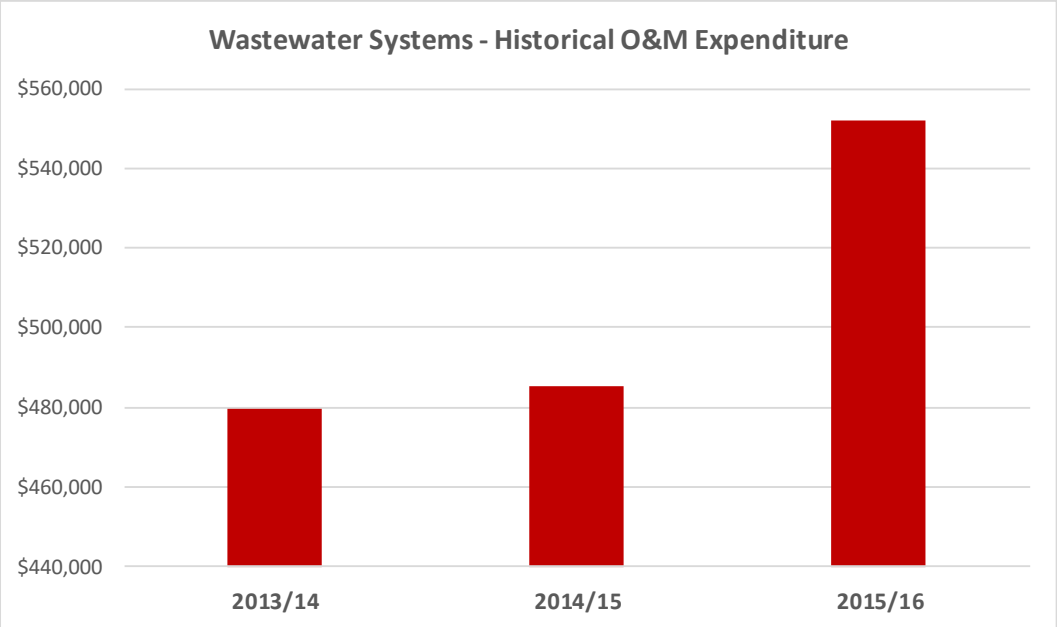
- wet wipes
- campervan discharges
- tourists

Reactive maintenance records are considered during renewal planning.

9.3.6 Operation and Maintenance Costs

The average annual operation and maintenance expenditure over the three years 2013/14 to 2015/16 equates to $505,694.

Figure 9-3: Historical O&M Expenditure



9.3.7 Manuals and procedures

Formal procedure manuals for treatment and pump stations are progressively developed, providing Council's Engineers and Contractors with documented emergency, operations and maintenance procedures required for Council's wastewater assets (**IP 6**).

9.4 Renewal/Replacement

This covers Major work which restores an existing asset to its original capacity or its required condition (e.g. pipeline replacement, pump replacement or reconditioning). This plan includes:

- End of life projections
- Renewal decision making process
- Renewals strategies and methods to meet required LOS
- How renewals are identified, prioritised and to what standard they are replaced
- Summary of future costs

The renewal programme is prioritised on the basis of overall condition.

Preventive Maintenance
Preventative maintenance includes non-routine work required to protect the serviceability of the network and minimise the threat of sewer surcharge.

Standards
The Council standards for replacement infrastructure are based on NZS 4404:2010. The O&M Contract specify Approved Materials.

9.4.1 Renewal Strategy

There is currently no documented renewal strategy for the wastewater assets. The maintenance strategies employed provides a basis for such a strategy, and as the maintenance strategies are refined the renewal strategy will be formalised.

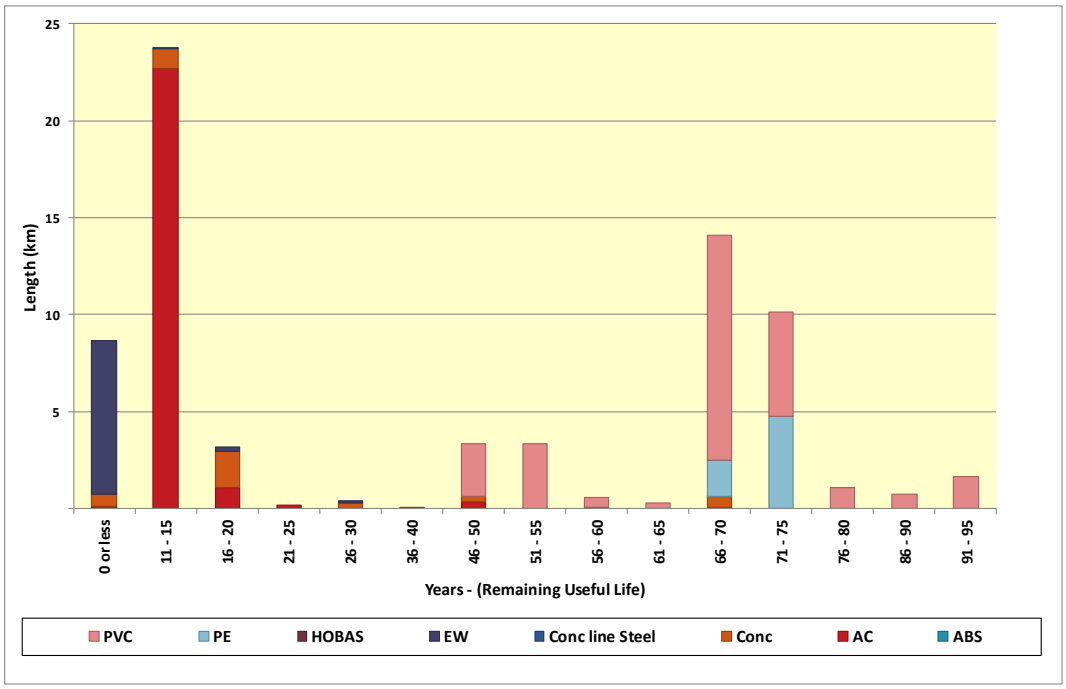
No formal criticality assessment has been documented, but Council engineers use practical experience and skilled application of staff and service providers in consideration of critical assets. This allows for different strategies to be applied depending on priority. For example, a "run to failure strategy" is applied to low priority assets as the consequence of failure is not major and the costs of ongoing condition monitoring may outweigh the costs of failure. A "risk and condition-based strategy" is applied where there is a significant implication due to failure, such as a major health and safety risk, significant reliability of supply consequence or significant expense to repair.

Currently the primary driver for replacement of an asset is the overall condition and remaining economic life of the asset with the condition of the asset informing the final decision for renewal.

9.4.2 Projected Renewals

Using the expected useful lives within the asset register provides the following graphical renewal projection of wastewater mains.

Figure 9-4: District Wide Projected Renewals



The graph shows that there are 8km of EW pipe and 0.6 km of Concrete pipe that have reached the end of their expected useful lives. There is 23km of AC pipe and 1.0km of Concrete pipe that will reach the end of their expected useful life within the 11-15 year window. There is 1.8km of Concrete pipe, 1.1km of AC pipe and 0.3km of EW pipe which will reach the end of their expected useful life within the 16-20 year window.

Council has a programme of internal inspection of the pipeline by CCTV to also monitor and record condition and performance. This information is used to estimate the condition of similar types of pipe in similar ground conditions. This information is used to develop the renewal programme.

9.4.3 Deferred Renewals

There is no deferred work associated with the wastewater system.

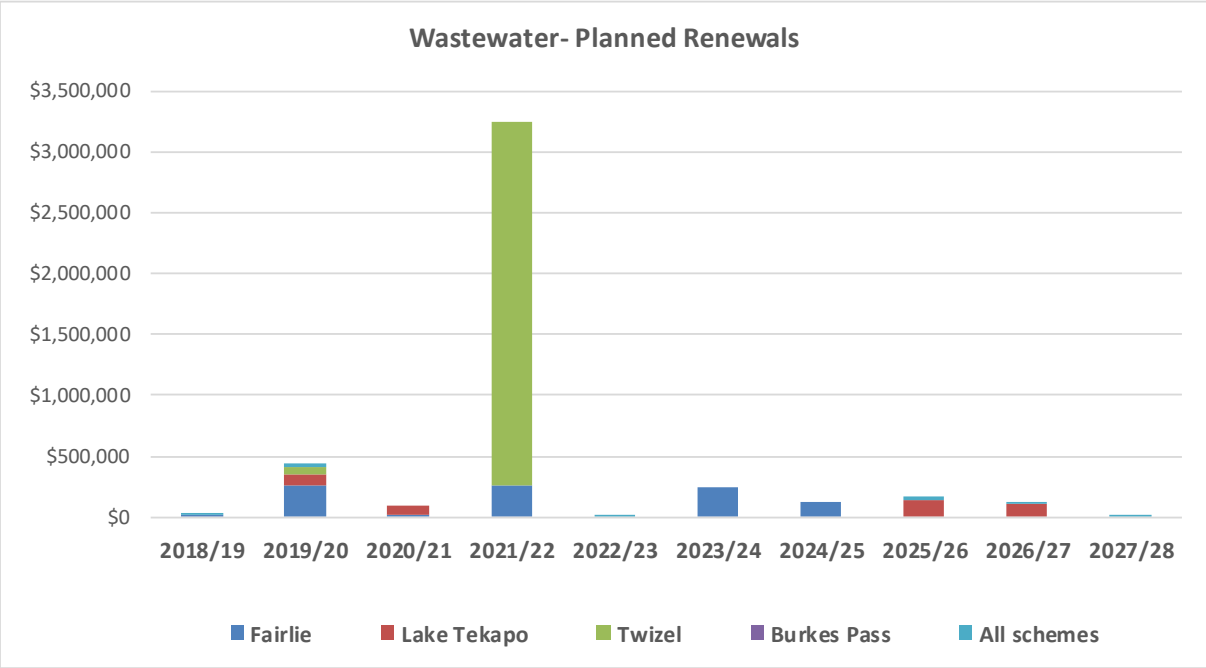
9.4.4 Planned Renewals

The planned renewals for the next 10 years are listed in Table 9 7: Planned Renewals below. This summarise the renewals for each wastewater system. The specific details are discussed within each individual wastewater system in Appendix A – Individual System Description.

All schemes include projects such as SCADA and revaluation, etc.

Table 9-7: Planned Renewals

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Fairlie	$14,000	$254,000	$14,000	$254,000	$0	$250,000	$127,000	$0	$0	$0
Lake Tekapo	$0	$99,000	$78,000	$0	$0	$0	$0	$132,000	$105,000	$0
Twizel	$0	$60,000	$0	$3,000,000	$0	$0	$0	$0	$0	$0
Burkes Pass	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
All schemes	$20,000	$20,751	$0	$0	$20,751	$0	$0	$35,751	$10,000	$5,000
TOTAL	**$34,000**	**$433,751**	**$92,000**	**$3,254,000**	**$20,751**	**$250,000**	**$127,000**	**$167,751**	**$115,000**	**$5,000**



9.5 Asset Development

Most new assets are created as part of subdivisions and subsequently taken over by the Council.

The criterion used for justifying new/replacement construction undertaken by Council includes evidence of regular leakage and consequent interruption to supply or blockage due to tree roots or the like. There are a number of asbestos cement pipelines (19.6%) in the district that are deteriorating from the inside out and will prematurely start to fail in the next twenty to thirty years or so. It is proposed to commence sampling of the network and complete a deterioration model to determine more accurately the expected life

Development Standards
Council uses the Land Subdivision Standard NZS4404: 2010

Development Programme
The cost of pipeline renewal and development works is included in the Council Renewal Programme.

9.6 Asset Disposal

Council has no plans for disposal of components of the wastewater asset. Details for specific assets are included in the following table.

Asset	Comment
Pipes	Generally left in the ground or are removed in pieces as part of the excavation to lay the replacement pipe
Manholes	Depending on condition, re-used or taken out.
Pump stations	Generally removed and the hole filled in. Where possible components are reused, otherwise they are disposed to waste

All pipeline renewals have a corresponding disposal either through the pipes being removed and disposed of at the landfill, or being left in the ground if the water services are renewed using 'no-dig' techniques or the asset is replaced in a new location. A work order report records each disposal and the details put in the AssetFinda database. Similarly, replacement of components at treatment plans and pumping stations usually involves disposal of those items being renewed/upgraded.

Buried assets remain in the ground unless economic to remove or they pose a potential hazard.

In all cases asset disposal processes must comply with Council's legal obligations under the LGA, which covers:

- Public notification procedures required prior to sale
- Restrictions on the minimum value recovered
- Use of revenue received from asset disposal

Under the Wastewater Activity, no assets for disposal are considered to be eligible to be for sale. When considering disposal options all relevant costs of disposal will be considered, including:

- Evaluation of options
- Consultation/advertising
- Obtaining resource consents
- Professional service, including engineering, planning and legal survey
- Demolition/making safe
- Site clearing, decontamination, and beautification

Asbestos Cement Pipe
AC pipes are composed of a mixture of Portland cement, asbestos fibres and finely ground silica.

Asbestos fibres are hazardous to health and there has been a well-established link between airborne asbestos fibres and asbestosis since before 1900.
It is therefore critical that exposure to airborne asbestos fibres is, where practical, eliminated or appropriate control measures are put in place to protect those working with AC pipes.

However, there is no evidence to show that asbestos fibres will cause any harm when they are wet and swallowed. The effects of asbestos in the water supply have been studied extensively, and results have not shown an elevated risk of asbestos-related disease.

When AC pipes are left undisturbed the risk of asbestos fibres becoming airborne is very low, and while they should still be treated as hazardous material, they present very low risk. Therefore, whenever it is practical, AC pipes should be left undisturbed (whether in service or abandoned).

When work on, or around, AC pipes is necessary, good working practices must be adopted to, where practical, eliminate or alternatively minimise exposure to airborne particles.

(Source: *Water New Zealand Good Practice Guide - Volume 1, National Asbestos Cement Pressure Pipe Manual*)

10.0 FINANCIAL

This section documents the financial requirements to manage and operate the asset.

10.1 Funding Details

10.1.1 Financial Strategy

The Council is required to have a financial strategy as part of its LTP. The purpose of the Financial Strategy is to facilitate prudent financial management by providing a guide to consider proposals for funding and expenditure against, and to show the overall effects of funding and expenditure proposals on the Council's services, rates, debt and investments.

In the strategy, the Council is required to specify the factors expected to have a significant impact on Council for the period covered by the LTP.

These factors include:

a) Tourism and visitor growth
b) Land use change
c) Climate change and community resilience
d) Infrastructure capital costs

Of these, infrastructure capital costs is of relevance to the wastewater activity. Upgrades to wastewater systems are programmed within the LTP period.

Changes to environmental standards, climatic conditions and growth will also require upgrades to some of the district's wastewater systems. Replacement of deteriorating infrastructure is also required over the term of the LTP.

10.1.2 Rating and Borrowing

The district's urban wastewater schemes vary in age and condition and there are some renewal costs over the next decade. This, combined with an increase in costs to meet upcoming environmental planning and discharge quality requirements, leads to an additional financial burden of providing wastewater networks.

The Council will borrow to fund these works and other significant capital expenditure on the 3 waters (water, wastewater and stormwater). This borrowing will be repaid through targeted rates.

10.1.3 Price Level Changes & Forecast Financial Statements

Accounting rules require that Council adjust its forecast financial information to take account of the impact of inflation. This should more fairly indicate rates movements, particularly in the first three years of the Plan. Council, through the Society of Local Government Managers has contracted Business and Economic Research Ltd (BERL) to construct forecast price level changes for key categories of expenditure as they affect local government. Council has considered this advice and considers it appropriate to apply it to our circumstances.

Council has endorsed the rates produced by BERL and has used these rates as the assumption for accounting for inflation for the preparation of the LTP.

Year Ending	Roading	Planning and regulation	Water, sewer, drainage, and waste services	Water and Environmental	Local government administration	Community activities	Earthmoving and site work	Pipelines	All salary and wage rates - Local govt sector
Jun-17	3.2	2.2	3.8	3.1	2.0	3.2	3.9	1.7	2.4
Jun-18	5.4	3.9	6.6	5.5	3.5	5.0	6.5	3.9	3.5

Jun-19	8.8	5.9	9.2	8.4	5.1	7.7	11.0	6.7	4.7
Jun-20	12.2	8.1	11.8	11.4	6.8	10.4	15.5	9.6	6.0
Jun-21	15.6	10.5	14.8	14.5	8.7	13.2	19.9	12.9	7.5
Jun-22	19.1	12.9	18.0	17.7	10.9	16.0	24.2	16.1	9.1
Jun-23	22.5	15.5	21.6	21.1	13.2	18.9	28.3	19.3	10.8
Jun-24	25.9	18.2	25.5	24.5	15.8	21.8	32.3	22.6	12.7
Jun-25	29.3	21.0	29.8	28.1	18.6	24.8	36.1	25.8	14.8
Jun-26	32.6	24.0	34.5	31.8	21.7	27.8	39.7	29.0	17.0
Jun-27	35.9	27.1	39.7	35.6	25.0	30.8	43.0	32.2	19.5

10.1.4 Vested Assets

When a developer carries out a subdivision, they are required to vest various assets to Council. These assets include any new roads, water mains, sewer mains, stormwater systems, footpaths, street lighting and landscaped areas. The Council is then responsible for the maintenance and future replacement of those assets.

The Council records the cost of those vested assets at the current cost when received and the assets will be revalued in line with the Council's other infrastructural assets. These assets will also be subject to depreciation.

10.1.5 Funding Strategy

The first priority is to maintain and operate the existing network in its current condition then allow for renewal expenditure that revitalises a component of the network that has worn out. Capital projects are funded through the Council's Policy for Funding Capital Expenditure, which was adopted as part of the 2012-2022 LTP.

