



STORMWATER

ASSET MANAGEMENT PLAN 2020



Asset Management Plan

Asset	Stormwater		
	Name	Signature	Date
Prepared By	Jeremy Rees		
Asset Manager	Jeremy Rees (acting)		
Group Manager Review	Erin Moogan		
Peer Review	IAM Consulting		
Council Adoption			

Changes to be Incorporated in Next Review

Number	Date of Change	Reason for Change
1	16 February 2021	Initial issue
2	11 March 2021	Changes as a result of audit.

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Executive Summary

THE ACTIVITY

The Infrastructure Group manages the stormwater network of pipes, open drains and pumping stations for the collection and disposal of stormwater to protect property from flood damage. This network has a total value as detailed below:

Table 0.1 Valuation of Network

Asset Group	Optimised Replacement Cost	Optimised Depreciated Replacement Cost	Depreciation
Fittings (manholes, cleaning eyes, etc.)	\$26,590,283	\$15,301,783	\$275,960
Pipes	\$321,898,007	\$154,135,980	\$3,329,255
Stopbanks	\$13,787,400	\$5,698,792	\$137,874
Pumping Stations	\$4,678,708	\$2,874,755	\$117,457
Total	\$366,954,398	\$178,011,310	\$3,860,546

The Invercargill City Council's role in providing the stormwater network is:

“The building blocks, including water, sanitation and roading, for a safe, friendly city is provided for all members of the community.”

The Asset Management Plan is the tool for the Infrastructure Group to demonstrate responsible asset stewardship and achieve compliance with statutory financial reporting requirements.

COMMUNITY OUTCOMES

Council has consulted its community to develop Community Outcomes for its Long Term Plan. The stormwater activity aligns with the Community Outcomes as follows:

Table 0.2 How the Activity Contributes

Community Outcome	Council's Role	How the Activity Contributes
Enhance our city	Invercargill's economy continues to grow and diversify	The stormwater activity protects urban areas from flooding
Embrace innovation and change	The development of future industry is encouraged	
Preserve its character	The building blocks for a safe, friendly city are provided for all members of the community	Properties are protected from flooding damage. Receiving waters are not adversely affected by contaminated discharge.

LEVEL OF SERVICE

The community has been consulted in relation to key performance measures through analysis of customer service requests and complaints, the Long Term Plan process and in relation to specific contracts. Community desires for the stormwater network are:

- (a) A safe and effective network which protects the city from stormwater flooding
- (b) Continuity of operation of the stormwater activity
- (c) Assurance that receiving water quality is not compromised by stormwater

The following table demonstrates how the stormwater activity contributes to these desires:

Table 0.3 Activity Measures and Level of Performance

Community Outcome	Council's Role	How Stormwater Activity Contributes	Customer Level of Service	Measure of Service
Embrace innovation and change	The development of future industry is encouraged	Properties are protected from flooding damage	The stormwater activity ensures there is reliable conveyance of stormwater where there is a Council Managed network	DIA Performance measure 1 (system adequacy) (a) The number of flooding events that occur in the Invercargill City district
				DIA Performance measure 1 (system adequacy) (b) For each flooding event, the number of habitable floors affected (expressed per 1,000 properties connected to the Council's stormwater system)
Preserve its character	The building blocks for a safe, friendly city are provided for all members of the community	Receiving waters are not adversely affected by contaminated discharge	The stormwater activity ensures the quality of receiving water is not adversely affected by stormwater contamination discharges	DIA Performance measure 2 (discharge compliance) Compliance with the Council's resource consents for discharge from its stormwater system, measured by the number of: <ul style="list-style-type: none"> ▪ Abatement notices ▪ Infringement notices ▪ Enforcement orders ▪ Convictions
Enhance our City	Invercargill's economy continues to grow and diversify	Performance of the stormwater system is maintained to prevent flooding of urban areas	The stormwater activity ensures timely response to stormwater network faults	DIA Performance measure 3 (response times) The median response time to attend a flooding event, measured from the time that Council receives notification to the time that service personnel reach the site
				DIA Performance Measure 4 (customer satisfaction) The number of complaints received about the performance of the stormwater system (expressed per 1,000 properties connected to the Council's stormwater system)

Measure	2016/2017	2017/18	2018/19	2019/20	2021/22 Target	2022/23 Target	2023/24 Target	2024-31 Target
DIA Performance measure 1 (system adequacy) (a) The number of flooding events that occur in the Invercargill City district	0	0	0	1	0	0	0	0
DIA Performance measure 1 (system adequacy) (b) For each flooding event, the number of habitable floors affected (expressed per 1,000 properties connected to the Council's stormwater system)	0	0	0	0.045	0	0	0	0
DIA Performance measure 2 (discharge compliance) Compliance with the Council's resource consents for discharge from its sewerage system, measured by the number of: <ul style="list-style-type: none"> ▪ Abatement notices ▪ Infringement notices ▪ Enforcement orders ▪ Convictions 	0	0	0	2*	0	0	0	0
DIA Performance measure 3 (response times) The median response time to attend a flooding event, measured from the time that Council receives notification to the time that service personnel reach the site	6 minutes	28 minutes	13 minutes	23 minutes	<1 hour	<1 hour	<1 hour	<1 hour
DIA Performance Measure 4 (customer satisfaction) The number of complaints received about the performance of the stormwater system (expressed per 1,000 properties connected to the Council's stormwater system)	0.82	1.03	0.63	1.00	<4	<4	<4	<4

The stormwater activity is meeting these performance measures to a high standard.

ASSET INFORMATION

The city's stormwater network consists of 416 kilometres of pipe, most of which is earthenware or reinforced concrete, and estimated to have a service life of up to 100 years. In addition there is approximately 47 kilometres of open drains, mostly situated in the rural residential area of Otatara. Nine stormwater pump stations provide for continued discharge of stormwater from low lying areas against high tide levels, or when receiving waters are elevated due to flooding.

Stormwater sumps on roads are managed and funded as part of the roading activity and are not included as stormwater assets.

In 1985, following widespread flooding in 1984, a new design standard was adopted and a major upgrading of the stormwater system began. The adopted design standard was for a five year return period storm (20% Annual Exceedance Probability (AEP)), with the focus of upgrading being on areas flooded in 1984, and the major stormwater outlets to natural waterways. Although the stormwater upgrade programme ended in 2005, pipes serving a large part of the city are still sized at old design standards, and these are being upgraded progressively as part of the asset renewal programme. As the piped stormwater catchments in the city are short, with the largest catchment having a maximum flow time (time of concentration) of less than 40 minutes, the system has been designed for short duration high intensity storms.

If an event larger than the five year return period occurs, the primary piped system may surcharge, however flooding inside homes is not expected. Much larger events, such as a 50 or 100 year return period, may result in overland flow. Overland flow paths within Invercargill are usually within road corridors, however there are some flow paths within private property. Stormwater modelling of both the primary pipe network and the overland flow path network is required to understand the risks to property and the steps to be able to manage these.

The large events, such as a 50 or 100 year return period, also have the potential to result in regional flooding and there is a risk posed to some areas of Invercargill by the Waihopai River, Otepun Stream and Kingswell Stream. These waterways have a flood protection system (stop banks) managed by Environment Southland.

Only limited assessment and inspection of the stormwater system using tools such as CCTV has been done to date and detailed knowledge of the condition of the stormwater system is limited. Spot inspections, especially during maintenance work, and inspection of specific pipelines to assess whether the pipeline should be repaired or replaced ahead of major roading upgrades indicate that the stormwater network is in moderate condition. The low number of system blockages and collapses tends to confirm this assessment.

The 1984 floods also led to the development of comprehensive flooding protection schemes on all the major waterways through Invercargill. These schemes are managed and funded by Environment Southland.

The Cobbe Road (Rifle Range) and Stead Street tidal floodbanks are managed by Invercargill City Council as part of the stormwater activity. These protect the low lying areas of Lake Hawkins (including the Invercargill airport) and Otatara from tidal flooding. They have been overtopped on occasions when extreme storms have coincided with high spring tides resulting in much higher tidal levels than normal. There is an ongoing project to raise the level of these stopbanks and this work is being done in conjunction with Environment Southland. Maps showing the stormwater reticulation, and flood protection infrastructure are included in both Section 1 and Appendix 16.02.

Further details of the types and conditions of the stormwater assets can be found in Section 5.