The policy is summarised as follows:

Capital Reserves

- A Capital Reserve has been established for each activity that the Council undertakes.
- All depreciation that has been funded from that activity will be lodged into the Capital Reserve on a quarterly basis when each instalment of rates is due.
- Funds from other reserves or financial contributions can also be deposited into the Capital Reserve.
- All capital expenditure will be paid from the Capital Reserve at the time of payment.
- Capital Reserves may go into overdraft at any stage with prior approval of Council.

Capital Expenditure

- All Capital Expenditure must be approved by Council through the budget process or by an explicit resolution.

Interest Component For Debt Incurred Prior to 30 June 2012:

- If the balance of the Capital Reserve is overdrawn, the community of interest for the relevant activity will be charged an interest rate set at 100 basis points greater than the Official Cash Rate determined by the Reserve Bank. Such interest will be charged as a cost to the activity operating expenses and be rated for.
- If the balance of the Capital Reserve is in funds, then the Council will pay the community of interest in the relevant activity an interest payment set at 25 basis points less than the Official Cash Rate determined by the Reserve Bank. Such interest will accrue to the activity's Capital Reserve.

Interest Component For Debt Incurred After 30 June 2012:

- For the component of the debt incurred after 30 June 2012 the interest rate will be set at a level equal to the Council's average bond portfolio rate applying at the previous 1 January. Such interest will be charged as a cost to the activity operating expenses and rated for.

In determining the projects to be undertaken the benefit/cost ratio is the governing criteria used with preference being given to projects which can be shown to be economically justified, attract subsidy and have the necessary Council funding available.

10.2 Asset Valuation

The last valuation of the Water Supply infrastructural network and associated assets was undertaken as at 1 July 2016 and is summarised in the following table. The valuation is updated 3 yearly to take into account capital works and additions to the water supply network.

The valuation consists of an assessment of the replacement cost, depreciated replacement cost and the annual depreciation or decline in service potential of the network. The annual depreciation or decline in service potential is the amount the asset declines in value over a year as a result of the remaining life of the asset reducing. Provision is required to be made to fund this depreciation so as to make suitable allowance for the future replacement or renewal of the asset.

Table 10-1: Asset Valuation

Asset Type	Optimised Replacement Cost/ORC ($)	Optimised Depreciated Replacement Cost/ODRC ($)	Annual Depreciation ($)
Pipelines	$19,022,606	$11,444,066	$215,210
Manholes	$2,979,989	$1,958,930	$35,392
Plant	$3,409,573	$1,756,783	$54,826
TOTAL	**$25,412,168**	**$15,159,779**	**$305,428**

The total optimised replacement cost of the Wastewater Infrastructure was assessed to be $25,412,168 as at 1 July 2016. The total optimised depreciated replacement cost was assessed to be $15,159,779

The annual depreciation has been determined to be $305,428 per annum.

10.2.1 Depreciation

Depreciation is provided on a straight-line basis on all physical assets at rates which write off the cost of the asset to the estimated residual value at the end of its assumed effective life.

Expenditure on renewing or improving the capacity of the asset is capitalised annually as are assets which are vested in Council by developers. Capital work in progress is not depreciated. The total cost of this work is capitalised at the end of the financial year in which it is completed and depreciated from then onwards.

10.2.2 Valuation methodology

All assets have been valued using depreciated replacement cost (DRC). A DRC valuation requires:

- Determination of quantities of assets optimised to relate to those required for current service delivery and foreseeable demand
- Unit rates for replacement with modern engineering equivalent assets
- Effective lives that take account of local influences
- Depreciation that defines current value given a definable remaining life.
-

The NZ Infrastructure Asset Valuation and Depreciation Guidelines 2006 give direction as to the overall methodology applicable to a DRC valuation for water supply assets. This has been applied in this case to achieve a suitable valuation for Council Improvements and Infrastructure Asset Valuation.

Borrowing costs were excluded from the valuation.

The primary data source for this revaluation was Council's Asset Register.

10.2.3 Asset Lives and Assumptions

The base life of an asset is set during the valuation process in order to identify what is believed to be the average length of time that the asset will be capable of providing the required level of service. The setting of the base life is the factor in the valuation process that directly affects the annual depreciation requirement for the asset.

The expected base lives in the reticulation for water, sewer and stormwater are reviewed as part of each valuation to align the expected lives, and the method of setting these with the renewal decision making practice.

Asset group	Expected useful life (years)
Mains	60-80
Pumps	15-40
Oxidation ponds	Not depreciated
Manholes	80

10.2.4 Resource Consents

It is difficult to determine the fair value of resource consents due to their specialised nature and having no active market to compare values against. For these reasons, Council holds resource consents at deemed cost and they are amortised over the life of the consent.

10.3 Financial Summary

The future overall financial requirements for the Wastewater activity are tabled below:

Table 10-1: Proposed Future Capital Works

SEWER	LTP Budget Yr 1 2019	LTP Budget Yr 2 2020	LTP Budget Yr 3 2021	LTP Budget Yr 4 2022	LTP Budget Yr 5 2023	LTP Budget Yr 6 2024	LTP Budget Yr 7 2025	LTP Budget Yr 8 2026	LTP Budget Yr 9 2027	LTP Budget Yr 10 2028
	(thousands)									
Urban Sewer										
0258193. Vested Assets	0	0	1,685	0	2,098	0	0	2,602	0	0
0258401. Sewer Reticulation Renewal	84	1,136	15	0	0	631	292	623	299	168
0258807. Resource Consent Costs	0	62	0	0	0	0	0	0	0	0
Total Urban Sewer Capital Expenditure	**84**	**1,197**	**1,699**	**0**	**2,098**	**631**	**292**	**3,225**	**299**	**168**

Table 10-2: Annual Net Cost - Funding Impact Statement

	Annual Plan 2017/18	Long-term Plan 2018/19	Long-term Plan 2019/20	Long-term Plan 2020/21	Long-term Plan 2021/22	Long-term Plan 2022/23	Long-term Plan 2023/24	Long-term Plan 2024/25	Long-term Plan 2025/26	Long-term Plan 2026/27	Long-term Plan 2027/28
						(thousands)					
General Rates, uniform annual general charges, rates penalties	0	0	0	0	0	0	0	0	0	0	0
Targeted rates	599	639	726	774	810	863	922	1,041	1,035	1,130	1,205
Subsidies and grants for operating purposes	0	0	0	0	0	0	0	0	0	0	0
Internal charges and overheads recovered	9	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tax, fines, infringement fees and other receipts	12	10	10	11	11	11	11	12	12	12	13
Total operating funding (A)	**620**	**649**	**736**	**785**	**821**	**874**	**933**	**1,053**	**1,047**	**1,142**	**1,218**
Payments to staff and suppliers	250	276	335	471	275	295	290	475	317	312	320
Finance costs	0	0	0	0	0	0	0	0	0	0	0

	Annual Plan 2017/18	Long-term Plan 2018/19	Long-term Plan 2019/20	Long-term Plan 2020/21	Long-term Plan 2021/22	Long-term Plan 2022/23	Long-term Plan 2023/24	Long-term Plan 2024/25	Long-term Plan 2025/26	Long-term Plan 2026/27	Long-term Plan 2027/28
						(thousands)					
Internal charges and overheads applied	4	6	6	6	6	6	6	6	6	6	6
Total applications of operating funding (B)	**254**	**282**	**341**	**477**	**281**	**301**	**296**	**471**	**323**	**318**	**326**
Surplus (deficit) of operating funding (A-B)	**366**	**367**	**395**	**308**	**540**	**573**	**637**	**572**	**724**	**824**	**892**
Development and financial contributions	205	0	0	248	0	552	0	0	1,142	0	0
Total sources of capital funding (C)	**205**	**0**	**0**	**248**	**0**	**552**	**0**	**0**	**1,142**	**0**	**0**
Capital expenditure											
To meet additional demand	0	0	0	0	0	0	0	0	0	0	0
To improve the level of service	1,511	0	927	0	0	0	0	0	0	0	0
To replace existing assets	0	84	273	15	0	0	631	292	623	299	168
	1,511	**84**	**1,197**	**15**	**0**	**0**	**631**	**292**	**623**	**299**	**168**
Increase (decrease) in reserves	(940)	283	(802)	751	540	1,125	6	280	1,243	525	724
Total applications of capital funding (D)	**571**	**367**	**395**	**766**	**540**	**1,125**	**637**	**572**	**1,866**	**824**	**892**
Surplus (deficit) of capital funding (C-D)	(366)	(367)	(395)	(308)	(540)	(573)	(637)	(572)	(724)	(824)	(892)
Funding Balance ((A-B)+(C-D))	0	0	0	0	0	0	0	0	0	0	0

11.0 IMPROVEMENT PLANNING

An important component of this Activity Management Plan is the recognition that it is a "live" document in need of monitoring, change and improvement over time. This Section details the improvements that will lead to improved management and increased confidence.

11.1 Improvement Plan Achievements

Many of the Improvement Plan Tasks identified in the 2015 Activity Management Plan have been achieved by the time of this review in 2017. The following table details improvements achieved to date.

Table 11-1: 2015 Improvement Plan Achievements

Project Description	Status	Date	Comment
Current age and remaining life of all assets needs to be reviewed and determined	Complete	June 2017	
Augment existing LoS information	Complete	June 2017	
Undertake customer surveys with defined performance targets.	Completed	2016	Ongoing
Develop a model of the Twizel Sewer Network to determine what impact development will have on specific areas.	Ongoing	June 2017	
Conduct a research study, to determine the impact of the Land and Water Plan as produced by Environment Canterbury as it applies to Council.	Ongoing	June 2017	
Complete a Customer Survey, including local industry, to establish any changes in customer expectations as they relate to demand on the network.	Completed	2016	On going
All assets need to be assessed for criticality	Transferred	June 2017	Part of the Current IP Programme
Risk management register needs to be developed. Assessed risks can then be linked to maintenance and renewals programmes.	Transferred	June 2017	Part of the Current IP Programme
Significant negative effects need to be identified and provide an input into the LTP. Also identify procedures for mitigating significant negative effects.	Completed	June 2017	Included in Section 5.0
Emergency management (including lifelines) requires full review and inclusion. Require procedures in place for rapid response to emergency failures.	Completed	June 2017	Part of Maintenance Contract
Corporate insurance policy/requirements and updating of asset insurance costs needs to be considered and incorporated.	Complete	June 2017	
Review and update the Asset Register database. Ensure all inventory data is captured.	Complete	June 2017	Ongoing
Complete a full review of the network assets (using both the Asset Register and field inspections) and develop a detailed 10 year Forward Work Programme for all asset groups	Complete	June 2017	
Produce Annual Plan Forecasts, adjust 10 year plan and add Year 10 to total programme	Complete	June 2017	Ongoing
The assessment of annualised depreciation needs to be reviewed to ensure that the depreciation collected is realistic and comparable to the lifecycle renewal cost.	Complete	June 2017	
The default construction date and the expected life of all assets need to be reviewed	Complete	June 2017	Ongoing
Sustainability - Include further summary of sustainability measures that are in place, including details of Council			

Project Description	Status	Date	Comment
Sustainability policy, strategies and operations enabling greater sustainability etc.			

11.2 Improvement Plan Focus

The Mackenzie District Council Wastewater Services Asset Management Improvement Plan and Projects will be focused on the following key areas:

- Protecting our communities from wastewater related health issues by providing community reticulated systems in agreed areas
- Protecting the natural environment
- Risk Management
- System knowledge update
- Investigating innovative ways to provide an efficient and cost effective wastewater collection and treatment system and ensure ongoing affordability of the wastewater service
- Asset Management

11.3 Current Improvement Plan

The following table documents the Improvement Items identified during the review and update of the AMP.

Table 11-2: Current Improvement Plan

IP #	Reference Section	Project Description	Timeline	Responsibility	Internal/External Resource
IP 1	Section 4.10	Develop a formal documented criticality assessment			
IP 2	Section 5.2.3	Develop hydraulic network models			
IP 3	Section 6.9.7	Assess 3 Waters buildings for seismic vulnerability (EQ prone buildings)			
IP 4	Section 7.6.1	Continue infiltration reduction programme			
IP 5	Section 8.3	Develop Risk Management Schedule including all associated documents			
IP 6	Section 9.3.7	Develop & maintain Operation and Maintenance Manuals (ongoing)			
IP 7	Section 11.6A1.6	Include replacement costs for equipment in asset register			

11.4 Project Identification and Assignment

Projects are identified through various processes including but not limited to:

- Legislative Compliance
- Levels of Service
- Growth
- Renewal
- Operation & Maintenance

Projects are then assigned to the individual staff to complete depending on their association or main project criteria e.g. Facilities/Reticulation/Asset Management, etc.

While projects in year 1 of the updated LTP are considered to be highly relevant, over the following two years some become less appropriate. This is generally due to:

- changes in legislation which remove the need for the work or change priorities
- better understanding of methods, costs and timing to deliver the project outcomes. This may be via other council business units, external agencies or through other projects.
- The community and council no longer supporting the work

11.5 Reporting on Projects

Currently all projects in the LTP and Annual Plan are reported quarterly. It is acknowledged that the management and completion of improvement items will contribute to the achievement of Community Outcomes, and regular reporting on activity items assist to ensure that achievement towards each outcome.

11.6 AM Preparation, Monitoring & Review

This AMP will continue to be developed over time to incorporate further advanced asset management techniques, make use of improved data collection and management systems, respond to legislative and policy changes, and address evolving issues. This Plan will be further tested and developed with ongoing focus on legislative compliance, planning for climate change, environmental management, and improving efficiency.

This AMP is to be reviewed on a 3-yearly basis, with the next full review taking place in 2020. Each review will be completed in line with whole of Council LTP delivery plans. During the three year period leading up to this review, the items in the Improvement Programme should be addressed within the timeframes provided. These improvements can then be incorporated into the next review of the AMP.

This AMP is the responsibility of the Utilities Manager.

APPENDIX A INDIVIDUAL SYSTEMS DESCRIPTION

A1 Fairlie Wastewater System

A1.1 Overview

Description		Quantity
Population Served 2013 % of district served by community wastewater system		693 (900 during holidays) 31%
Type of Collection		Gravity
Properties	Able to connect	527
	Connected	
	residential	
	commercial	
	industrial	
	TOTAL Connected	474
History	Original scheme installed in	1938
Demand	Average Dry Weather Flow (design)	3.14 l/s (271 m^3/day)
	Peak Wet Weather Flow (5.3 x ADWF)	42.1 l/s (3,637.44 m^3/day)
Length of reticulation		12.7km
Number of manholes		103
Number of pump stations		1
Treatment	Treatment	Oxidation ponds
	Disinfection	None
Disposal		To land
Infiltration		Extent unknown
Financial	Funding	Universal rate

A1.2 Key Issues for Service

Issues	Resolution
Earthenware mains CCTV	Replace
Groundwater Inflow& Infiltration	Investigate, consider resolution options and implement
Pond sludge levels	Monitor, consider options and desludge

A1.3 Overview & History

The Fairlie wastewater system was first constructed in 1938 using earthenware pipes with cement joints. The Initial Oxidation ponds were constructed in 1971 and then upgraded in 2002.

The five soakage basins were constructed in 2004 to remove the discharge from the Opihi River. Now all effluent either evaporates or discharges to ground.

Extensions of pipelines over the years have been mainly in asbestos cement and uPVC.

Wastewater Oxidation pond and disposal system is located on Talbot Road.

A1.3.1 Reticulation

Generally speaking, all of the systems in Fairlie are in a good state of repair and if they are maintained and renewed regularly, and at the appropriate times, they can be expected to last indefinitely, without any significantly abnormal costs having to be incurred.

Figure 11-1: Fairlie Installations

	
Pump station	**Emergency Holding Tank**

A1.3.2 Pump Stations

There is only one pump station in Fairlie. This collects the effluent from the Camping Ground and pumps it via a rising main into the gravity system.

The original Camp Ground Pump Station was decommissioned and a new EOne pump system was installed in 2014. The system installed was a Model 2014iP 1100 x 2000mm supplied by Ecoflow Ltd.

The pump station has two EOne 0.75 kW submersible grinder pumps and an alarm panel as part of the package. The Duplex station is rated for 4000litres per day. With both pumps running it pumps 1.2 l/s.

A1.3.3 Treatment Plant

The initial oxidation ponds were constructed in 1971 and then upgraded in 2002 with the dividing up of the secondary pond with solid bunds and filter paths at the ends. This was to control the flow paths through the ponds. The soakage basins were constructed in 2004.

The effluent enters the ponds in the south west corner travelling a long flow path to exit the pond system at the north east corner.

The treated effluent then enters the soakage system to finally discharge to ground via the soakage basins. The five soakage basins are automatically rotated in the following sequence:- Basin 1 – 3 - 5 – 2 then 4.

Figure 11-2: Fairlie WW Treatment Plant

Primary pond – 1.098ha	Maturation ponds (5) – 0.60ha

A1.3.4 Flow and Loading Estimations (Original Design)

Flow and loading monitoring is now in place for the discharge. However, the following assumptions were used during the investigation and design of the wastewater treatment and disposal investigation.

Loadings

Allowing a standard contribution of 75g BOD/person/day and a population of 1,000 then an average loading of 75 kg/day is expected. This is a reasonable estimation because the town is largely residential with some commercial properties which are typically quite stable contributors. The 75g BOD/person/day is an upper value with a range of 60-75 being used in assessments elsewhere. The large number of school children arriving to town each day, relative to the base population supports the use of the upper value.

Flows

Significant infiltration is expected. A good approach for estimation of flows is given by the Christchurch Drainage Board Design Manual. This approach was used in the Status Report, assuming a population of 800. As a design population of 1,000 has been chosen, the flows have been reworked with this increased population.

The Average Wastewater Flow (AWF) can be reliably approximated with an allowance of 270 l/day/person which gives a flow of 3.14 l/s. Determination of the Peak Wet Weather Flow (PWWF) and the Peak Dry Weather Flow (PDWF) can be achieved by the Christchurch Drainage Board method as shown in the table below:

Appendix Table 1: Flow estimations (l/s)

	Area (ha)	AWF	P/A	PDWF	BI	SA	PWWF
Total	**70.3**	**3.14**		**23.1**	**4.9**	**14.1**	**42.1**

Notes:

AWF = Average Wastewater Flow
P/A = Peak to Average ratio which increases for smaller catchments
BI = Basic Infiltration which allows for sub-surface infiltration
SA = Storm Allowance which allows for surface infiltration (e.g. through manhole covers) and increased sub-surface infiltration
PDWF = Peak Dry Weather Flow
PWWF = Peak Wet Weather Flow

From the above table, wet weather and groundwater infiltration will have a significant effect on the flow rate. Fairlie has a consistent rainfall from month to month through the year with only April having a significantly higher precipitation than the other months. Hence the infiltration rate will be assumed as consistent when evaluating an Average Wastewater Flow (AWF). The AWF will be assumed to be the sum of the Average Sewage Flow and the Basic Infiltration or 8.04 l/s.

The minimum flow rate can be assumed to be less than the AWF of 3.1 l/s. The new system is operating effectively with no issues.

Two surveys have been completed approximately three years apart to monitor sludge levels within the ponds. Monitoring is ongoing.

A1.4 Environmental Management

The following table list the resource consent associated with the Fairlie Wastewater System.

Consent #	Description	Expiry Date	Allowable discharge
CRC992647	Discharge odour to air	17 December 2038	Not applicable
CRC992608.1	Discharge to land	17 December 2038	650m^3/day (average)

The Fairlie wastewater treatment plant complies with the above resource consents for air and effluent discharge.

A1.5 Demand

Detailed work was completed as part of the upgrade of the treatment facility in 2002. Reports for the Fairlie Oxidation Ponds state:

Allowing a standard contribution of 75g BOD/person/day and a population of 1000 then an average loading of 75 kg/day is expected. This is a reasonable estimation because the town is largely residential with some commercial properties which are typically quite stable contributors. The 75g BOD/person/day is an upper value with a range of 60-75 being used in assessments elsewhere. The large number of school children arriving to town each day, relative to the base population supports the use of the upper value.

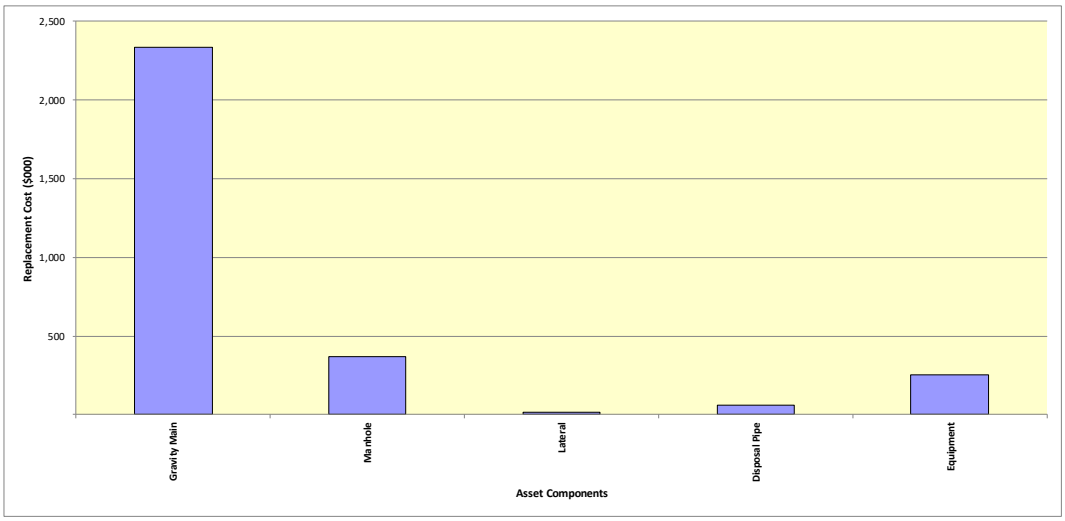
Significant infiltration is expected. A good approach for estimation of flows is given by the Christchurch Drainage Board Design Manual. This approach was used in the Status Report, assuming a population of 800. As a design population of 1000 has been chosen, the flows have been reworked with this increased population.

Provision of wastewater reticulation is sufficient for the township population of 1,137 (2013) and a significantly increased peak holiday population. There is capacity in the treatment facility without further pre-treatment.

Over winter problems can occur with high water tables causing increased infiltration in a number of locations. These are private drains but regular monitoring of the known sites and smoke detection surveys will need to be carried out to locate any large infiltration and remedy it.

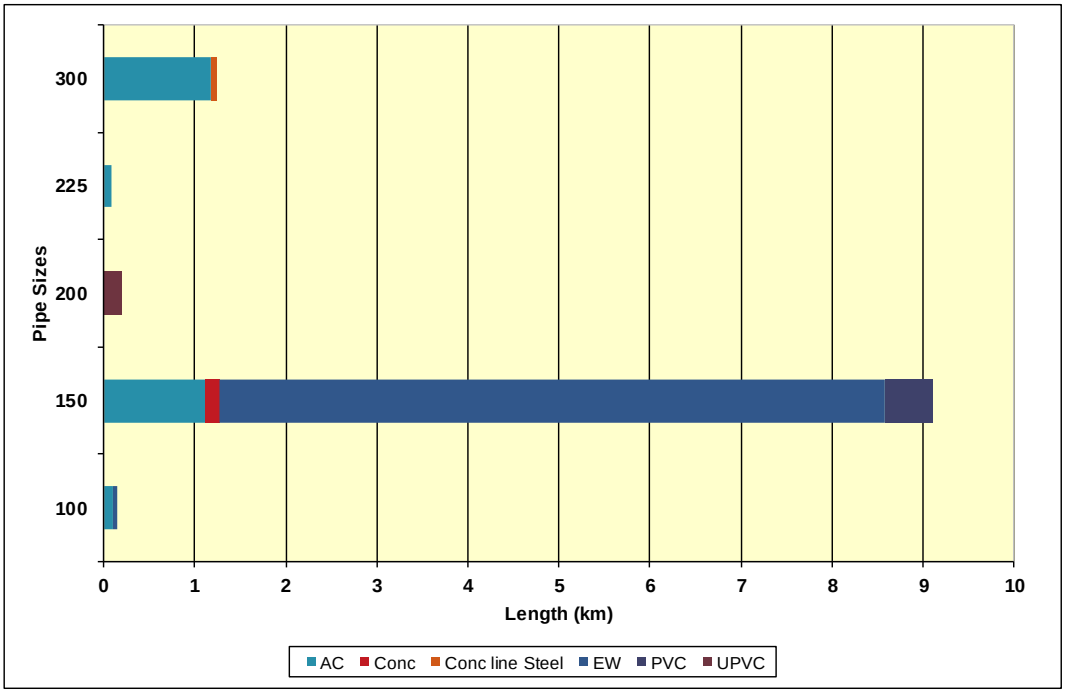
A1.6 Asset Details

Appendix Figure 1: Replacement Costs Reticulation



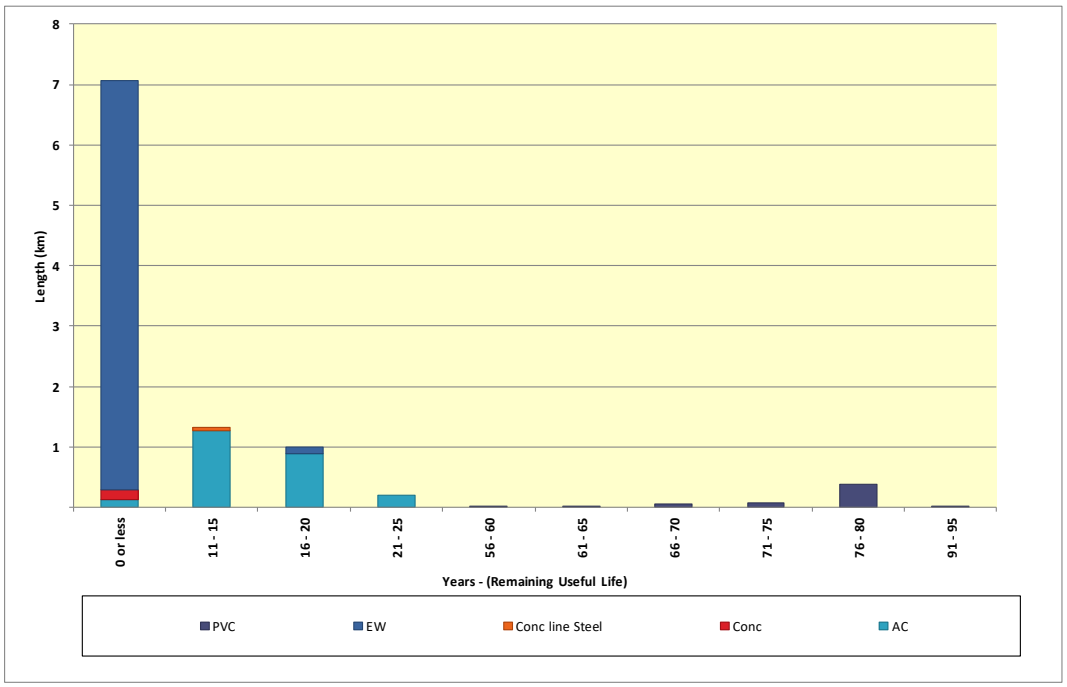
Gravity mains make up 79% of the total asset values
The replacement costs of equipment e.g. facilities are not recorded within the Asset Register (**IP 7**)

Appendix Figure 2: Wastewater Main Diameters



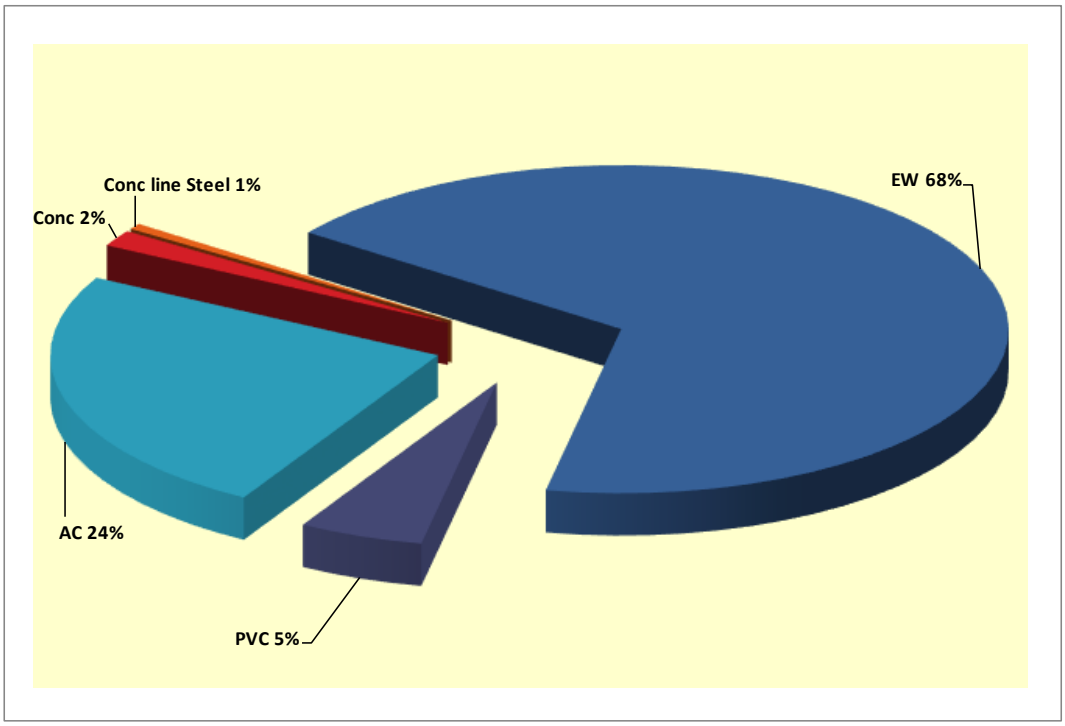
Ø150mm pipe make up 85% of the sewer main length. Of this 68% is EW.
Ø300mm pipe make up 12% of the sewer main length.

Appendix Figure 3: Pipe Age Group Replacement Cost



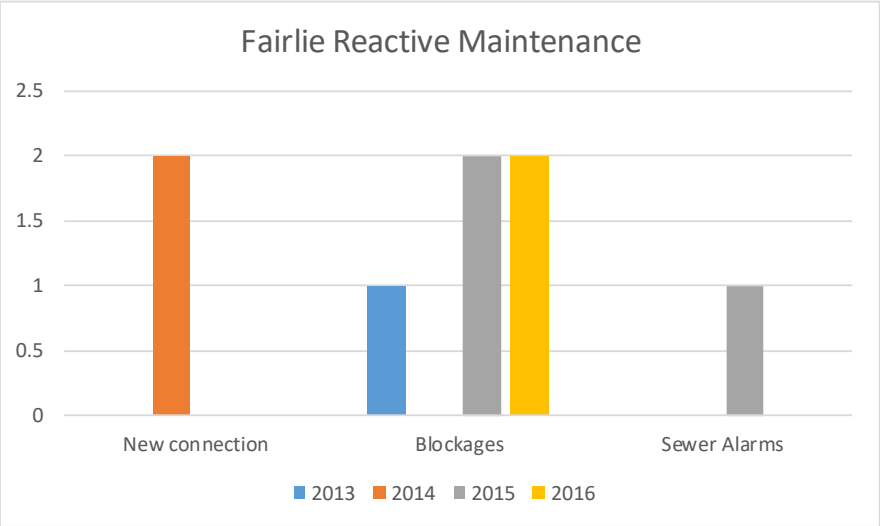
There is 7km of pipe (mainly EW) that has reached the end of its expected useful life.
There is 1.3km of pipe (mainly AC) that will reach the end of its expected useful life within the 11-15 year window.

Appendix Figure 4: Water Main Material



The graph shows that 68% of the reticulation consist of EW and 24% of AC. The remainder is made up of PVC, Concrete and Concrete lined Steel

Appendix Figure 5: Reactive Maintenance



Reactive maintenance consists of alarms, blockages and new connections. There were 2 blockages in 2015 and in 2016

A1.7 Data Confidence

Appendix Table 2: Data Confidence

Scheme	Component	Pump Stations	Reticulation	Treatment
	Asset Attributes	G	G	G
	Condition	G	G	G
	Performance	G	G	G

Where

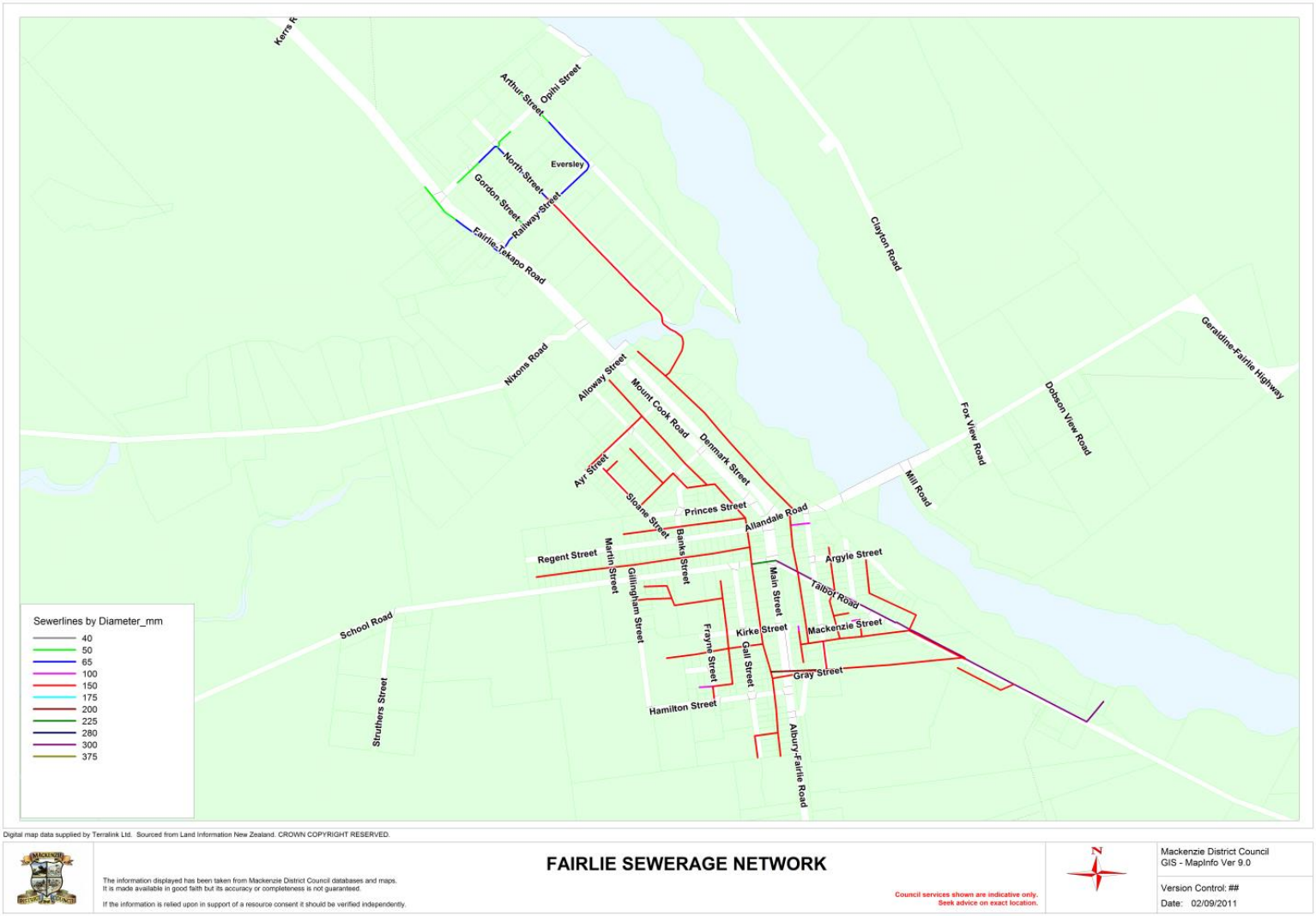
Score	Description	Definition
1	Accurate	100%
2	Minor inaccuracies	± 5%
3	50% estimated	± 20%
4	Significant data estimated	± 30%
5	All data estimated	± 40%
X	No asset	