RISK MANAGEMENT

Management practices focus on ensuring the reliability of critical assets. Generally pipelines of 600 mm diameter or larger and pump stations are classified as extreme or major criticality assets, as failure can cause serious disruption to service delivery over a substantial area and raise public safety concerns. As the Infrastructure Group prepare an asset renewal programme, a risk management process consistent with Standard AS/NZ 4360 will be used to identify critical assets and specific risks associated with the stormwater asset. In prioritising and programming capital works, consideration is given to risk and benefits, affordability, and existing performance with respect to levels of service and life cycle.

FINANCIAL FORECAST

Total budgeted expenditure for 2021/22 is \$13,526,000, including \$12,223,000 for capital renewal of pipe and pump station assets and stormwater treatment. This also includes the upgrade project of the Stead St stopbank which is 70% funded by the “shovel ready” funding from MBIE. The 30 year projections are shown in Section 8.25, adjusted for annual inflation. The following graphs summarise this information, adjusted for annual inflation, annually for the 2018-28 period, and in five yearly blocks over the term of this Asset Management Plan.

Figure 0.5 Operating Expenditure Over 10 Years

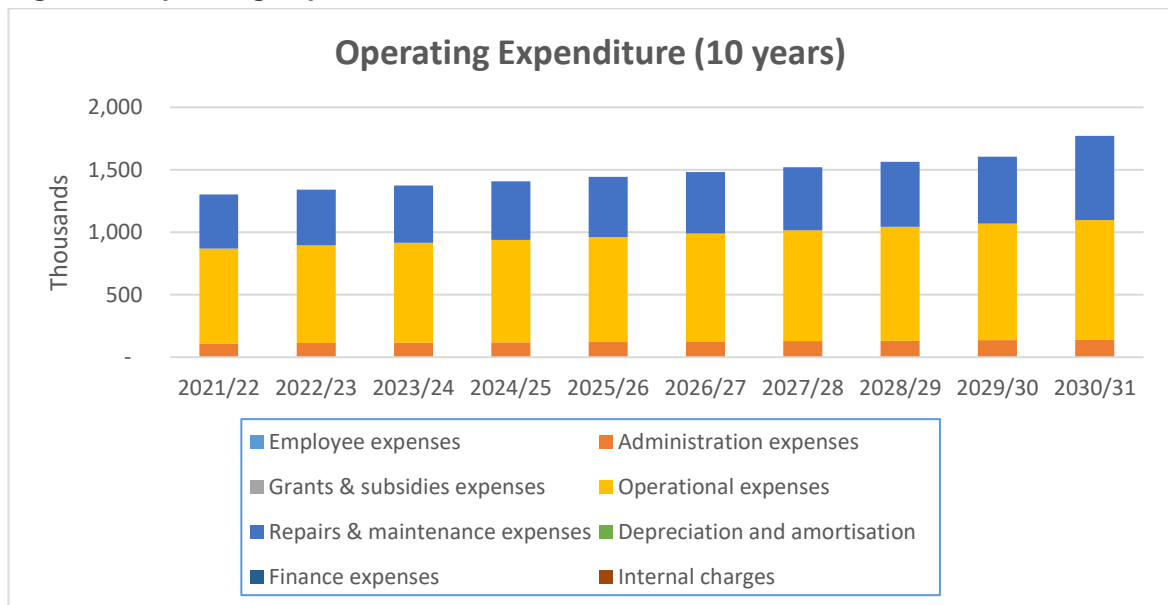


Figure 0.6 Capital Expenditure Over 10 Years

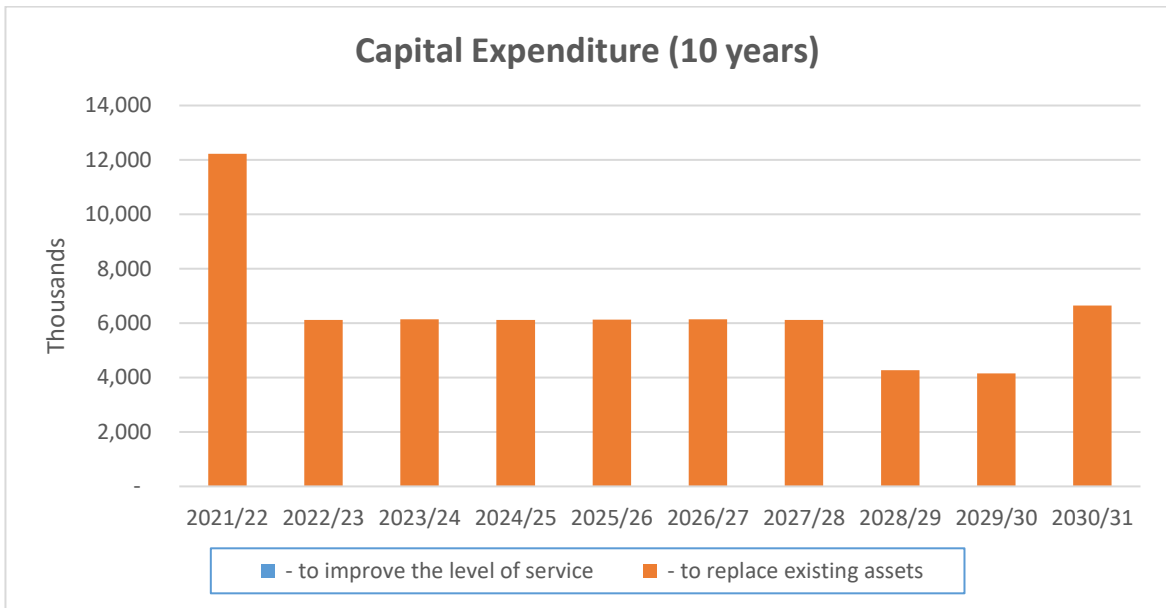


Table 0.7 Operating Expenditure Over 30 Years

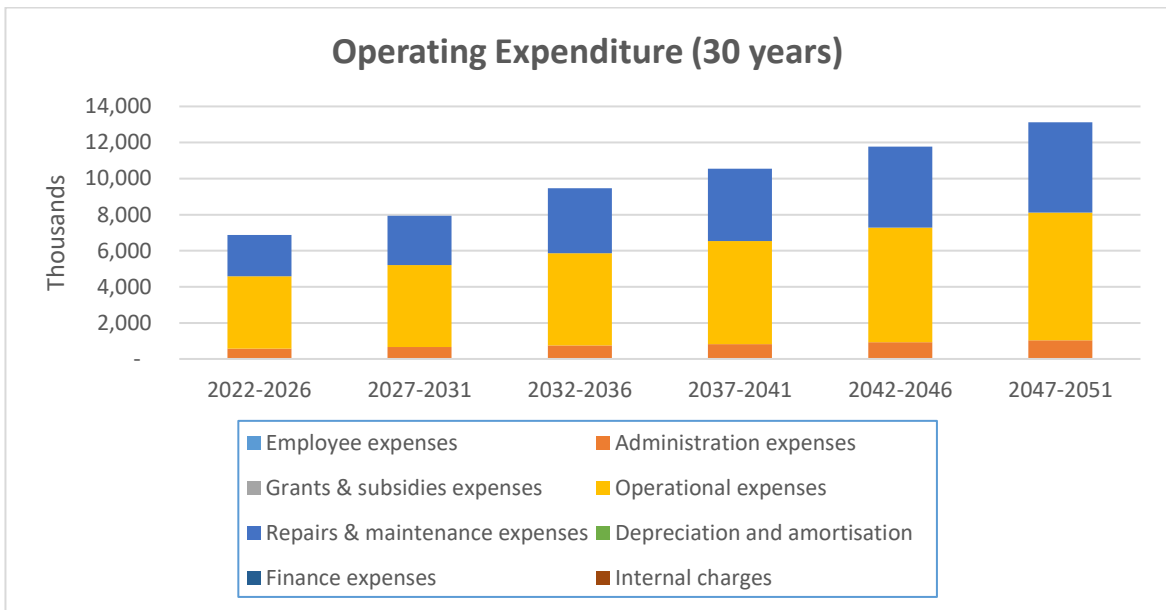
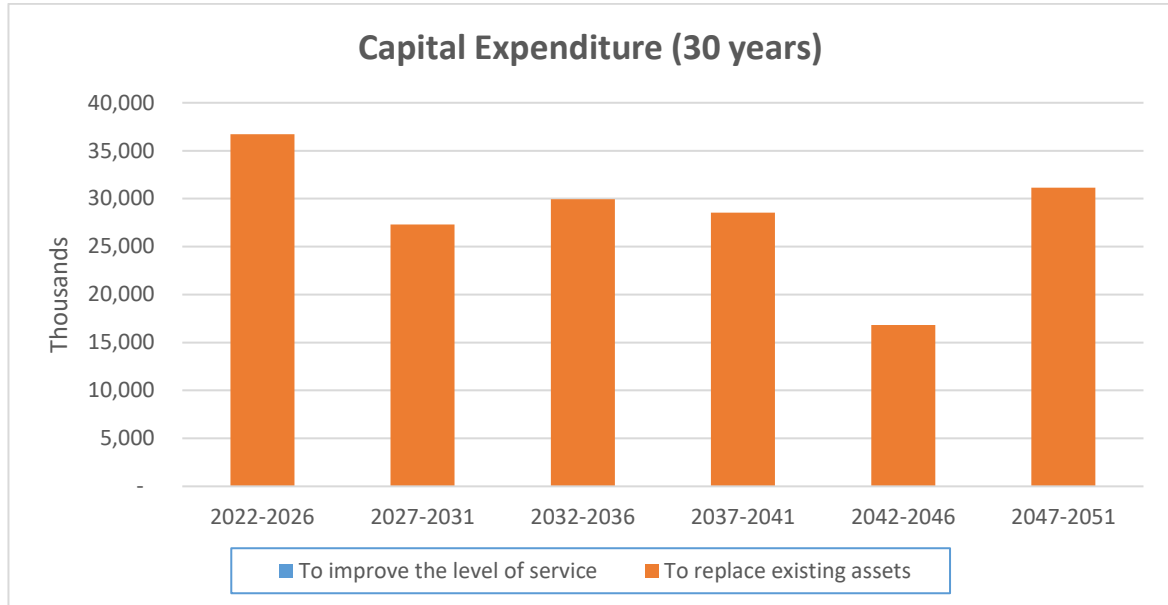