A1.7.1 Capital Projects

Appendix Table 3: Capital Projects

Name	Type	Value	When
Desludge pond	Renewal	$189,000	2020/21
Flow meter	Level of Service	$20,000	2018/19
Replace EW pipe	Renewal	$877,000	2019 - 2025
Replace manhole lids	Renewal	$20,000	2018 -2021
Actuator valve	Renewal	$16,000	2018 - 2022

A1.8 Fairlie Wastewater Map



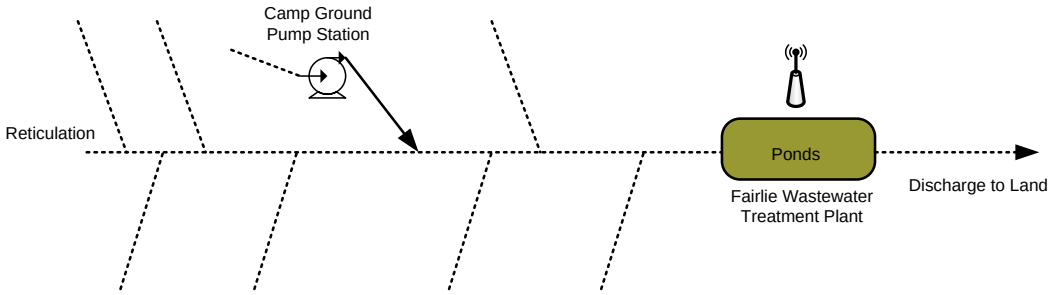
A1.9 System Schematic

LEGEND

Rising Main

Reticulation

SCADA



	Fairlie Wastewater System Schematic Layout	Revision January 2017	WAUGH

A2 Lake Tekapo Wastewater System

A2.1 Overview

Description		Quantity
Population Served 2013 % of district served by community wastewater system		369 (1,050 during holidays) 17%
Type of Collection		Gravity and pumping
Properties	Able to connect	687
	Connected	
	residential	
	commercial	
	industrial	
	TOTAL Connected	525
History	Original scheme installed in	1950's
Demand	Average Dry Weather Flow (design)	m^3/day
	Peak Wet Weather Flow (4 x ADWF)	l/s
Length of reticulation		17.1km
Number of manholes		274
Number of pump stations		3
Treatment	Treatment	Oxidation Ponds
	Disinfection	None
Disposal		To land
Infiltration		Extent unknown
Financial	Funding	Universal rate

A2.2 Key Issues for Service

Issues	Resolution
Inflow & Infiltration	Investigate, consider resolution options and implement
Some earthenware pipe at end of its life and poor condition	Replace
Disposal of effluent (consent limits)	Investigate, consider resolution options and implement

A2.3 Overview & History

The Lake Tekapo wastewater system was first constructed in the 1950's when Lake Tekapo served as a base for the Ministry of Works and New Zealand Electricity Department (NZED). Lake Tekapo has become a popular tourist destination, with several resort hotels, restaurants, camping ground, and residential areas. Recently the Tekapo township has seen a growth in subdivision with significant developments on both sides of the river.

Since the installation of the reticulation a variety of pipe materials have been used in the reticulation. The current oxidation pond was constructed during 1972 and located on Council land off Murray Place, with discharge by way of trickle irrigation to the south of the site.

A2.4 Reticulation

Generally speaking, all of the systems in Tekapo are in a good state of repair and if they are maintained and renewed regularly, and at the appropriate times, they can be expected to last indefinitely, without any significantly abnormal costs having to be incurred.

A2.5 Pump Stations

There are three wastewater pump stations in Tekapo. Two recently constructed (Sealy St and Domain) constructed in 2005 using modern engineering design. They are both connected to the Fairlie office by telemetry, monitoring a range of functions. Both have eight hours over flow storage at peak flow.

The third one is the Lakeside Drive pump station and is connected to the telemetry. This PS will need to be upgraded when the demand increases in the area. It has approximately four hours overflow storage at peak flow.

Sealy Street Pump Station (installed 2005)			
Duty Regime	**Q max (l/s)**	**H total (m)**	**H static (m)**
Initial stage	77	31.4	24.6
Future stage (3rd pump)	77	31.4	24.6
Data on two pumps installed			
Make		Flygt	
Model		NP 3202.180 HT	
Outlet size		DN 150	
Impeller diameter		344mm	
Motor output rating		37kW	
Motor rated current		63A	
Motor poles		4	
Motor efficiency		91%	
Motor power factor		0.90	
Base frequency		57Hz	
Rated speed		1,475rpm	

Domain Pump Station (installed 2005)			
Duty Regime	**Q max (l/s)**	**H total (m)**	**H static (m)**
Initial stage	77	31.4	24.6
Future stage (3rd pump)	77	31.4	24.6
Data on two pumps installed			
Make		Flygt	
Model		NP 3202.180 HT	
Outlet size		DN 150	
Impeller diameter		344mm	
Motor output rating		37kW	
Motor rated current		63A	
Motor poles		4	
Motor efficiency		91%	
Motor power factor		0.90	
Base frequency		57Hz	

Domain Pump Station (installed 2005)			
Duty Regime	**Q max (l/s)**	**H total (m)**	**H static (m)**
Rated speed		1,475rpm	

Lakeside Drive Pump Station (installed 1990)			
Duty Regime	**Q max (l/s)**	**H total (m)**	**H static (m)**
Initial stage	7	14	-
Data on two pumps installed			
Make		Flygt	
Model			
Outlet size		DN 100	
Impeller diameter		-	
Motor output rating		-	
Motor rated current		-	
Motor poles		-	
Motor efficiency		-	
Motor power factor		-	
Base frequency		-	
Rated speed		-	

A2.6 Treatment Plant

Raw sewage from Tekapo Township gravitates to three pumping stations: one on the shore of Lake Tekapo to the west of the outlet, one at the Lakeside Drive and the main one in Sealy Street on the eastern bank.

The Sealy Street and Domain Pump Stations are equipped with two large submersible pumps (with provision for a third) and they operate automatically. The Lakeside Drive pump station conveys the sewage over a small rise, then it gravitates for approximately 800 m back down to the Domain pump, which pumps the sewage 1000 m to the treatment plant in a 200 mm diameter PE pipeline. The Tekapo sewage reticulation system was upgraded is 2004/05 to cater for the projected demand for the next 50 years.

The plant was first commissioned in 1972 and consisted of a single oxidation pond, which was overloaded by 2000. It was upgraded in 2002 to two oxidation ponds and three maturation ponds, which discharge into two evaporation basins and now provides primary, secondary and tertiary treatment. Any overflow from the evaporation basins discharges via trickle irrigation on the vegetated slopes of the site.

The flow is split between two primary oxidation ponds, then recombines to flow through three maturation ponds in series. The increased area provided by the four additional ponds has increased the capacity of the treatment plant.

Figure ***Lake Tekapo WW Treatment Plant

Primary ponds (2) – 0.42ha	Maturation ponds (5) – 0.30ha

In the past ECan has indicated ongoing concern with the Tekapo disposal system. Council engineers are working on a replacement system that will provide certainty of disposal in the short to medium term. It is anticipated to have new disposal system in place by the end of 2017.

A2.6.1 Flow and Loading Estimations (Original Design)

The facultative ponds (primary oxidation ponds) were sized on surface BOD loading rate according to temperature. The photo above shows the upgraded treatment plant surface areas for the ponds at the Tekapo WWTP.

Appendix Table 4: Pond size

Pond data	
Previous pond area	0.42ha
Current	
Pond 1A (existing)	0.42ha {0.59ha (1)}
Pond 1B (new)	0.47ha
Pond 2 (new)	0.30ha
Pond 3 (new)	0.10ha
Pond 4 (new)	0.05ha
Pond 5 (new basins)	0.03ha

A freeboard of 0.6m has been provided for the Tekapo WWTP external bunds. Internal bunds at Tekapo have a freeboard of 0.2m. Overtopping of internal bunds at maximum storage levels will be infrequent and of minor consequence. Retention time in Pond 1A and 1B at ADF is approximately 35 days. Total retention time in all ponds is about 52 days.

Aeration improves oxygen transfer in primary ponds, allowing improved nutrient removal and micro-organism reduction (disinfection) by sunlight. Previously there was no aeration capability at the Tekapo WWTP.

Mechanical aeration has been adopted in the Tekapo primary ponds to increase the oxygen transfer during adverse weather (especially cold, still weather). Two floating, 2.2 kW brush aerators are now installed, located so that flow circulation is encouraged away from the outlet.

The pump data showed that wastewater flows into the Tekapo ponds fluctuate seasonally. This resulted in seasonal overloading of the original pond. Aeration of the new primary ponds provides increased oxygen transfer, allowing effective treatment of the increased wastewater flow.

The pond capacity can meet the BOD demand for a population of approximately 1,000 people (without aerator assistance). If the size of pond 1A is increased from 0.42 ha to 0.59 ha (as allowed for in the layout), the ponds can meet the demand for a population of approximately 1,300 people (without aerator assistance). The present capacity of the Tekapo WWTP with the existing aerator assistance can meet a BOD demand for a population of approximately 1,800 people. Capacities are for monthly average populations because the load is buffered by the long retention time.

Should the population increase beyond 1,800, the capacity of the WWTP could be increased by installing additional aerators on the oxidation ponds and extending Pond 1A. A 1 kW aerator capacity can meet the BOD demand for 300 people (with algae oxygen supply). Allowing for two 2 kW aerators on each of Pond 1A and 1B and a total pond surface area of 1.06 ha, the pond capacity could meet a BOD demand of 2,100 people.

For any further growth above 2,100 people, the Tekapo WWTP will require the addition of a dedicated aeration basin at the inlet with all oxygen being supplied by aerators. Similar pre-treatment has been undertaken at the Oamaru and Blenheim WWTPs and can remove 40% of BOD. Therefore, these upgrades (extended Pond 1A, two 2 kW aerators and aeration basin with aerators) can increase plant capacity to about 3,500 people. If the population of Tekapo increases above 3,500, alternative means of treatment and disposal will have to be investigated and new resource consents applied for.

A2.6.2 Pond construction

Rock Filters

In-bank rock filters have been constructed at the Tekapo WWTP, providing increased SS and nitrogen removal from the wastewater during summertime. The rock filters were designed on the basis of the horizontal velocity through the rock filter. The more conservative guideline value of 3m/hr was applied to achieve solids capture as per the Delft concept. The table below shows the rock filter sizing for various section of the WWTP.

Appendix Table 5: Rock filter sizing

Pond 1-2	None
Pond 2-3	3.00m
Pond 3-4	>10m (full bank width)

Flow splitting

The primary ponds at the Tekapo WWTP operate in parallel. Flow to these ponds is split, using manual valves located at the original manhole immediately prior to the original primary pond. The flow splitting structure divides the flow between the two primary ponds (Ponds 1A and 1B), as the ponds operate at two different levels, Pond 1A at 64.75m and Pond 1B at 63.50m. Flow is split as follows: 49% to Primary Pond 1A and 51% to Primary Pond 1B.

Inlet Scum Baffle

Scum baffles have been constructed around the inlet structures to trap scum and floatable material discharging into the ponds, minimising the scum formation across the pond surface. Trapped scum is removed weekly to minimise odour nuisance.

Pond liner
A pond liner minimises seepage from the new treatment ponds. This liner consist of a 200mm thick silt-clay material on the pond base and 300mm thick on the external pond bunds, over a geotextile base liner to minimise the loss of fines by seepage.

Embankment Structure
The pond banks were constructed using gravel/silt material available from the site. Rock rip rap protection against wave action has been adopted rather than the construction of a concrete wave band.

A2.6.3 Effluent Disposal

The Tekapo WWTP uses soakage to land for the final disposal of treated effluent. The disposal system is comprised of a two-cell evaporation basin system, located behind the Refuse Transfer Station (refer Fig 3.3.1). A single soakage basin was previously used for the disposal of the treated effluent and this formed the basis of the design of the upgraded system.

The original soakage basin overflowed from time to time, during extreme wet weather, and when the base became blinded by solids. The two new basins operate in parallel, with provision made to operate each individually (manual valves), so that the basins can be emptied and the accumulated solids dewatered, prior to disposal.

In periods of low evaporation and/or rainfall, the basins overflow to a slow rate irrigation land disposal system. The irrigation system is sited on the forested slopes south of the ponds and contours approximately 100 m across the slope. Discharge rates are dependent on water levels in the evaporation basins. Recently this system has not been as efficient, particularly in cold weather with concerns expressed by Ecan regarding the ponding. In the past ECan has indicated ongoing concern with the Tekapo disposal system. Council engineers are currently working on a replacement system that will provide certainty of disposal in the short to medium term. There will be a strategic study in Year 1 of the LTP which will review the future location and extent of the disposal system but any works to relocate the system (if required) will be outside of the term of this AMP.

Increased vegetation is noticeable near the discharge points along the irrigation line. Flow monitoring of the irrigation system has been undertaken since 22 December 2003. The results of this monitoring have shown a range of flow rates from 400-500 m^3/d.

A comparison of pump station flow rates and irrigation data for the monitoring period (December to April) show that a considerable percentage of flow is being evaporated prior discharge in the irrigation system.

A2.7 Environmental Management

The following table list the resource consent associated with the Lake Tekapo Wastewater System.

Consent #	Description	Expiry Date	Allowable inflow
CRC042914	Discharge to land	17 December 2038	1,100m^3/day (monthly mean)

The Lake Tekapo wastewater treatment plant complies with the above resource consents for effluent discharge.

A2.8 Demand

Detailed capacity calculations were completed as part of a significant upgrade of the treatment facilities in 2002.

The pond capacity can meet the BOD demand for a population of approximately 1,000 people (without aerator assistance). If the size of pond 1A is increased from 0.42 ha to 0.59 ha (as allowed for in the layout), the ponds can meet the demand for a population of approximately 1,300 people (without aerator assistance). The present capacity of the Tekapo WWTP with the existing aerator assistance can meet a BOD demand for a population of approximately 1,800 people. Capacities are for monthly average populations because the load is buffered by the long retention time.

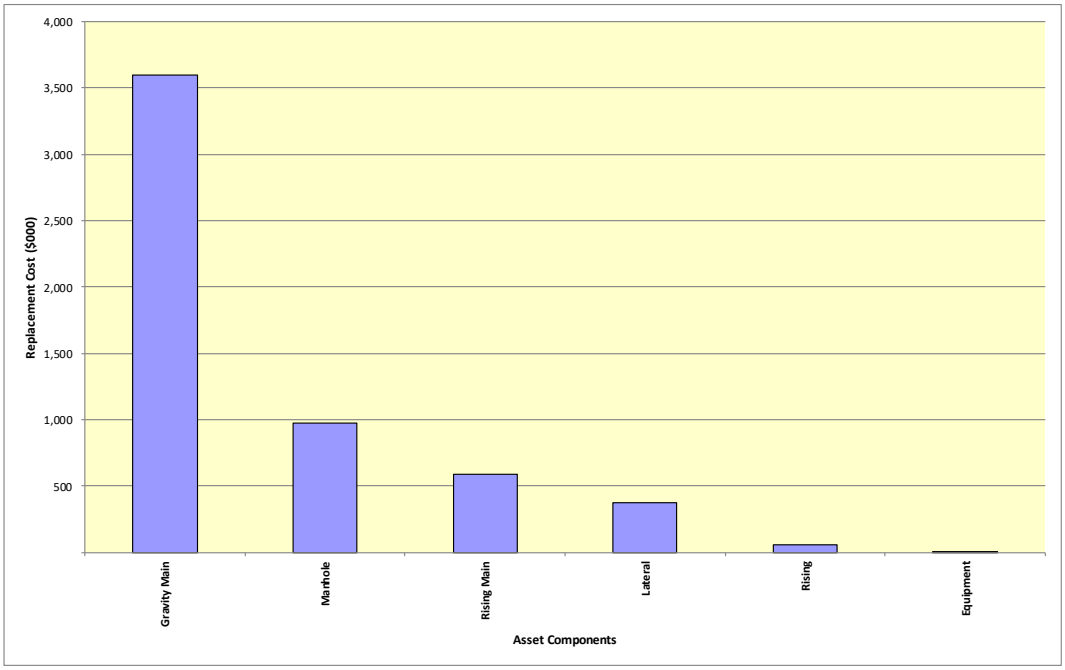
Should the population increase beyond 1,800, the capacity of the WWTP could be increased by installing additional brush aerators on the oxidation ponds and extending Pond 1A. A 1 kW brush aerator capacity can meet the BOD demand for 300 people (with algae oxygen supply). Allowing for two 2 kW aerators on each of Pond 1A and 1B and a total pond surface area of 1.06 ha, the pond capacity could meet a BOD demand of 2,100 people.

The upgraded pump stations and network, constructed in 2004 were sized to for an average size section of 400m2 that would see the network able to provide the current level of service beyond 2025.

There is a reasonable increase in flow to the oxidation ponds during wet weather. The Community Board have approved a programme of smoke detection to identify any illegal connections to the wastewater network, as this is the most likely source. Once located the property owner will be required to resolve the situation.

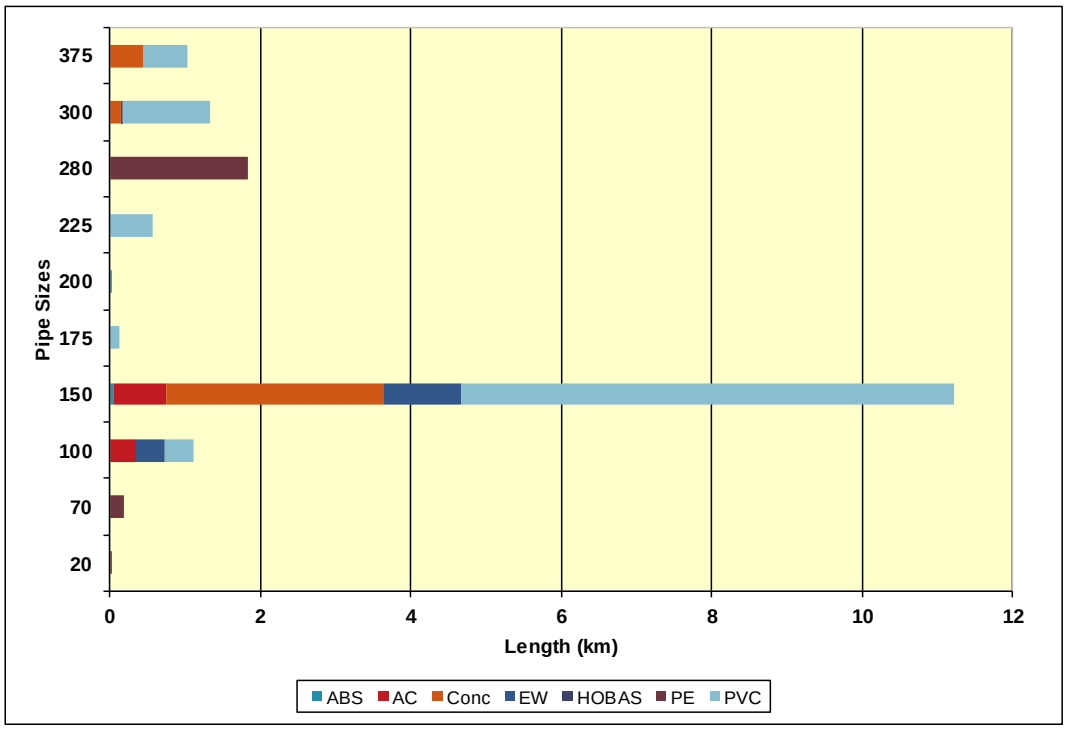
A2.9 Asset Details

Appendix Figure 6: Replacement Costs Reticulation



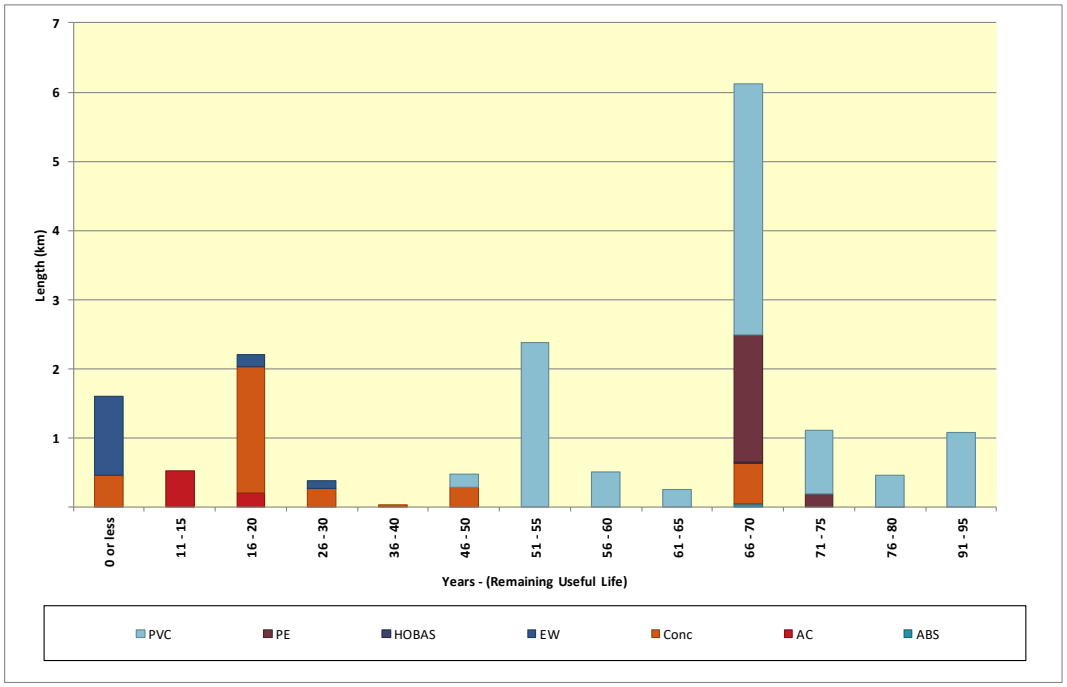
Gravity mains make up 64% of the total asset values
The replacement costs of equipment e.g. facilities are not recorded within the Asset Register **(IP 8**)

Appendix Figure 7: Wastewater Main Diameters



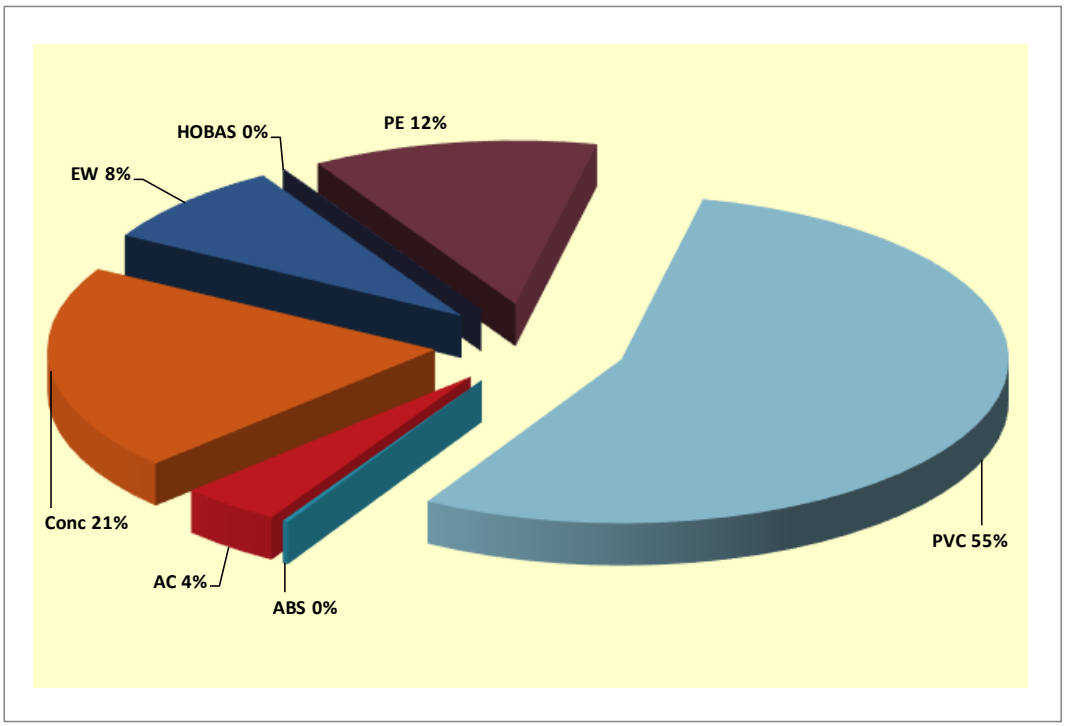
Ø150mm pipe make up 64% of the sewer main length. Consisting mainly of PVC and Concrete. Pipe greater than Ø300mm pipe make up 14% of the sewer main length

Appendix Figure 8: Pipe Age Group Replacement Cost



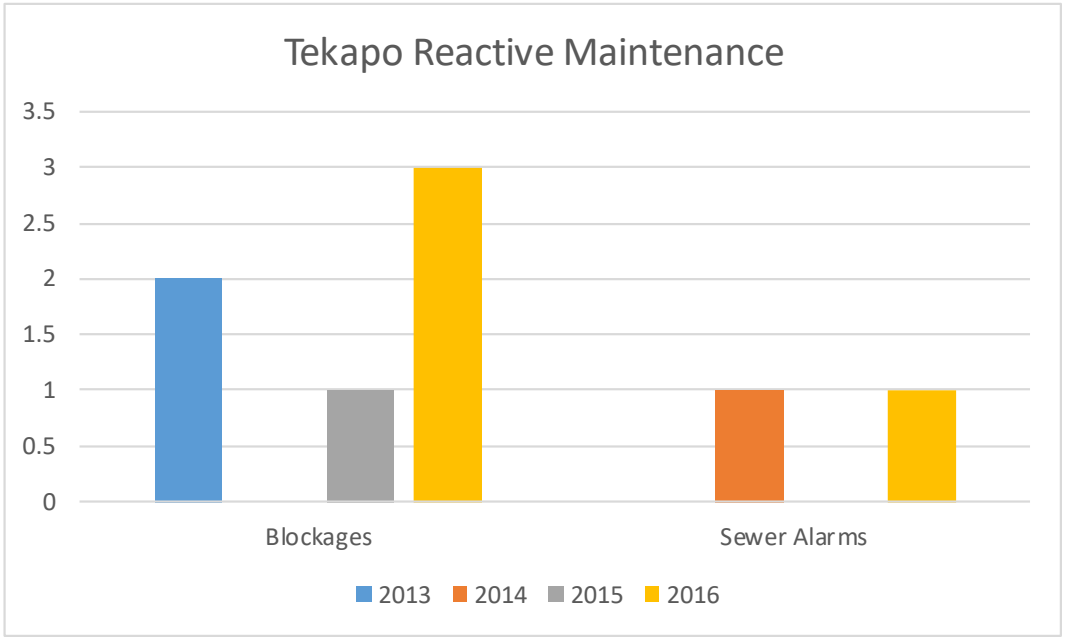
There is 1.6km of pipe (mainly EW) that has reached the end of its expected useful life.
There is 0.5km of pipe (mainly AC) that will reach the end of its expected useful life within the 11-15 year window.
There is 2.2km of pipe (mainly Conc) that will reach the end of its expected useful life within the 16-20 year window.

Appendix Figure 9: Water Main Material



The graph shows that 55% of the reticulation consist of PVC and 21% of Concrete. The remainder is made up of PE, EW, AC ABS and HOBAS.

Appendix Figure 10: Reactive Maintenance



Reactive maintenance consists of alarms and blockages
There were 3 blockages in 2016

A2.10 Data Confidence

Appendix Table 6: Data Confidence

Scheme	Component	Pump Stations	Reticulation	Treatment
	Asset Attributes	G	G	G
	Condition	G	G	G
	Performance	G	G	G

Where

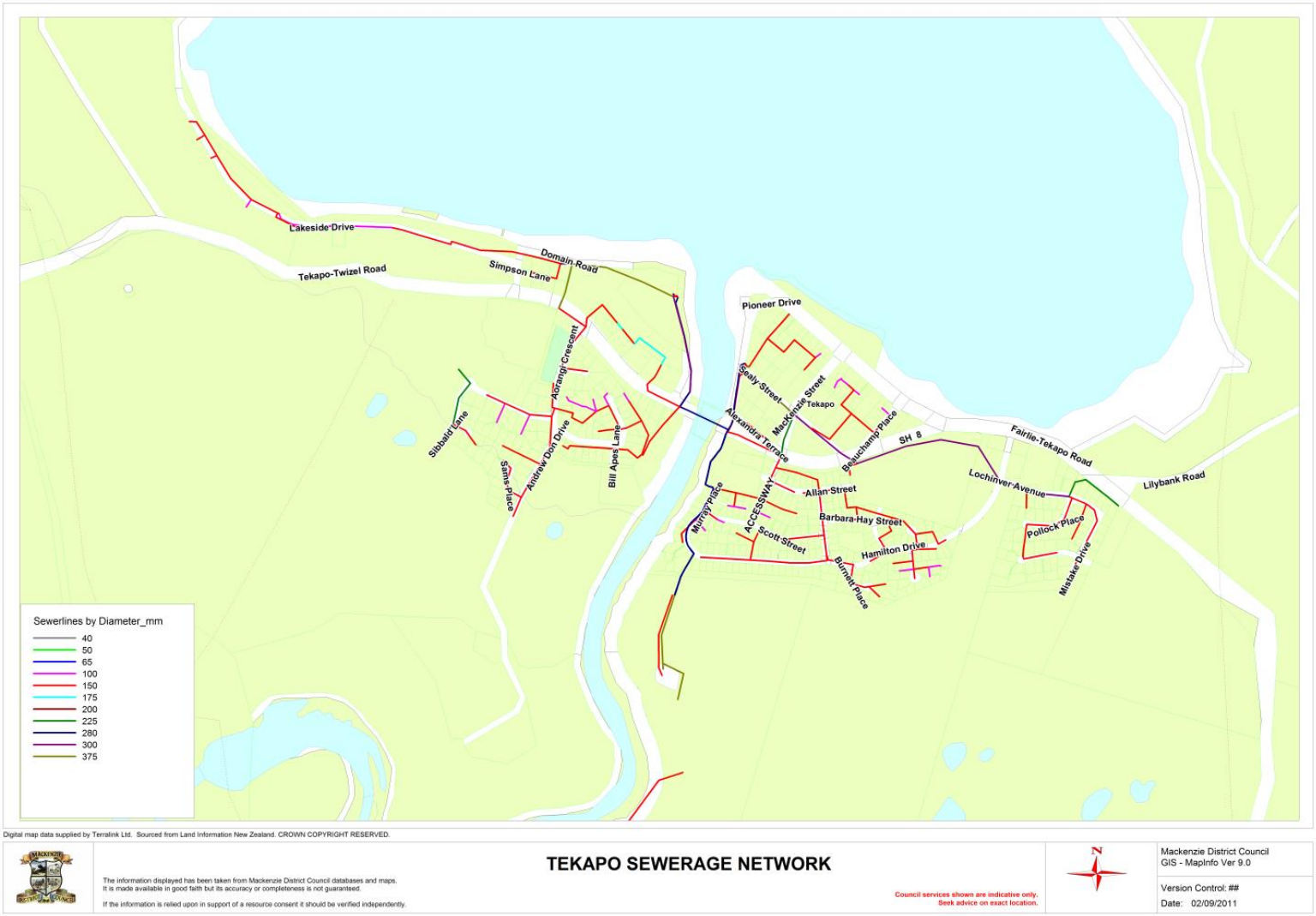
Score	Description	Definition
1	Accurate	100%
2	Minor inaccuracies	± 5%
3	50% estimated	± 20%
4	Significant data estimated	± 30%
5	All data estimated	± 40%
X	No asset	

A2.11 Capital Projects

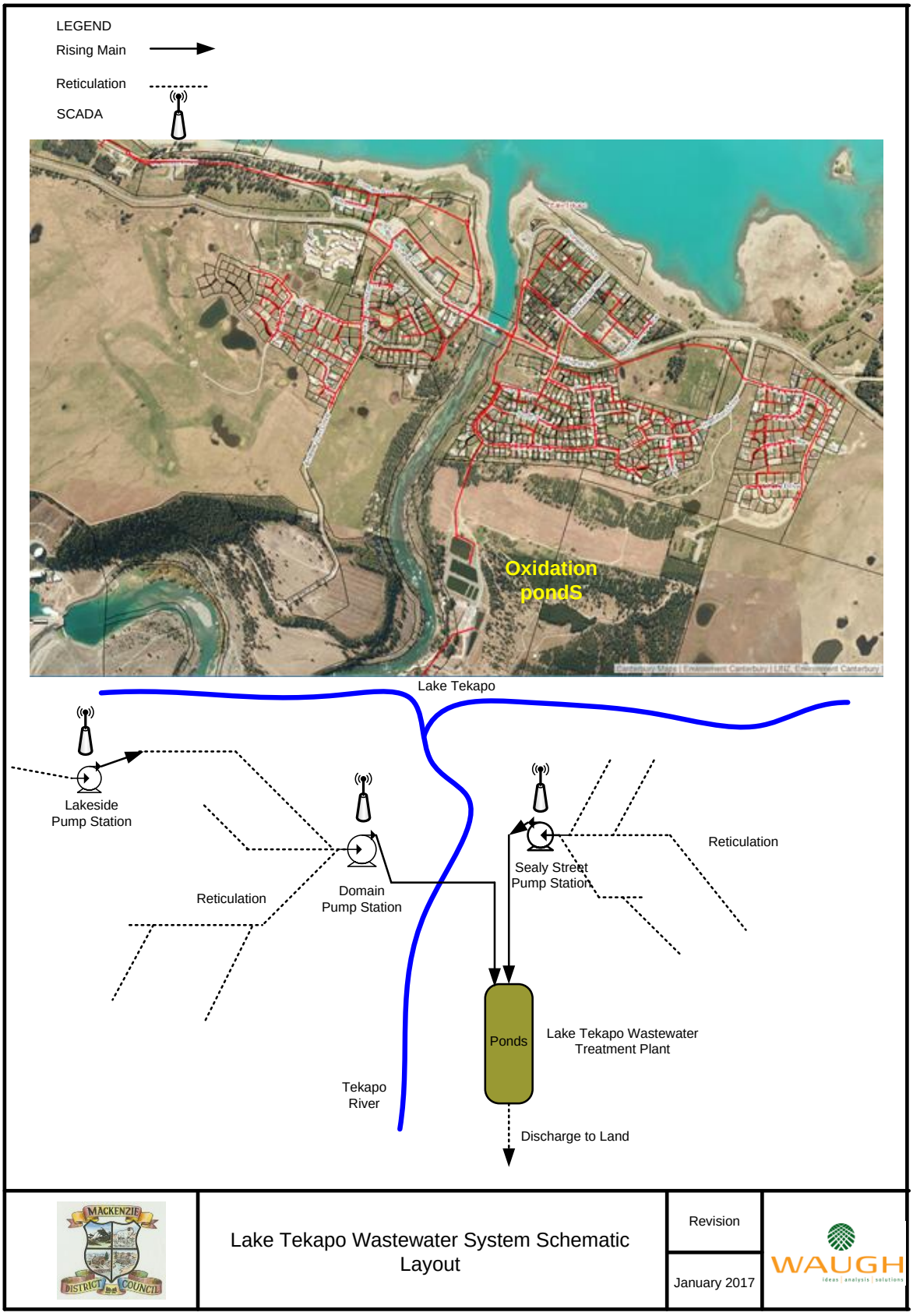
Appendix Table 7: Capital Projects

Name	Type	Value	When
Desludge pond	Renewal	$150,000	2024/25
Pond aerators	Renewal	$78,000	202/21
Pump station upgrade	Renewal	$99,000	2019/20
Pump stations – replace pumps	Renewal	$132,000	2025/27