Table 0.8 Operating Expenditure Over 30 Years



Significant trends are:

- *Operation* – expenditure of \$759,000 in 2021/22 rising to \$958,000 in 2030/31 to fund additional costs associated with the stormwater discharge consent and associated treatment, and inflation.
- *Maintenance* – expenditure of \$434,000 in 2021/22 then rise by inflation through the planning period.
- *Renewals* – expenditure is budgeted at \$12,223,000 for pipe renewals and most notably the Stead Street stopbank upgrade project, which is 70% funded by “shovel ready” funding from MBIE, then dropping back to \$6,115,000 for pipe and structure renewals along with pump assets renewals.

The budget is based on an assumed optimum pipe asset life of up to 100 years, depending on the pipe material, and detailed asset condition assessment is required to confirm this life. Asset renewal budgets may require review to reflect confirmed optimum pipe asset life. The renewal budget is based on the expected year of renewal for stormwater assets which is then smoothed over 5-7 years to remove yearly spikes in renewals. The assets are valued every three years (most recently in August 2019) and the budget is based on the Optimised Replacement Value of these assets programmed for renewal.

Pump station renewals vary throughout the plan period as pumps and electrical components reach the end of economic life.

DEVELOPMENT

No specific plans are included for residential development although the district plan does highlight areas where such development is likely. Costs of stormwater infrastructure in new residential subdivisions will be met by developers.

KEY ASSET MANAGEMENT ASSUMPTIONS

Growth

- Population change will follow the Statistics New Zealand medium population projection

- Climate change scenario RCP4.5 is expected and stormwater asset renewals will be designed in accordance with this climate change scenario
- The majority of infrastructure required to service new developments will be funded by developers

Levels of Service

- There will be no significant changes in levels of service
- The Southland Water and Land Plan will require improvements to stormwater quality, within the budget provisions of this Plan
- No upgrading of existing infrastructure will be required as a result of urban development, provided the anticipated development is evenly spread across the urban area
- Future condition assessments will not indicate additional remedial / replacement works to those scheduled in work programmes

Natural Disasters

- This Plan is based on the assumption that there will be no natural disasters affecting the Council's stormwater network
- No provision has been made in the Asset Management Plan for the cost of repairing damage or other additional costs consequent upon a natural disaster such as a major flood or substantial earthquake

Financial

- See the financial strategy and the assumptions register for financial assumptions.

IMPROVEMENTS TO PLANNING

This Asset Management Plan highlights a need for improved quality of management practices to ensure optimum operation of the stormwater system.

Improvements will focus on:

Table 0.7 Improvement Programme 2020

Item	Current Practice	Areas for Improvement
Knowledge of Assets / Data Management	Pipe Network	
	➤ Data – knowledge of pipe age, materials, sizes and location is very good	Continue to update records
	➤ Condition – knowledge of pipe condition from 5% of asset record on CCTV and graded in accordance with pipe inspection manual	Continue pipe inspection programme to improve knowledge of asset condition
	Electro Mechanical Plant	
	➤ Condition regularly maintained and inspected	Current practice adequate
	➤ Condition assessed annually	
	➤ Rated three yearly	
	Structures (buildings, manholes, etc.)	Current practice adequate
	➤ Buildings maintained and	

Item	Current Practice	Areas for Improvement
	assessed regularly – upgrading needs assessed for Asset Management Plan	
Valuation, Depreciation and Effective Lives	➤ Valuation guidelines	Reassess effective lives of pipe network based on improved condition assessment
Asset Costing	➤ Replacement costs based on continuing records of renewal contracts	Current practice adequate
Asset Renewal and New Works Strategy	<ul style="list-style-type: none"> ➤ Forward 30 year plan based on age and condition ➤ Annual Plans consider: <ul style="list-style-type: none"> ○ Condition ○ Age ○ Capacity ○ Co-ordination with other asset upgrades / renewals 	Improve asset condition assessment to better identify renewal needs
Service Level Specification and Measurement	<ul style="list-style-type: none"> ➤ Meeting most performance measures ➤ Customer focussed service levels only recently measured ➤ Surveys used to assess customer needs 	Continue to measure and assess performance against service levels
Review, Audit and Continuous Improvement	<ul style="list-style-type: none"> ➤ Annual financial audit ➤ Annual service level audit ➤ Peer review of Asset Management Plans 	Current practice adequate
Operations and Maintenance Strategy	<ul style="list-style-type: none"> ➤ Competitively tendered maintenance contracts in place for major maintenance and operational items ➤ Quality contract management procedures in place 	Continue current practice
Consent Compliance	➤ Discharge consents to five freshwater streams	Monitor and implement identified improvements
Risk Plans	<ul style="list-style-type: none"> ➤ Lifelines Project identifies risk and response strategies for major events ➤ Asset Management Plan identifies asset failure risk and response strategies 	<p>Current practice adequate</p> <p>Improve risk management strategies</p> <p>Identify high value risk assets</p>
Sustainability	➤ Develop strategy	

1. Introduction

1.1 ABOUT THIS PLAN

The stormwater activity is one of the core Infrastructure activities addressed in the Invercargill City Council Long Term Plan (LTP). This Stormwater Asset Management Plan (AMP) is, therefore, strongly linked to the overall strategic direction for the City. The LTP is the document that alerts the community to the key issues and strategies of the activity.

The purpose of this AMP is to outline Council's tactical planning response to the stormwater activity. The AMP outlines the long term management approach for the provision and maintenance of the stormwater activities services. Under Council's significance and engagement policy, the stormwater networks in Invercargill and Bluff and the drainage network in Otatara are deemed to be a strategic asset and therefore are significant in ensuring Council's capacity to contribute towards the Community Outcomes, and the current and future needs of the community. The AMP demonstrates responsible management of the assets on behalf of customers and stakeholders, and assists with the achievement of strategic goals and statutory compliance. The AMP combines management, financial, engineering and technical practices to ensure that the level of service required by the customers is provided, and is delivered in a sustainable and efficient manner. This AMP is based on existing levels of service, currently available information, and existing knowledge and judgement of Council staff.

A programme of Asset Management improvements is planned to improve the quality of decision making and to improve the knowledge of Council's assets and customer expectations. These future enhancements will enable Council to optimise life cycle asset management activities and provide a greater degree of confidence in financial forecasts.

This AMP has been prepared by Invercargill City Council's Engineering Services Manager, acting as the Drainage Manager, with the support of experienced asset management and engineering staff. The Plan has been peer reviewed by Asset Management consultants, IAM Consulting Ltd.

1.2 ACTIVITY OVERVIEW

Council owns and maintains assets on behalf of the community, providing a stormwater service to each property in the Bluff and Invercargill urban areas. Stormwater is discharged to natural waterways including the Waikiwi Stream, Waihopai River, Kingswell Creek, Clifton Channel, Otepuni Stream, the new river Estuary and Bluff Harbour.