A2.12 Lake Tekapo Wastewater System Map



A2.13 System Schematic



A3 Twizel Wastewater System

A3.1 Overview

Description		Quantity
Population Served 2013 % of district served by community wastewater system		1,137 (10,000 during holidays) 51%
Type of Collection		Gravity and pumping
Properties	Able to connect	1,769
	Connected	
	residential	
	commercial	
	industrial	
	TOTAL Connected	900
History	Original scheme installed in	1970's
Value ($)	Replacement Cost	$14,393,844
	Depreciated Replacement Cost	$7,487,174
Demand	Average Dry Weather Flow (design)	m^3/day
	Peak Wet Weather Flow (4 x ADWF)	l/s
Length of reticulation		40.6km
Number of manholes		453
Number of pump stations		2
Treatment	Treatment	Oxidation ponds
	Disinfection	None
Disposal		To land
Infiltration		Extent unknown
Financial	Funding	Universal rate

A3.2 Key Issues for Service

Issues	Resolution
Condition of the AC pipe	Replace
Disposal at the Treatment Plant	Consider options and implement
Pond sludge levels	Monitor, consider options and desludge

A3.3 Overview & History

Twizel was a purpose built town constructed in the late 1960's and early 1970's. The design parameters for the oxidation ponds were for a population in excess of 5,000 persons. The whole of the original system is gravity flow and asbestos cement pipe has been used extensively for wastewater pipes. In 2006 a pump station was built to service the Mackenzie Park subdivision. This pump station discharges to the wastewater main in Ostler Road.

The effluent from Twizel flows under gravity across State Highway 8 eastward onto land owned by the Council and discharges into oxidation ponds. After passing the oxidation ponds the effluent discharge to ground via a 1.6 km long disposal trench.

Environment Canterbury did not consider this best practise when Council applied to renew the consent in 2004 and as such granted a 10 year consent with a strong indication that an application to continue this discharge at the end of that period would unlikely to be granted.

Council has an agreement to acquire land adjacent to the oxidation ponds and construct rapid infiltration basins and consolidate the disposal in them. This will retire the existing disposal trench. This project has been accelerated and is planned for completion by 2019/20.

It will also require a land subdivision, land purchase, new resource consent and construction of the physical works along with the de-commissioning of the existing disposal trench. The budget for this work is $900,000.

A3.4 Reticulation

The condition profile in the graph is based on the results of surveys undertaken from 1993 to 2010. Closed circuit television was used to video the wastewater pipes, with faults recorded and grades assigned to each fault depending on the severity and type of fault.

In general, all the systems in Twizel are in a good state of repair and if they are maintained and renewed regularly, and at the appropriate times, they can be expected to last indefinitely, without any significantly abnormal costs having to be incurred.

In Twizel there are no aggressive soils or groundwater surrounding the AC pipes so the deterioration is only from the inside. Nationally studies have shown that the deterioration model is very irregular throughout the networks where AC pipe is used so it is necessary to have a programme of sampling to get a better understanding when these pipes will have to be replaced and by default adjust the depreciation charged accordingly.

There is 21.3km of AC pipe in the Twizel wastewater network and the current replacement cost (2016) of $4.7m. Due to known performance of the AC pipe the base life of the pipe has been set at 80 years leaving a remaining life of 40 years.

The South Island Rowing facilities includes a private wastewater system which pumps wastewater into the Twizel reticulation.

A3.4.1 Pukaki Airport

A wastewater reticulation collecting wastewater from the development at the Pukaki Airport flows into the Pukaki Airport Pump Station. From the pump station the wastewater is pumped through a 1,100m long 75mm PE rising main to the Twizel reticulation.

A3.5 Pump Stations

There are two pump stations in Twizel. One collects the effluent from the Mackenzie Park subdivisions and sections to the west of it and pumps it via a rising main into the gravity system in Ostler Rd and the second one pumps effluent from the Pukaki Airport into Twizel.

Mackenzie Park Station (installed 2006)			
Duty Regime	**Q max (l/s)**	**H total (m)**	**H static (m)**
Initial stage	11.5	7.5	-
Data on two pumps installed			
Make		Flygt	
Model		NP 3127.180 MT	

Mackenzie Park Station (installed 2006)			
Duty Regime	**Q max (l/s)**	**H total (m)**	**H static (m)**
Outlet size		DN 100	
Impeller diameter		-	
Motor output rating		-	
Motor rated current		-	
Motor poles		-	
Motor efficiency		-	
Motor power factor		-	
Base frequency		-	
Rated speed		-	
Pump controller		Flygt FMC 200	
Telemetry		Abbey Systems	
Control		Alan Bradley PLC	

Pukaki Airport Station (installed 2009)			
Duty Regime	**Q max (l/s)**	**H total (m)**	**H static (m)**
Initial stage	2.1	28.1	-
Data on two pumps installed			
Make		Flygt	
Model		NP 3068.170-210 MT	
Outlet size		DN 75	
Impeller diameter		-	
Motor output rating		-	
Motor rated current		-	
Motor poles		-	
Motor efficiency		-	
Motor power factor		-	
Base frequency		-	
Rated speed		-	
Pump controller		Flygt FMC 300	

A3.6 Treatment Plant

The two oxidation ponds were constructed in the 1970's with a discharge to the Twizel River. This discharge has been discontinued and now discharges to ground via 1.7km long soakage trench. Depending on demand the treated effluent does not always reach the end of the trench.

Figure 11-3: Twizel WW Treatment Plant

Pond 1 = 2.5ha	Pond 2 = 1.73ha

The original initial inlet that discharges into the centre of pond 1 has been reinstated and this has avoided having to relocate that inlet to the south west corner of pond 1 which will give the maximum flow path through the pond. A bund has been constructed (2010) in Pond 2, two thirds of the way across the pond to ensure the maximum retention time of the effluent within the ponds.

Figure 11-4: Twizel Disposal Trench

Viewed from south	**Viewed from North**

A3.6.1 Flow and Loading Estimations (Original Design)

The Twizel WWTP was commissioned in 1969 and treats domestic sewage, as well as small quantities of trade wastes from Twizel Township. The WWTP provides primary treatment of the influent in oxidation ponds before discharging effluent into a 1.7km long soakage/evaporation trench that runs south from the plant.

The Twizel ponds were originally designed in 1969 for a population of 5,000 assuming an average daily flow (ADF) of 1,818 m3/day and a peak flow of 5,455 m3/day. An ADF of 650 m3/d was predicted by

CH2MBeca in the "Application for Resource Consent and Assessment of Environmental Effects for the Twizel WWTP "(June 2004).

A3.7 Environmental Management

The following table list the resource consent associated with the Twizel Wastewater System.

Consent #	Description	Expiry Date	Allowable discharge
CRC042915	Discharge to land	8 July 2020	1,500m^3/day (average)

The Twizel wastewater treatment plant complies with the above resource consent for effluent discharge. The resource consent is due to expire during July 2020. The application to renew this consent have been lodged as this forms part of the planned disposal.

A3.8 Demand

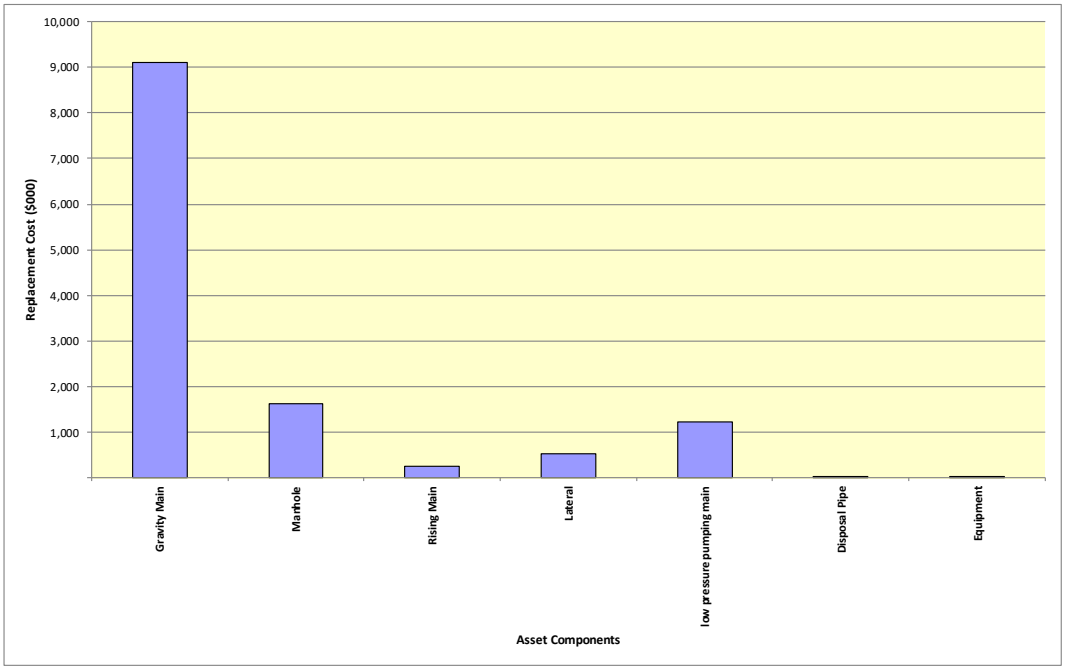
The Twizel ponds were originally designed in 1969 for a population of 5,000 assuming an average daily flow (ADF) of 1,818 m^3/day and a peak flow of 5,455 m^3/day. An ADF of 650 m^3/d was predicted by CH2MBeca (June 2004) to be reached by 2025 with a population of 1,860. This shows that there are no capacity issues with the oxidation ponds.

Council plans to acquire land adjacent to the oxidation ponds and construct rapid infiltration basins and consolidate the disposal in them. This will retire the existing trench and consolidate the disposal on the 5.6ha site.

Twizel continues to show steady growth in holiday homes and in order to understand the total demand Council will model the network so that it will be better able to predict when pipes need to be upsized or aeration installed at the oxidation ponds to improve treatment and when a new rising main will have to be constructed directly to the oxidation ponds from the pump station in Mackenzie Park. This work is programmed for 2018/19, but will only be constructed if demand puts pressure on the current systems to the point they cannot cope.

A3.9 Asset Details

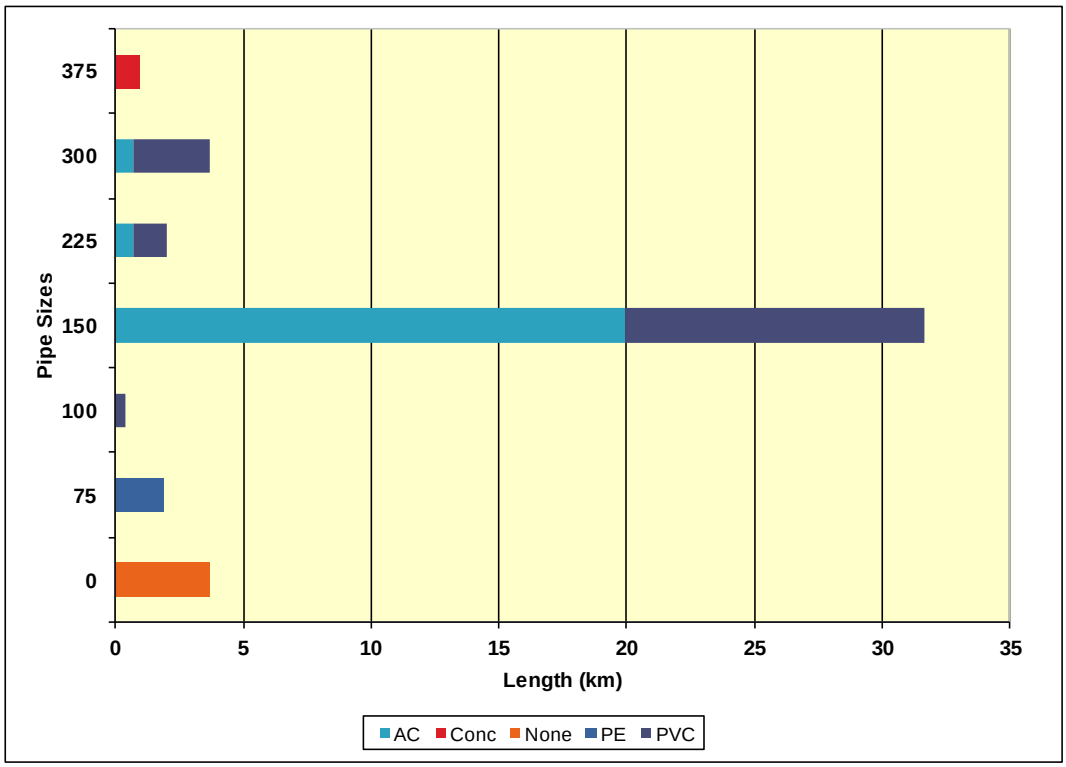
Appendix Figure 11: Replacement Costs Reticulation



Gravity mains make up 71% of the total asset values

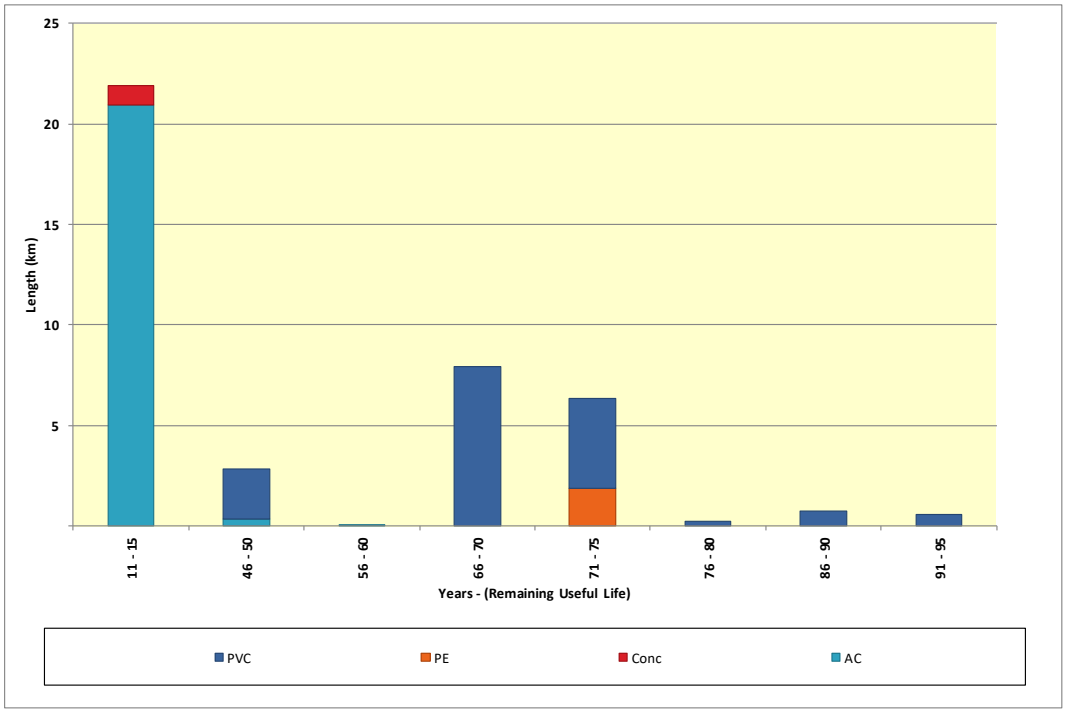
The replacement costs of equipment e.g. facilities are not recorded within the Asset Register (**IP 8**)

Appendix Figure 12: Wastewater Main Diameters



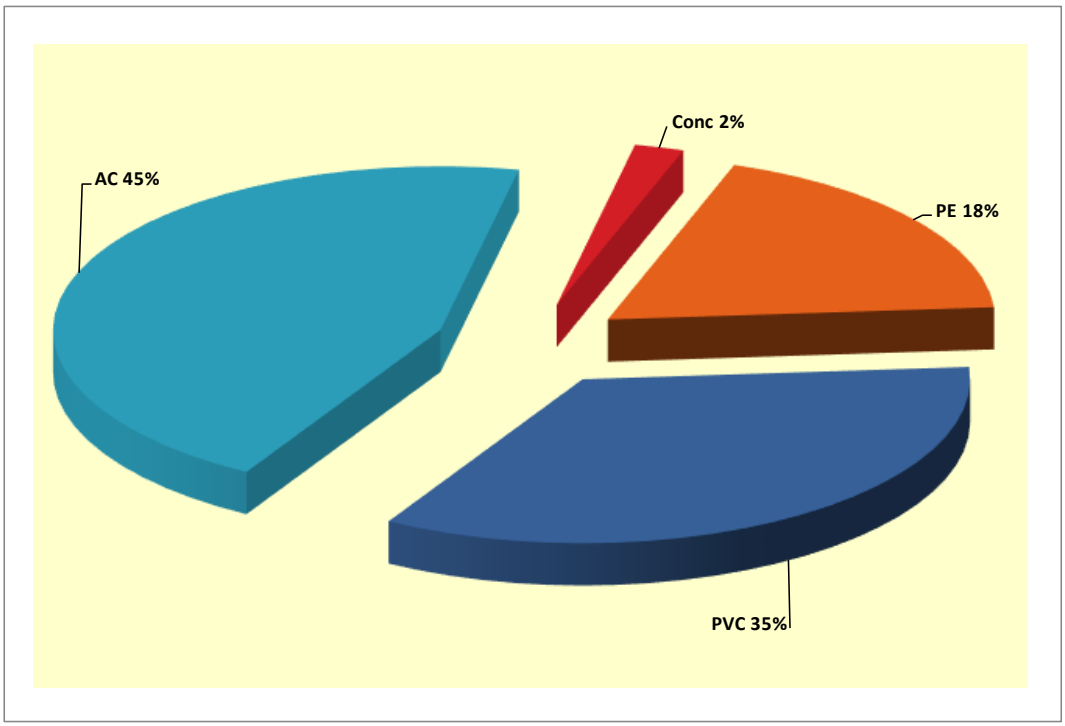
Ø150mm pipe make up 72% of the sewer main length (mainly AC).
≥Ø300mm pipe make up 10% of the sewer main length.