The city's stormwater network consists of 416 kilometres of pipe, most of which is earthenware or reinforced concrete, and estimated to have a service of life up to 100 years. In addition there is approximately 47 kilometres of open drains, mostly situated in the rural residential area of Otatara. A total of nine stormwater pump stations provide for continued discharge of stormwater from low lying areas against high tide levels, or when receiving waters are elevated due to flooding.

Stormwater sumps on roads are managed and funded as part of the roading activity and are not included as stormwater assets.

The city is also protected by a series of flood protection schemes on the main waterways through the city and around the Waihopai Arm of the New River Estuary. The majority of these schemes are managed by Environment Southland, with Invercargill City Council managing tide protection banks around the Waihopai Arm.

The natural waterways into which the stormwater network discharges are managed by Environment Southland, including the flood protection schemes protecting the urban areas of Invercargill from flooding. These schemes are funded by Environment Southland through its rating system.

Maps of the stormwater system and the floodbank network are shown on the following pages.

Legislation requires that the Council manages its stormwater assets in an efficient and effective manner. This AMP provides a strategy for the Council to do so.

The stormwater system is managed and operated by staff employed directly by Council, and maintenance and capital works are carried out by contract under supervision by Council staff.

No other communities within the Council's territory are supplied with a stormwater disposal service other than the urban communities of Invercargill, Otatara, Bluff and a number of rural drainage districts. Property owners outside of these areas are responsible for the provision and maintenance of drainage systems through their property, and within roadways adjacent to the property.

Figure 1.1 Stormwater Reticulation Major Pipes and Pump Stations

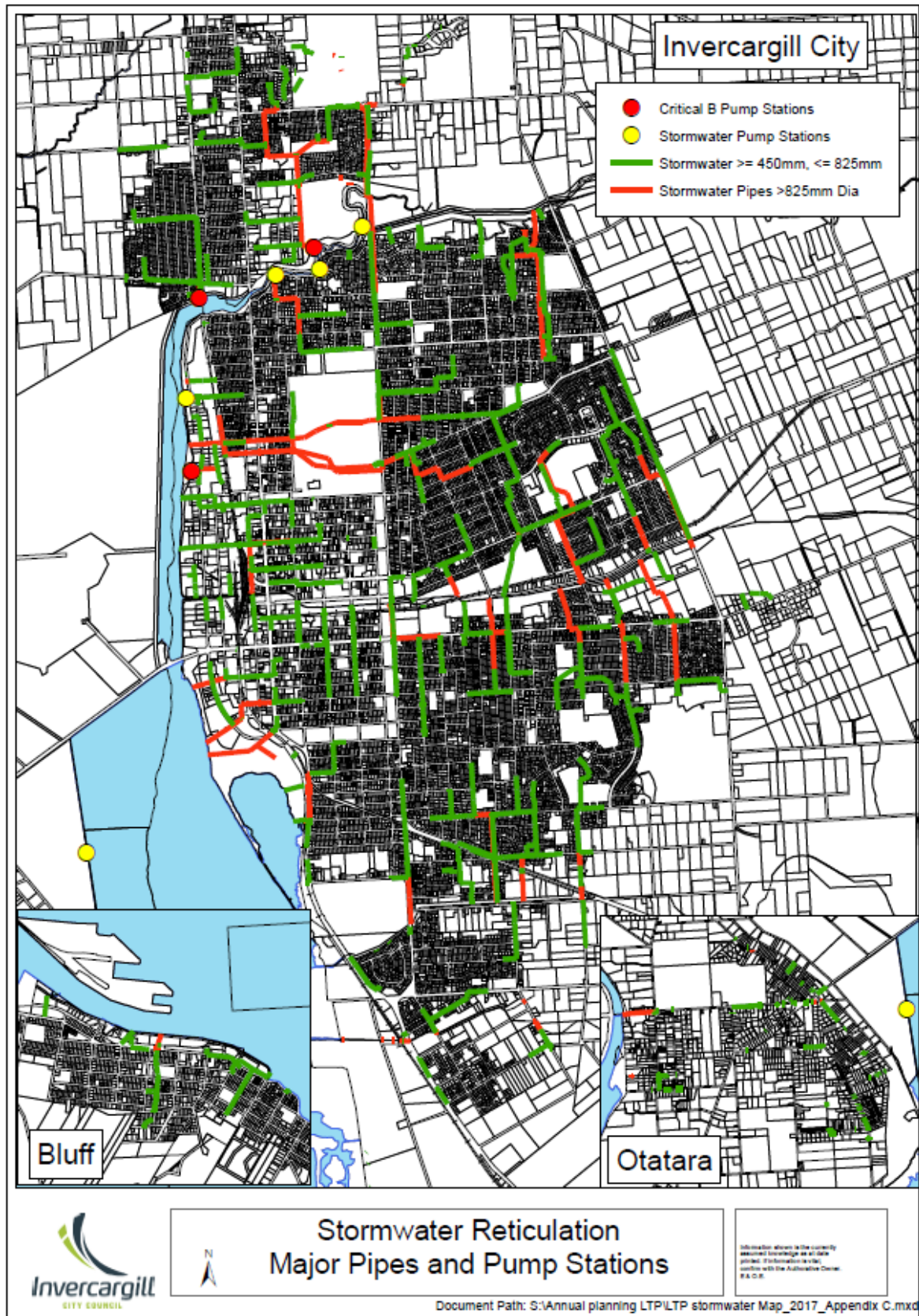
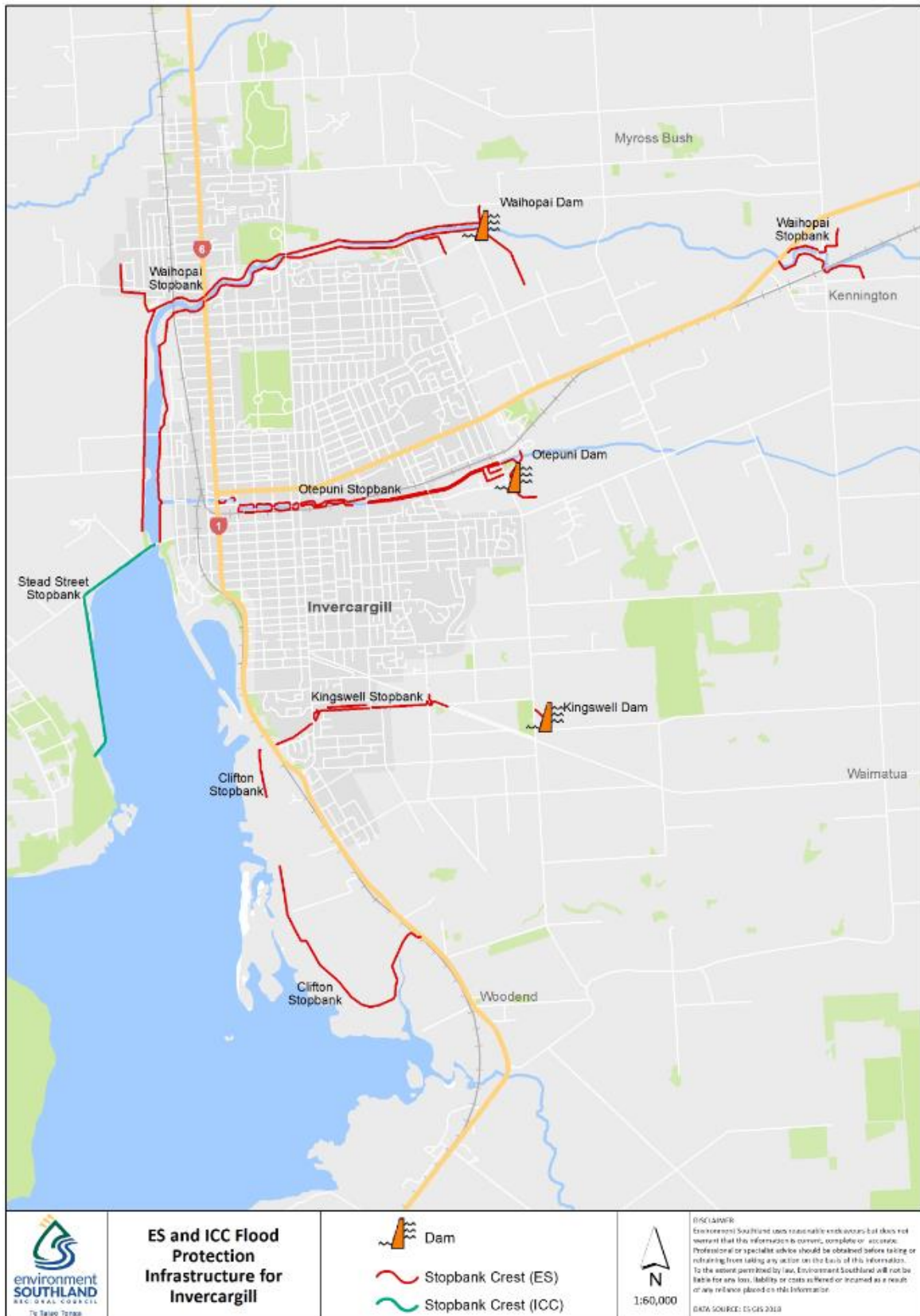


Figure 1.2 Environment Southland and ICC Flood Protection Infrastructure for Invercargill



2. Strategic Context

2.1 ALIGNMENT WITH STRATEGIC GOALS

2.1.1 COMMUNITY OUTCOMES

Council has developed its own Council-focussed 'Community Outcomes' for the Long Term Plan that will fulfil the requirements of 'Community Outcomes' under the Local Government Act.

The Community Outcomes have been derived from Council's vision:

“Our City with heart” / “He Ngākau Aroha”

Table 2.1 Community Outcomes

Community Outcomes		
Enhance our City	Preserve its Character	Embrace Innovation and Change
We will know success when:		
Invercargill's population is over 1.2% of the New Zealand population	Invercargill is celebrated for preserving its heritage character	Invercargill's culture is embraced through community projects
New residents feel welcomed and embraced by Invercargill culture	Ease of access throughout the City is maintained	The development of future industry is encouraged
Healthy and active residents utilise space (including green space) throughout the City	Our natural and existing points of difference are celebrated	Technology is utilised in both existing and new City services
Invercargill's economy continues to grow and diversify	The building blocks (including water, sanitation and roading) for a safe, friendly City is provided for all members of the community	Residents of, as well as visitors to, Invercargill give positive feedback and have great experiences
Invercargill's business areas are bustling with people, activities and culture	Strong, collaborative leadership of the City is demonstrated	Invercargill has the 'wow factor' with the right facilities and events to enjoy

2.1.2 Rationale for the Activity

The removal of stormwater from residential, industrial and commercial properties reduces the risk of property damage by flooding and so protects public health, supports city growth, and contributes to the general wellbeing of the community. In urban areas stormwater disposal is most effectively achieved by means of reticulated (piped) stormwater systems. This allows the costs associated with maintaining high standards and efficient infrastructure to be spread over the community. Council are required under Section 17A to review the cost effectiveness of current arrangements for meeting the community's needs. The next main review of the cost effectiveness of the current arrangements is due prior to the renewal of the drainage maintenance contract.

2.1.3 Activity Objectives

The objectives of the stormwater activity are:

- To safeguard public health, and public and private property from damage from flooding
- To support economic growth of the community
- To provide a cost effective stormwater disposal system
- To reduce the incidence of stormwater contamination in order to reduce adverse effects on the natural environment

The alignment of the stormwater activity with the Community Outcomes is:

Table 2.2 Alignment of the Stormwater Activity Community Outcomes

Community Outcome	Council's Role	How the Activity Contributes
Enhance our City	Invercargill's economy continues to grow and diversify	The stormwater activity protects urban areas from flooding
Embrace innovation and change	The development of future industry is encouraged	
Preserve its character	The building blocks for a safe, friendly City are provided for all members of the community	Properties are protected from flooding damage and receiving waters are not adversely affected by contaminated discharge

Council will know that it is achieving the Community Outcomes above when the following results are realised:

- Industry can establish in Invercargill with access to effective stormwater drainage systems
- Environmental values in the waters to which stormwater is discharged are protected
- Levels of service as develop in Section 3.3 (including the requirements of the stormwater discharge consent) are achieved

2.2 BUSINESS DRIVERS

2.2.1 Regulatory Framework

Council operates under a number of legislative frameworks. The Local Government Act 2002 and Health and Safety at Work Act 2015 are the most prevalent to Council's core business.

The Local Government Act is the overarching framework that regulates what Council's scope is, as well as their ability to conduct day-to-day business.

The Health and Safety at Work Act ensures that as an employer we are meeting all requirements to care for our employees in a safe manner at all times.

Both aspects of legislation are paramount to the day to day running of business and most departments within Council will operate under specific provisions of both Acts, alongside any other relevant legislation.

2.2.2 District Plan and Council Policies

Under provisions provided in the Local Government Act 2002, Council has the ability to create policies, bylaws and plans.

Council operates under a number of policies. These policies are reviewed regularly in line with legislative requirements.

Council currently operates under a number of bylaws, some that were created out of need to resolve nuisance and others that are requirements under the Local Government Act or were resolved to become a bylaw through Central Government. Council intend to develop a stormwater bylaw by 2021 to manage the quality of stormwater that it receives through connections to the reticulation system. The *Code of Practice for Land Development and Subdivision Infrastructure Bylaw (2016/1)*¹ is intended to ensure new infrastructure, in this case stormwater, is designed and constructed to our minimum standards to meet the community needs and to protect the receiving water from contaminated discharges.

Further, Council operates under a District Plan which sets limits on the types of development that can occur and a number of rules for land use which the stormwater activity requires to assist in managing the outcomes of land use and development.

2.2.3 Long Term Plan

The Local Government Act 2002, Schedule 10 requires the development of a 10 year Long Term Plan. Asset Management Plans are the foundation to providing a robust basis for the long-term forecasts.

In 2014, an amendment to the Act inserted a statement that Asset Management Planning should be a fundamental part of Council's prudent stewardship of community resources over the long term, a requirement to produce a 30 year infrastructure strategy for core assets. The Infrastructure Strategy is required to address:

- Identification of strategic issues and options
- How infrastructure assets will be managed
- Indicative capital and operating expenditure forecasts
- Significant CAPEX decisions – cost options for each
- Assumptions on life cycle, demand and levels of service

The Asset Management Plan records the current and desired Levels of Service, and determines the Maintenance and Capital Works Programmes and their associated budgets required to make assets meet their desired Levels of Service.

- The Long Term Plan confirms Maintenance and Capital Works budgets that are approved by Council to meet Community Outcomes.
- The Asset Management Plan underpins the activities in the Long Term Plan and is implemented through expenditure programmes in asset areas. Adoption of the budgets for these programmes is carried out through the Long Term Plan process. Changes to budgets for programmes may occur during the consultation process and adoption of Long Term Plan budgets.

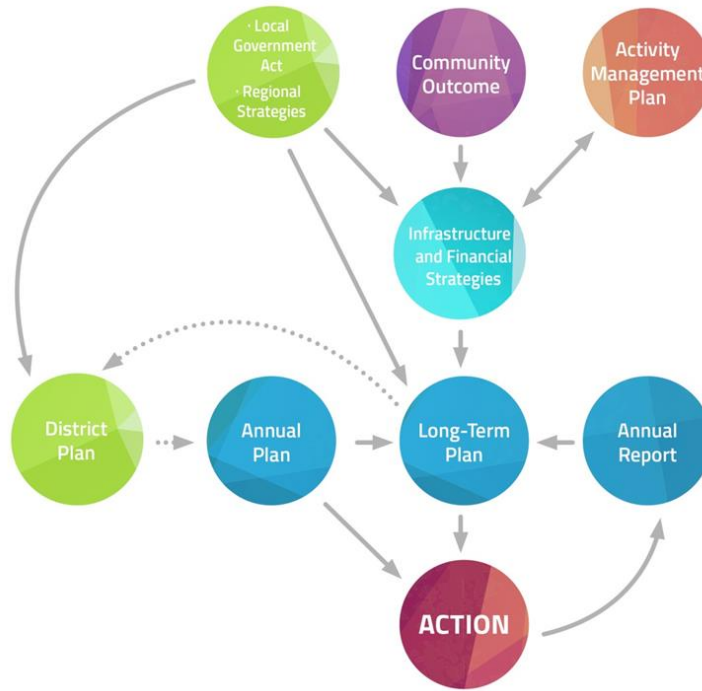
Variations between this Plan and the most recently adopted Long Term Plan / Annual Plan are recorded in the "Table of Changes to be Incorporated in Next

¹ <https://icc.govt.nz/wp-content/uploads/2014/11/Code-of-Practice-Land-Development-and-Subdivision-2016.pdf>

Review” at the beginning of the Plan. The consequences of any variations will be reflected in subsequent reviews of the Long Term Plan / Annual Plan.