Appendix Figure 13: Pipe Age Group Replacement Cost



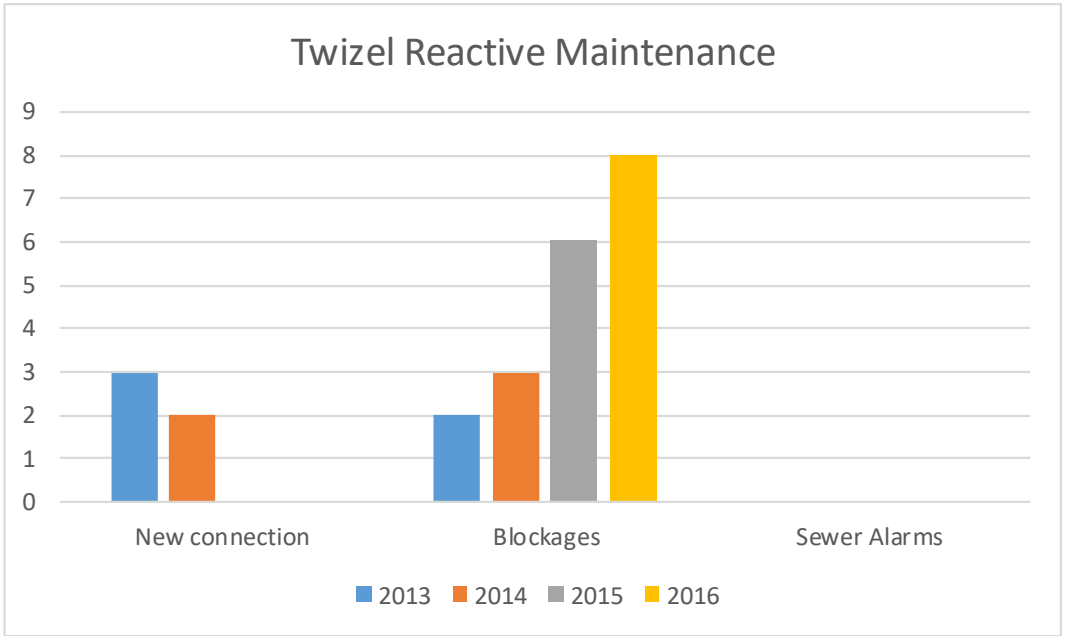
There is 21km of pipe (mainly AC) that will reach the end of its expected useful life during the 11-15 year window.
There is 2.8km of pipe (mainly PVC) that will reach the end of its expected useful life within the 46-50 year window.

Appendix Figure 14: Water Main Material



The graph shows that 45% of the reticulation consist of AC and 35% of PVC. The remainder is made up of PE and concrete

Appendix Figure 15: Reactive Maintenance



Reactive maintenance consists of alarms, blockages and new connections.
Blockages show a significant increase over the last number of years.
The increase in blockages is associated with an increase in a number of areas:

- wet wipes
- campervan discharges
- tourists

There are no alarms recorded.

A3.10 Data Confidence

Appendix Table 8: Data Confidence

Scheme	Component	Pump Stations	Reticulation	Treatment
	Asset Attributes	G	G	G
	Condition	G	G	G
	Performance	G	G	G

Where

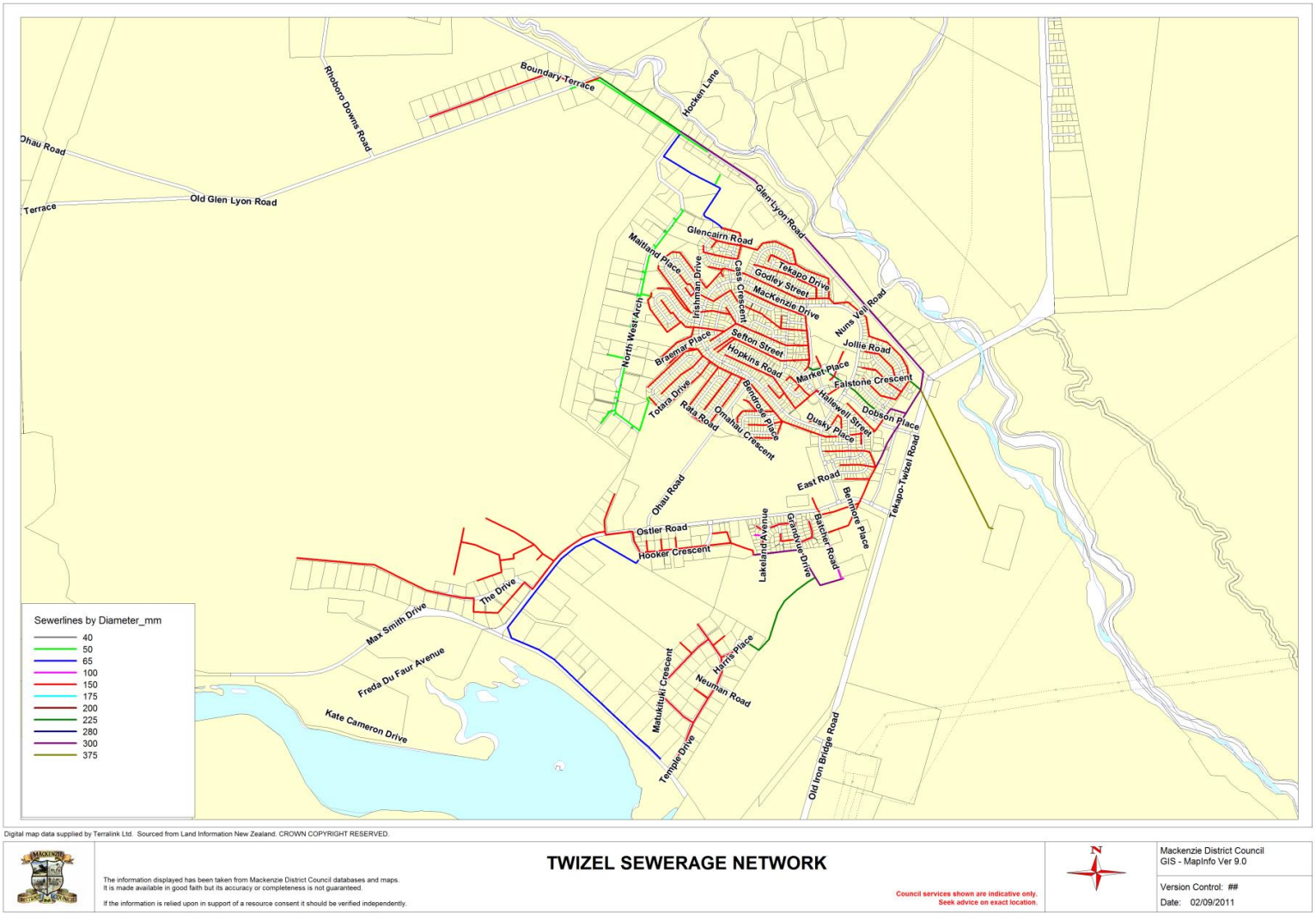
Score	Description	Definition
1	Accurate	100%
2	Minor inaccuracies	± 5%
3	50% estimated	± 20%
4	Significant data estimated	± 30%
5	All data estimated	± 40%
X	No asset	

A3.11 Capital Projects

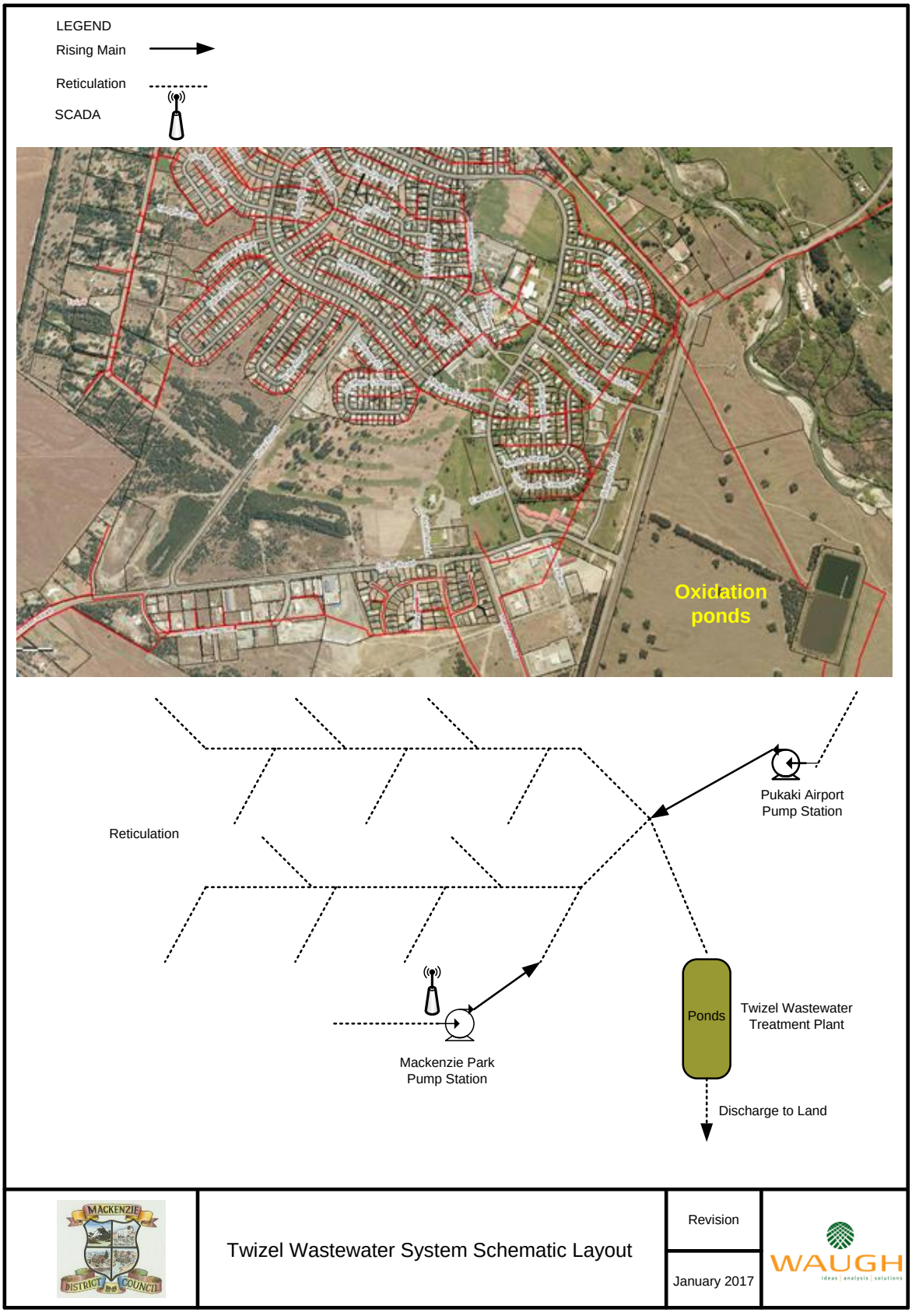
Appendix Table 9: Capital Projects

Name	Type	Value	When
Effluent disposal	Demand & LoS	$830,000	2018-2020
Upsize Main	Renewal	$300,000	2023/24
Renew Resource Consent	Renewal	$60,000	2019/20

A3.12 Twizel Wastewater System Map



A3.13 System Schematic



A4 Burkes Pass Wastewater System

A4.1 Overview

Description		Quantity
Population Served 2016 % of district served by community wastewater system		30 (60 during holidays) 1%
Type of Collection		Gravity
Properties	Able to connect	18
	Connected	
	residential	
	commercial	
	industrial	
	TOTAL Connected	18
History	Original scheme installed in	1990
Demand	Average Dry Weather Flow (design)	m^3/day
	Peak Wet Weather Flow (4 x ADWF)	l/s
Length of reticulation		0.9km
Number of manholes		16
Number of pump stations		-
Treatment	Treatment	Oxidation pond
	Disinfection	None
Disposal		To land
Infiltration		Extent unknown
Financial	Funding	Universal rate

A4.2 Key Issues for Service

Issues	Resolution
There are no known current issues with the Burkes Pass WW system	

A4.3 Overview & History

The Burkes Pass wastewater system was built in 1990 to serve the existing town which is largely unchanged today.

The effluent from Burkes Pass flows under gravity across State Highway 8 eastward onto land owned by the Council and discharges into oxidation ponds. After passing the oxidation ponds the effluent discharges to ground via two irrigation pipelines that are spelled individually on a six month cycle.

A4.4 Reticulation

The condition profile in the graph is based on an assessment of the pipe network. With the pipe being uPVC and laid to the appropriate engineering standards fifteen years ago there is no reason to expect the pipe to be less than perfect.

However within ten years there should be a video inspection to confirm that there are no issues. This date will be bought forward if we start experiencing problems with the pipe system.

Currently the network performs as designed with no maintenance issues at all.

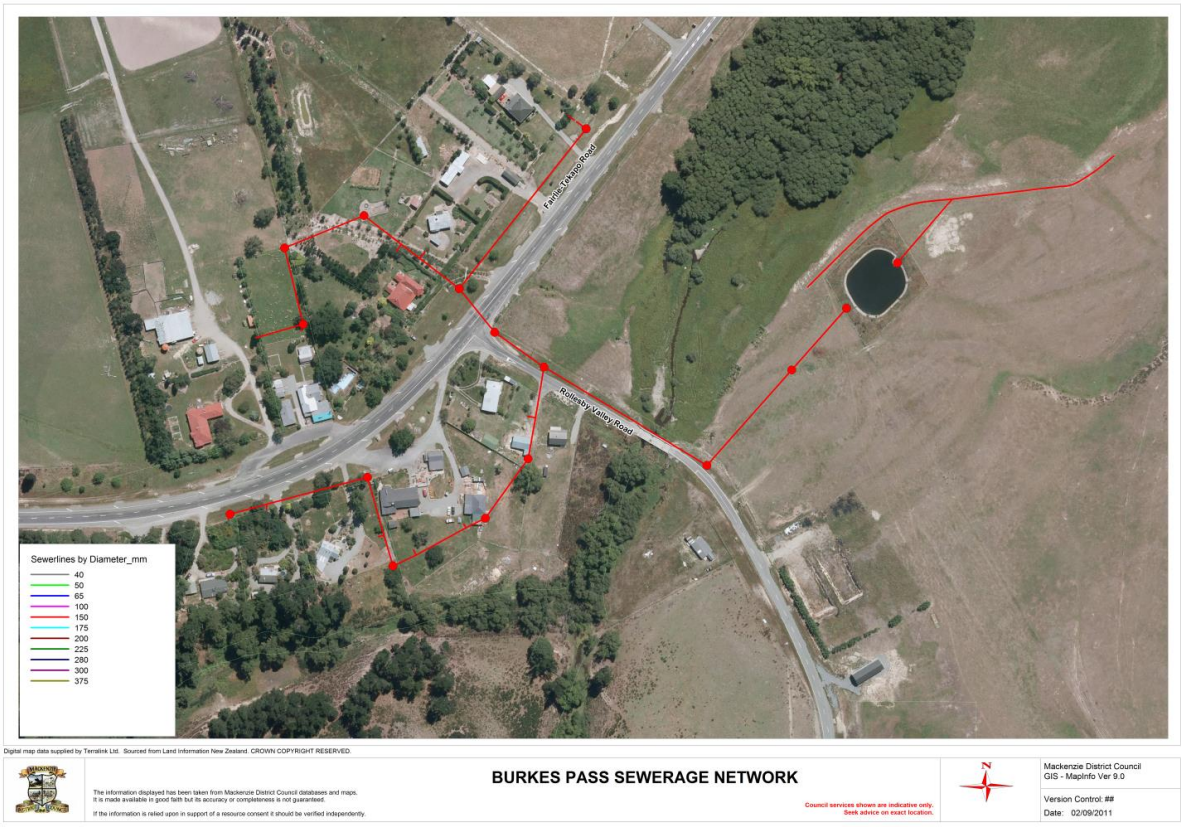
A4.5 Pump Stations

There are no pump stations in Burkes Pass Wastewater system.

A4.6 Treatment Plant

The treatment plant consist of a single oxidation pond.