The diagram below shows how the Asset Management Plan feeds into the Council’s Infrastructure and Financial Strategies, and relates to Council’s other plans.

Figure 2.1 How this Plan Feeds into and Relates to Council’s Other Plans



2.2.4 Asset Management Framework

Figure 2.2 Asset Management Plan



The Asset Management System is the set of people, processes, tools and other resources involved in the delivery of asset management.

The Asset Management Policy (Appendix 2.01) outlines the principles, requirements and responsibilities for asset management.

The Asset Management Strategy (Appendix 2.02) sets the asset management objectives, practices and audit and review processes.

2.3 STRATEGIC ISSUES AND CHALLENGES

The key corporate strategic issues and challenges facing the Invercargill City Council are:

- The City's changing demographic profile
- The community's willingness and ability to pay
- An expectation from the community to provide and retain services in a more effective manner at a lower cost
- Encouraging growth projects whilst ensuring financial and operational sustainability for future generations
- Ensuring that Council works in a financially prudent manner that promotes the current and future interests of the community
- Responding to the changing natural environment
- Retaining Invercargill's character within its built environment
- How Council will adapt to technology changes
- Balancing Council's regulatory obligations with customer service

Specific issues related to the stormwater activity are:

- Aging infrastructure, requiring investment in maintenance and renewal programmes to continue to achieve levels of service
- New Discharge Consents Conditions requiring improved discharge water quality

- Climate change driven sea level rise, which will compromise stormwater functionality
- Climate change driven increase in rainfall intensity leading to greater runoff

2.4 KEY ASSUMPTIONS

As assumptions deal with matters of uncertainty and complexity, actual results will vary, even though they are based on the best information available. If events differ significantly from the assumptions, material variances to this Plan may result. The stormwater activity is particularly susceptible to the following assumptions:

- ***Resource Consents***

The stormwater freshwater discharge consent, issued in December 2017, includes strict consent conditions requiring action by Council to improve discharge quality where contaminated discharge are identified. If greater improvements than budgeted for are required, Council could incur significant cost to comply.

- ***Useful Life of Significant Assets***

Asset life has been assigned to stormwater assets, ranging up to 100 years for some pipe categories. Renewal expenditure is the greatest single cost item for the activity. Significant variance in asset life will increase or decrease the activity's budget requirement.

- ***Asset Valuation***

Asset valuation are based on the costs of procurement averaged over previous projects.

- ***Climate Change***

The significant effect of climate change for the stormwater activity is sea level rise. This reduces the ability of the network to discharge and renewals need to be designed to allow for a sea level rise in line with the RCP4.5 scenario. This should be reviewed periodically and adapted. The new review should be around the year 2050.

Climate change will also lead to greater intensity events and renewals will be designed to accommodate rainfall events in line with the RCP4.5 scenario. The new review should be around the year 2050.

2.4.1 Internal Factors

Other assumptions that can directly affect the stormwater activity are summarised in Table 2.3 below. Financial assumptions have not been considered as they are managed by the Financial Strategy.

Table 2.3 Key Assumptions - Internal Factors

Assumption	Level of Uncertainty	Area of Impact and Potential Financial Impact
<p>Population</p> <p>At 30 June 2020, the estimated population of Invercargill was approximately 57,100².</p> <p>The population growth for Invercargill is around 1%³.</p>	<p>Moderate – risk that actual numbers will vary.</p>	<p>Infrastructure and Housing.</p> <p>Significant increases in population may create a demand for infrastructure and services beyond existing capacity.</p> <p>Significant decrease in population would adversely impact on the community's ability to fund current levels of infrastructure and services.</p>
<p>Household Growth</p> <p>The number of households will increase as the population ages and size of households decrease slightly.</p> <p>The size of household will vary between 2.25 and 2.35 people over the time of the infrastructure strategy, requiring 2,300 more homes than in 2013</p>	<p>Moderate – risk that actual numbers will vary.</p>	<p>Infrastructure and Housing.</p> <p>Significant increases in the number of households may create a demand for infrastructure and services beyond existing capacity.</p>
<p>Resource Consents</p> <p>Resource consents will be obtained with reasonable conditions and negligible impact on how Council provides its services.</p>	<p>Moderate – change is imminent but extent of which is unknown.</p>	<p>Capital expenditure may be required if the conditions attached to resource consents require changes to how Council delivers its services.</p>

² [Subnational population estimates \(TA, SA2\), by age and sex, at 30 June 1996-2020 \(2020 boundaries\) \(stats.govt.nz\)](#)

³ As above.

2.4.2 External Factors

Table 2.4 Key Assumptions - External Factors

Assumption	Level of Uncertainty	Area of Impact and Potential Financial Impact
<p>Legislation As a result of the Central Government directed Waters Reform, it is assumed there will be a change in water reticulation and sewerage delivery services within the life of the plan.</p>	<p>Moderate – difficult to know what central government will implement; the services will continue to be delivered but these will be provided by another party.</p> <p>This will be managed in line with Government best practice, and will remain within the Council financial and 10-year assumptions.</p>	<p>Services, Finances and Governance.</p> <p>Significant legislative change can impose significant financial and service delivery costs on Council.</p>
<p>Natural Disasters There will be no major catastrophes that impact on Invercargill or its economy.</p>	<p>High – it is certain the Alpine Fault will rupture in the future but uncertain as to when and the impact.</p>	<p>Infrastructure, Services, Housing and Population.</p> <p>A Civil Defence emergency in the District would impact financially on Council and the community. The financial risk to Council is reduced by maintaining insurance cover for emergency events.</p>
<p>Climate Change Climate change impacts will arise over the life of the Long Term Plan and current trends will be allowed for when planning and renewing infrastructure and services.</p>	<p>Moderate – long term trend of rising temperatures and more frequent intense weather events is reasonably certain, short to medium term impacts are less certain.</p>	<p>Water availability, coastal hazards (roading and infrastructure), services, air quality, agriculture, farming and biosecurity.</p> <p>The effect of Climate Change occurring more quickly than anticipated may require Council to review and change its current activities and levels of service. This could have a significant financial impact on the community.</p>

2.4.2 Long Term Plan 2021-2031 Assumptions

Population			
Assumption	Level of certainty	Impact of uncertainty	Council response
<p>Population growth At 30 June 2020, the estimated population of Invercargill was approximately 57,100⁴⁵.</p> <p>The population growth for Invercargill is around 1%⁶. This rate has been observed during eight of approximately the past twelve years, making it a reasonable assumption for the current plan.</p> <p>Based on a 1% growth assumption, the expected population for 2031 is estimated to be around 62,810.</p> <p>Covid-19 might significantly change the previous growth forecasts for Council. Population growth is expected to be minimal in the short term as a result of Covid-19 limiting the ability of students and migrant workers to travel, along with continued aging of the population.</p>	Medium	<p>Council is not planning for a major change in population during the life of the current plan.</p> <p>There are multiple uncertainties related to population growth in Invercargill:</p> <ul style="list-style-type: none"> • While International students currently in New Zealand are able to return to SIT for study, the number of EFTS⁷ to date for 2021 is only 337. This is compared to 775 in 2020. • Riding out recession impacts of Covid-19 Alert Levels 4 and 3 • Proposed Tiwai Aluminium Smelter closure • Mid-range population forecast but noting underlying increase in population that has already surpassed StatsNZ estimates 	<p>The critical infrastructure and resources that Council provides were designed for a city with a population larger than we are now. Council has appropriate infrastructure and resources to service our population without significant financial impact as we have plenty of room to grow.</p> <p>This is in line with the higher forecast of the Southland Regional Development Strategy.</p> <p>Council will continue to monitor change in population growth during the life of the current long term plan to prepare for/respond to any significant changes realised from the multiple uncertainties identified.</p>
<p>Diversity The population will continue to become more diverse. The Maori population will grow from 17% to 19%⁸. The Asian population will grow from 6% to 9%⁹.</p>	Medium	<p>Interruptions to travel may affect international migration although it is not expected to effect this assumption significantly. Impact of uncertainty is low.</p>	<p>Council continues to explore new ways of engaging and ensures a balanced sample in customer research to ensure it understands changing needs and expectations.</p>

⁴ [Subnational population estimates \(TA, SA2\), by age and sex, at 30 June 1996-2020 \(2020 boundaries\) \(stats.govt.nz\)](#)

⁵ [Stats NZ Overview of data quality ratings, interim coverage and response rates, and data sources for 2018 census](#)

⁶ As above.

⁷ EFTS – Equivalent Full Time Student

⁸ Growth in line with NZ stats estimate of 2% growth in the Southland region (NZ. Stats, population projections)

⁹ Growth in line with NZ stats estimate of 3% growth in the Southland region (NZ. Stats, population projections)

<p>Ageing population Those aged 65 and older will form 23% of the population in 2031, which is higher than the current aged population in 2020¹⁰ (estimated at 10,000 of 57,100, or 17.51%)¹¹.</p>	<p>High</p>	<p>The pattern of aging in the population is a long-term trend which is not expected to be disrupted.</p>	<p>The needs of older people and younger people are different from those in the working age and Council will continue to consider the needs of all users of its services.</p>
<p>Households The number of households will increase as the population ages. The size of households will decrease slightly and may vary between 2.35 and 2.25 people over the time of the infrastructure strategy¹²</p>	<p>Medium</p>	<p>The impact of a potential decline in numbers of students and migrant workers on demand for housing is uncertain.</p>	<p>Council's infrastructure has sufficient capacity to accommodate the potential increase in population and/or demand.</p>

¹⁰ NZ Census Area unit forecast

¹¹ [Subnational population estimates \(TA, subdivision\), by age and sex, at 30 June 2018-20 \(2020 boundaries\)](#)

¹² To calculate the projected average occupancy rates we took past and projected population data from Statistics New Zealand and cross referenced this to past and projected number of households. The average occupancy is the total population divided by the total occupied households.

Economy

Assumption	Level of certainty	Impact of uncertainty	Council response
<p>COVID-19 The lockdown and potential future impacts of COVID-19 may negatively impact residents' ability to pay rates. This could lead to a short term cashflow impact and increased rates arrears. Rates arrears could increase further.</p>	Medium	To date there has been little impact on our rates receipts and the response to the new rates postponement and remission policy has led to a number of ratepayers contacting Council to go onto a payment plan for their rates.	Council has adopted an additional policy for postponement and remission of rates. This policy allows ratepayers financially impacted by COVID-19, to delay payment of up to 1 year's rates. Council staff will work with affected ratepayers to set up affordable payment plans.
<p>Economy A recessionary period is expected for the first five years of the LTP and longer-term structural changes to the economy beyond this time. This will lead to higher unemployment and lower GDP.¹³</p>	Medium	The shape of the recession (u or v) is as yet unknown. The relative impact across regions, based on industries impacted most by COVID-19, as well as potential impacts of proposed Tiwai closure and SIT becoming a subsidiary of Te Pūkenga needs to be better understood by Council in order to reduce this uncertainty. Significant errors in this area could have a significant impact on Councils budgets over the forecast period ¹⁴ .	<p>Council will focus on efficiency savings. Investment will only be made in activities which can be serviced.</p> <p>Council will continue to review its work programme and priorities as the level of uncertainty reduces.</p>
<p>Community funding Council can expect to see increased funding applications from groups as a result of Covid-19 and its impact on Community Trust of Southland and Invercargill Licencing Trust's ability to fund.</p>	Medium	The immediate impact of Covid-19 has been seen in the local community, with reduced funding available from major community funders including the Community Trust of Southland and Invercargill Licencing Trust and Foundation.	Council acknowledges the potential community expectation that Council will be positioned to distribute grants to fund community wellbeing related activities.
<p>Economic diversification Volatility in the global economy may affect one or more of Invercargill's key export industries. This will drive</p>	Medium	The relative impact needs to be better understood by Council to reduce uncertainty, as significant errors could	Council will continue to monitor changes in the global markets.

¹³ BERL Local Government Cost Adjustor Forecasts – Three Scenarios Reference No: #6109

¹⁴ <https://www.infometrics.co.nz/industry-concentrations-and-the-fall-of-think-big/> ; <https://www.infometrics.co.nz/examining-the-nz-industries-hit-hardest-by-the-covid-19-pandemic/> ; BERL Local Government Cost Adjustor Forecasts – Three Scenarios Reference No: #6109

diversification but will slow growth. There may be a delayed effect through the risk of impacted industries abandoning properties.		have a significant impact on Council budgets over the forecast period ¹⁵ . This may directly impact rates and ability of Council to fund projects.	
<p>Central Business District Following a period of static activity until 2023 when the City Block development is complete, the CBD will become more vibrant and have increased connectivity.</p> <p>Council will work in collaboration with others to enable strategic activities and initiatives to support the success of the CBD.</p>	High	<p>The city centre is at the centre of Council's vision. As with any major investment of this type there is a level of uncertainty as to the impact of the development on future use patterns within the city. If the development does not succeed in drawing people to the city centre it will have an impact on Council strategy.</p>	<p>Council strategic activities and economic development activities delivered through Great South will align to support the success of the city centre projects</p> <p>Streetscape works will be designed to support connectivity to the city centre. Council will need to plan for the structural change this is anticipated to involve.</p> <p>Council has support for heritage buildings through the Regional Heritage Strategy and associated funds to support businesses managing high costs of older buildings.</p>
<p>Tourism Tourism numbers will slowly increase, returning to 2019 levels by 2031.</p>	Low	<p>The tourism sector is the hardest hit in the economy and is not expected to fully recover out to 2030.</p> <p>This may have an impact on the Airport and other infrastructure needs that may or may not be required in short term as tourist numbers reduce.</p>	<p>Council expects some impact, but tourism is not a major proportion of Invercargill's GDP so the effect is expected to be relatively minor.</p>
<p>International education The numbers of International students studying at the Southern Institute of Technology will slowly increase back to 2019 levels by 2031.</p>	Low	<p>Students are an important part of the economy, creating significant demand. The impact on retail, hospitality and housing could be significant.</p>	<p>Council is working with Great South on economic development.</p>

¹⁵ <https://www.infometrics.co.nz/industry-concentrations-and-the-fall-of-think-big/> and <https://www.infometrics.co.nz/examining-the-nz-industries-hit-hardest-by-the-covid-19-pandemic/>

Social and cultural			
Assumption	Level of certainty	Impact of uncertainty	Council response
<p>Māori culture Māori culture will become more visible in the city.</p>	Medium	Increased awareness of the need to recognise Maori culture and tikanga (methodology), with a particular focus on partnership, participation and protection.	Council will invest more in Maori engagement to ensure strategic projects reflect Maori culture in the city.
<p>Socio-economic The impact of COVID-19 is yet to be realised, and there may be changes in Invercargill's socio-economic patterns over time.</p> <p>Māori have been disproportionately affected by the economic crisis brought about by the COVID-19 containment measures, and it is expected to continue to play out over the ten year recovery period.¹⁶</p>	Medium	<p>With GDP softening the long range economic outlook will hinge largely on the ability for the current and successive governments to provide economic stimulus.</p> <p>This may have an impact on Council activities that rely on users discretionary spend for revenue</p>	Council acknowledges the potential community expectation that Council will be positioned to distribute grants to fund community wellbeing related activities.

¹⁶ BERL (July 2020). Economic Scenarios to 2030. The post-COVID-19 scene.

Resilience

Assumption	Level of certainty	Impact of uncertainty	Council response
<p>Community wellbeing The COVID-19 response measures will have long term impacts on the wellbeing of communities, requiring a long term perspective response.</p>	<p align="center">Medium</p>	<p>The situation is evolving and will continue to be monitored.</p>	<p>Council has tasked Great South, the regional development agency, to focus on resilience and economic diversification. A Community Wellbeing Fund has been established.</p>
<p>Community resilience The amalgamation of Southern Institute of Technology with Te Pūkenga, and the potential loss of zero fees advantage, will have an uncertain long-term effect on Invercargill's population and economy.</p>	<p align="center">Medium</p>	<p>The effects of COVID-19 on immigration will impact student numbers in the short to medium term.</p> <p>The risk of losing the zero fees advantage could have an impact on our growth strategy.</p>	<p>Council funds Great South to promote the region and continues to monitor and plan for the impact.</p>
<p>Community resilience Tiwai Point Aluminium Smelter will continue to operate until 31 December 2024.</p>	<p align="center">Medium</p>	<p>A transition plan will be developed to prepare for the eventual closure. It is not yet clear where and how the impact will be felt in the community.</p>	<p>Council is working with the Just Transition team and Great South on economic diversification.</p>
<p>Natural disaster No natural disaster is expected to impact the City during the life of the plan.</p>	<p align="center">Medium</p>	<p>The impacts of a disaster will be assessed at the time and an appropriate response prepared.</p> <p>Infrastructure renewals are undertaken using resilient design practices.</p>	<p>Council has a focus on resilience. Council continues to support and invest in Emergency Management Southland.</p>

Environment – Climate Change

Climate change impacts will vary across regions in Southland. The following is a summary of impacts taken from the *Southland climate change impact assessment, August 2018* report.