Figure 11-5: Burkes Pass WW Treatment Plant



A4.6.1 Flow and Loading Estimations (Original Design)

Loadings

For oxidation ponds without mechanical aeration, the former MWD guideline value of 84 kg/BOD/ha/day is considered appropriate. This equates to 1,200 persons/ha for a mainly domestic catchment, which is the case for Burkes Pass.

1,200/ha x 0.11 = 132 persons

Therefore the Burkes Pass pond appears to be adequate for servicing the estimated current population of 45 persons, including any short term peak loadings.

Flows

Estimated flow volume (domestic)	8,250 l/day
Estimated flow volume (commercial)	600 l/day
Total Flow	**8,850l/day**

A4.7 Environmental Management

The following table list the resource consent associated with the Burkes Pass Wastewater System.

Consent #	Description	Expiry Date	Allowable discharge
CRC992607	Discharge to land	7 June 2040	8.1m^3/day

The Burkes Pass wastewater treatment plant complies with the above resource consents for air and effluent discharge.

A4.8 Demand

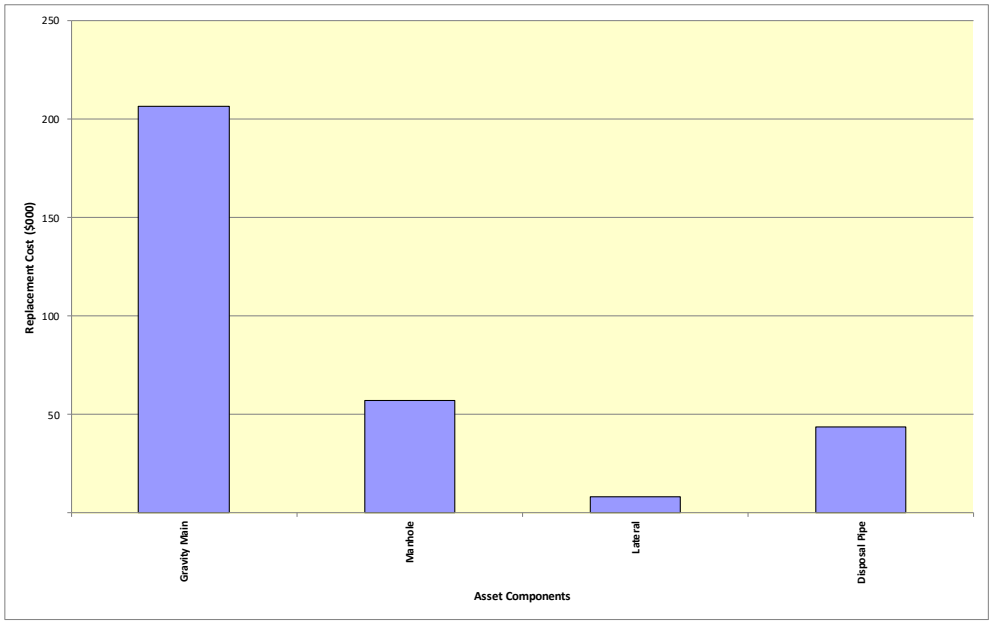
Given the current and projected populations, no upgrading of the primary pond is necessary at this time. The pond is located on flat farmland, with strong prevailing winds (especially from the north-west in the summer time) so adequate wind mixing within the pond is expected.

As no data is available for the pond influent quality, an allowance of 70g BOD/person/day is assumed (former MWD guideline) for both the domestic and commercial wastewaters from Burke's pass. The total assumed BOD loading is, therefore, 3.2 kg/day for Burke's Pass.

The former MWD guideline of 84kg BOD/ha/day, when applied in this case, results in an allowable BOD loading of 9.24kg BOD/day for the single oxidation pond. The existing BOD loading on the pond is therefore well within the allowable BOD loading.

A4.9 Asset Details

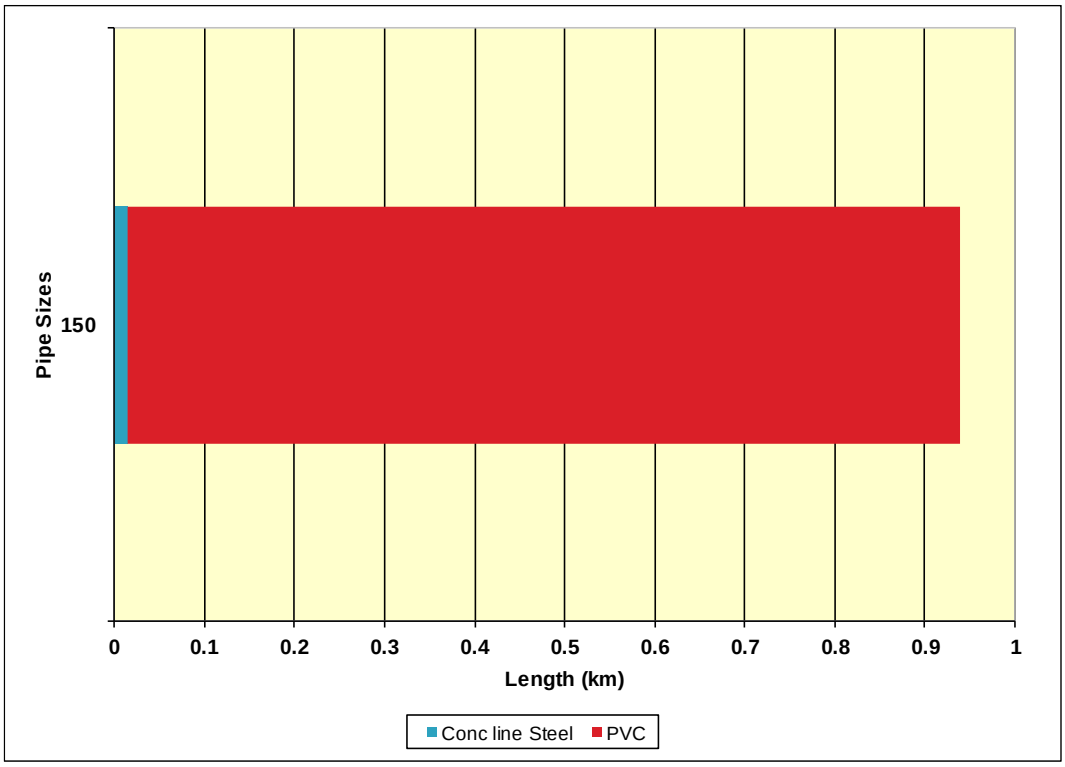
Appendix Figure 16: Replacement Costs Reticulation



Gravity mains make up 65% of the total asset values

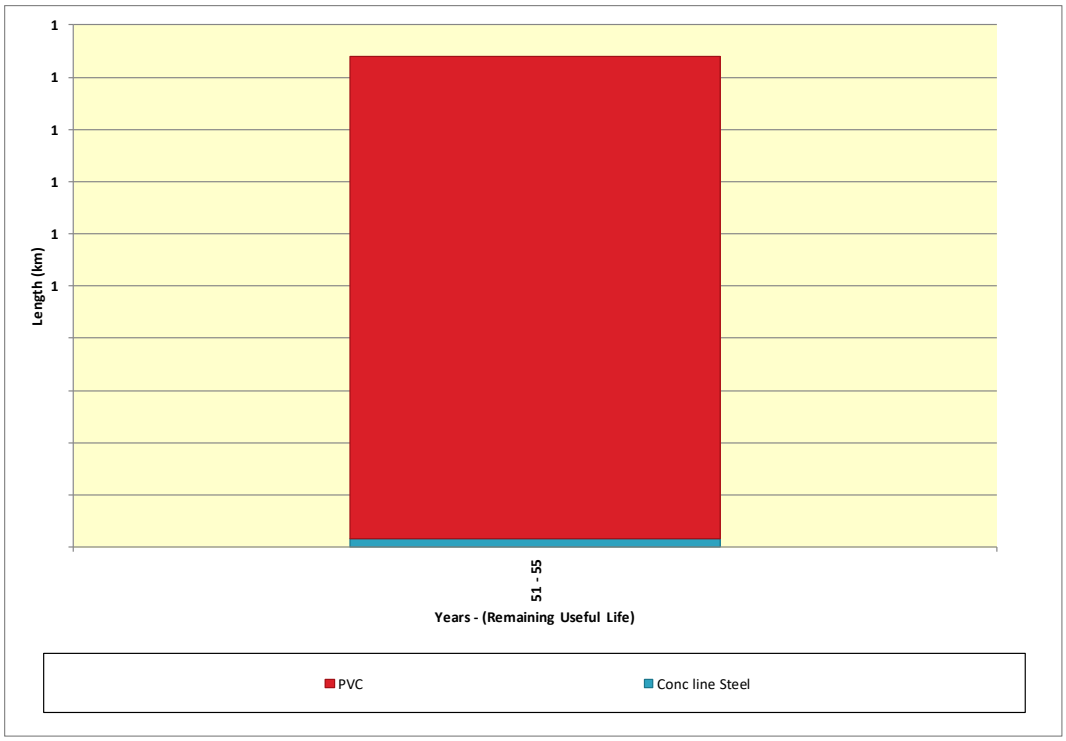
The replacement costs of equipment e.g. facilities are not recorded within the Asset Register (**IP 8**)

Appendix Figure 17: Wastewater Main Diameters



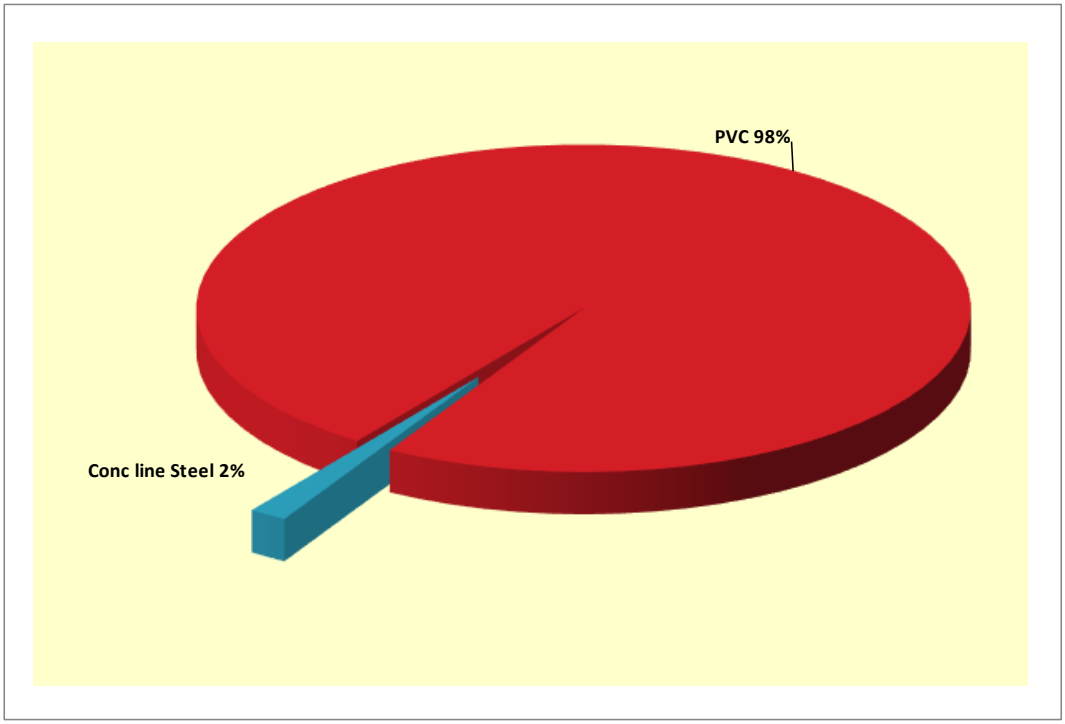
There is only Ø150mm pipe in the reticulation. This consist mainly of PVC

Appendix Figure 18: Pipe Age Group Replacement Cost



The reticulation will reach the end of its expected life within the 51-55 year window

Appendix Figure 19: Sewer Main Material



The graph shows that 98% of the reticulation consist of PVC and 2% of Concrete lined Steel.

There are no reactive maintenance records for Burkes Pass Wastewater system.

A4.10 Data Confidence

Appendix Table 10: Data Confidence

Scheme	Component	Pump Stations	Reticulation	Treatment
	Asset Attributes	G	G	G
	Condition	G	G	G
	Performance	G	G	G

Where

Score	Description	Definition
1	Accurate	100%
2	Minor inaccuracies	± 5%
3	50% estimated	± 20%
4	Significant data estimated	± 30%
5	All data estimated	± 40%
X	No asset	

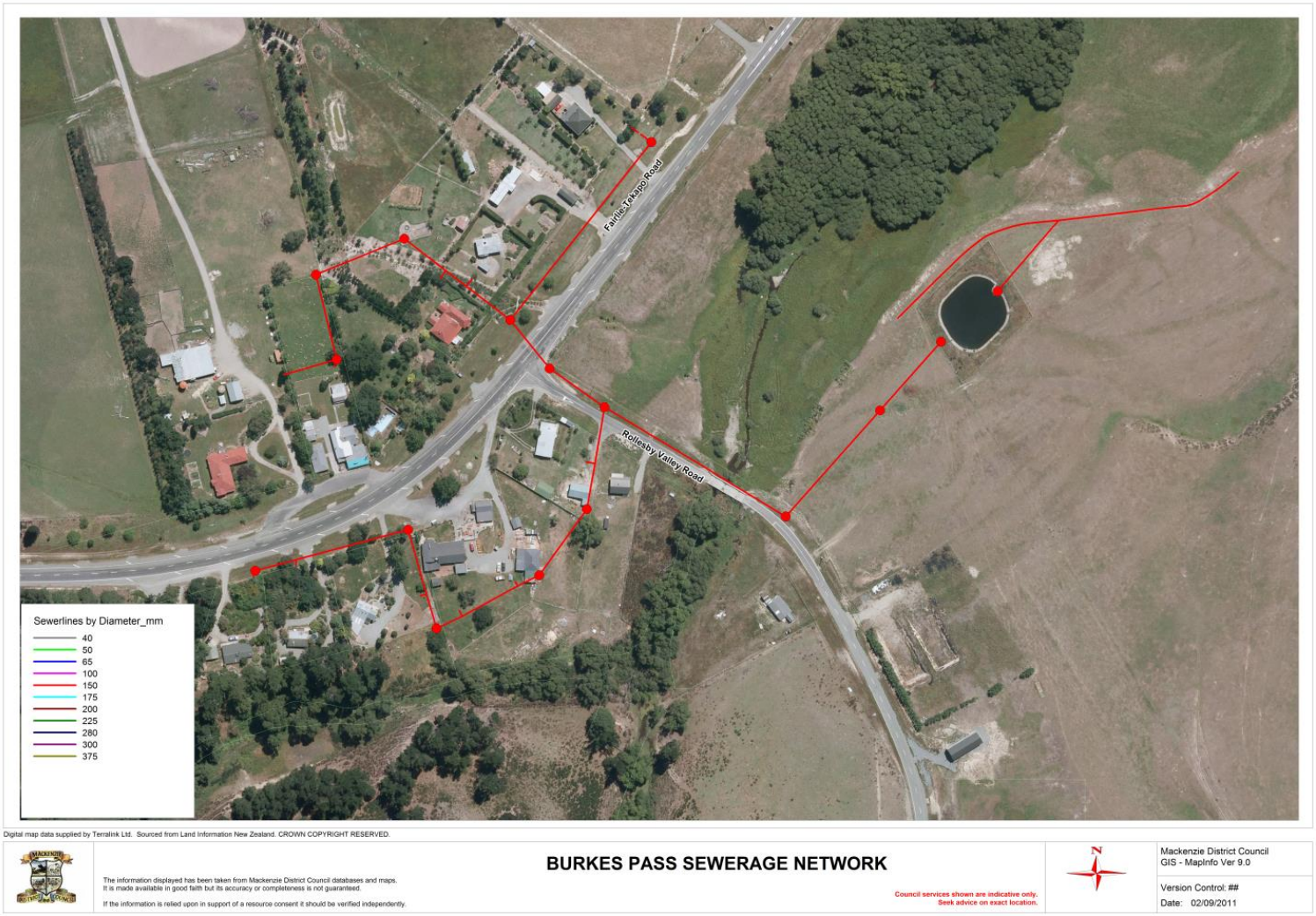
A4.11 Capital Projects

Appendix Table 11: Capital Projects

Name	Type	Value	When

No capital projects specifically identified for Burkes Pass wastewater system.

A4.12 Burkes Pass Wastewater System Map

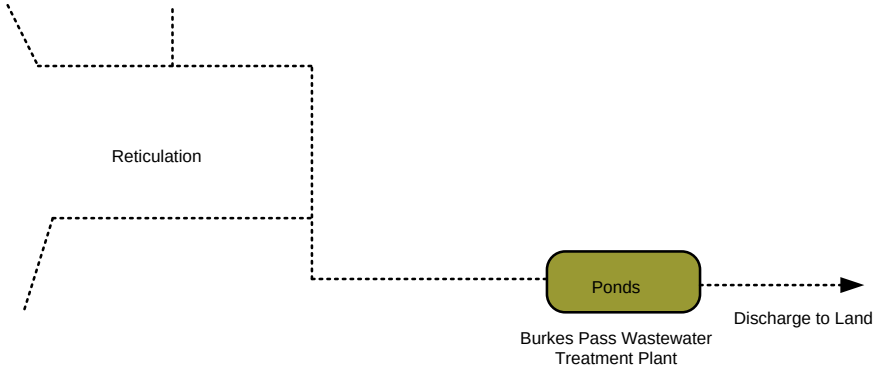


A4.13 System Schematic

LEGEND

Rising Main

Reticulation



	Burkes Pass Wastewater System Schematic Layout	Revision January 2017	