Assumption	Level of certainty	Impact of uncertainty	Management response
<p>Mean annual and extreme temperatures (days where temp. exceeds 25°C) are expected to increase with time: By 2040: mean annual temperature increase of 0.5-1°C with 0-10 more hot days per annum. By 2090: mean annual temperature increase of 0.7-3°C, with 5-55 more hot days per annum.</p>	High	<p>Water - Longer period of drought may result in increased demand, whilst flood events create turbidity and increase the cost to treat for consumption.</p> <p>Flood Banks – increased temperature results in more extreme weather events, with a corresponding increase in height and frequency of storm surges.</p>	A planned pathway for the review of these assumptions and the impacts will minimise large impacts upon activities.
<p>Annual rainfall is expected to increase: By 2040: +0-10% By 2090: +5-20% Increased frequency of high rainfall days, i.e. increase in intensity of rainfall.</p>	High	<p>Roading - increased frequency and intensity of rainfall may require extra drainage works in the road network that may alter long-term maintenance costs</p> <p>Stormwater – increased frequency and intensity of rainfall events resulting in increased demand on the network.</p> <p>Wastewater - Increased frequency and intensity of rainfall events results in infiltration and inflows that increase volumes to be treated.</p>	A planned pathway for the review of these assumptions and the impacts will minimise large impacts upon activities.
<p>Mean sea level is expected to rise. By 2040: 0.2-0.3 m By 2090: 0.4-0.9 m</p>	High	<p>Errors in modelling will have significant impact on capital works programme required</p> <p>Stormwater – increased tailwater levels require consideration for outfall design.</p> <p>Flood Banks – Renewals need to consider increased sea level during design life.</p> <p>Sewerage – Clifton outfall may need to be pumped long term.</p>	A planned pathway for the review of these assumptions and the impacts will minimise large impacts upon activities.

Council operations

Assumption	Level of certainty	Impact of uncertainty	Council response
<p>Council services and structure Council is planning for the current structure to deliver the current set of services, with the exception of water and sewerage.</p>	<p align="center">Medium</p>	<p>If amalgamation does occur, costs to the ratepayer will remain the same, although revenue and financing will be done by a different operator.</p>	<p>Council will proactively engage with neighbouring authorities and central government to ensure that the best result is achieved from any amalgamation.</p>
<p>Water Reform As a result of the Central Government directed Waters Reform, it is assumed there will be a change in water reticulation and sewerage delivery services within the life of the plan. This will result in a structural change for Council in relation to the ownership of assets and associated debt capacity. The services will continue to be delivered, but these will be provided by another party. This will include increased regulatory requirements as required by the new regulatory authority.</p>	<p align="center">High</p>	<p>The services will continue to be delivered but these will be provided by another party. This will be managed in line with Government best practice, and will remain within the Council financial and 10-year assumptions.</p>	<p>Council will assess proposed reform options when Central Government has provided their final recommendations to Local Government entities. Council will proactively engage with neighbouring authorities and central government to ensure that the best result is achieved from any reforms. Council is incorporating management of this potential outcome through planning for management of debt.</p>
<p>Legislative changes There will be changes to legislation that have an impact on how Council will provide services. These changes may affect the Council organizational structure but not change the level of service received by the customer/ratepayer.</p>	<p align="center">High</p>	<p>Changes may affect the Council organizational structure but not change the level of service received by the customer/ratepayer.</p>	<p>Management will continue to engage with Government and plan for changes in services in response to policy and regulation changes as these arise.</p>

<p>Consents Council will continue to carry out legislation-directed ordinary functions while factoring in an increase to required quality for consent conditions.</p>	<p>Medium</p>	<p>If unexpected consent conditions are imposed there may be unexpected costs to compliance.</p>	<p>Council will work with the Regional Council early to minimise the risk of unexpected consent conditions.</p> <p>The cost of obtaining consents, knowing environmental standards are increasing, will be built into activities.</p>
<p>The Funding Assistance Rate (as advised from Waka Kotahi NZTA) will reduce by 1% each year until reaching 51% funding assistance in the 2023/2024 and then remain at 51% for the life of the plan.</p>	<p>High</p>	<p>Increase in demand on rate funding for roading activities, including the forecast NZTA portion of the city centre streetscape project.</p>	<p>Continue to engage with NZTA on funding assistance.</p>
<p>Asset life Assets will remain useful until the end of their average useful life, assuming asset average life expectancy assumptions are correct.¹⁷</p> <p>Infrastructure installed in the 1920s are nearing the end of their lives and require renewal within the term of the Infrastructure Strategy.</p>	<p>High</p>	<p>Assets may need renewal earlier if this assumption is incorrect and change the renewal profile. Or may allow delayed renewal in other cases.</p>	<p>Review the appropriateness of assets at the time of renewal including, where appropriate, whole of life cycle assessment.</p> <p>Increase knowledge of asset conditions to better predict the average use of life if assumptions are lower than expected.</p>
<p>Investment property and Forestry Investment Property and Forestry Assets are valued on a yearly basis. They are expected to increase in line with inflation. This is reflected in our Financial Strategy, and Accounting policies.</p>	<p>High</p>	<p>Variation in valuations have no cash flow implications for Council</p>	<p>Continue to value Investment Property and Forestry assets on an annual basis.</p>
<p>Capital programme delivery Implementation of a Project Management Office will increase effectiveness of delivery of the capital programme over the Long-term Plan. 75% of the capital programme will be delivered In Year 1, 80% in Year 2, 85% in Year 3.</p>	<p>High</p>	<p>It may take longer to implement the Project Management Office than expected, including as a result of challenges in attracting qualified personnel. Availability of contractors may have a greater impact than expected. Delay in the programme will result in higher costs as a result of inflation.</p>	<p>Active management of project processes, including engaging consultants as required, active and early engagement with contractors. Management of the programme rather than individual projects will enable contractor availability as well as funding levels to be actively managed. The financial risk of higher levels of delivery than expected across multiple areas will be monitored. Any impact of delayed capital expenditure on renewals on maintenance budgets will be actively managed.</p>

¹⁷ Council will use national standards is asset revaluation.

Financial forecasting

Assumption	Level of certainty	Impact of uncertainty	Council response
Inflation Operational forecasts and capital work programmes will increase by the accumulated Local Government Cost Index inflation forecast by BERL.	Medium	Cost change factors are based on information developed for Council's by Business and Economic Research Limited (BERL). Significant variations to inflation would have an impact on Council's financial management.	Council will continue on the planned pathway for the Capital Works programme and review operational revenue & expenses each year.
Asset revaluation Asset values will increase by the accumulated Local Government Cost Index inflation forecast by BERL on the last valuation value. Revaluation occurs in 2021/22 and every third year therefore.	Medium	Changes in the valuation or life of Council assets may have a significant impact on Council's financial management and capital programme.	Council will continue on the planned pathway for the Capital Works programme and monitor with after each revaluation cycle.
Interest rates - Borrowing Expected interest rates on borrowing will be 2.5%.	High	The treasury report from Bancorp projects the ICC Borrowing interest rate are currently at 2.20% in 2020, and is expected to fall and remain under 2% for the next 10 years. Significantly higher interest rates would impact Council's financial position.	2.5% would allow some upside if the situation changed (interest rates increase or credit rating decreases); but Council have potential to go to 2.25% or 2% to lower costs.
Interest rates – Cash and Deposits Return on cash and term deposits are forecasted to expect a negative rate at some stage within 2020/2021.	Medium	Term deposit rates currently vary from 0.5% for under 6 months to a flat 1% for longer. Most forecasts still expect a negative rate at some stage within 2020/2021.	An assumption of 0.5% should be comfortable and if rates do increase again in the future, this will put Council in a more positive position.
Dividends from ICHL will be \$4.8m + CPI.	Medium	This would have a negative impact on Council's overall revenue and cash position, which would increase the burden on ratepayers.	Council will consider strategic reliance on dividends noting increased levels of economic uncertainty.
External Funding It is assumed Council will achieve the level of external funding as estimated.	High	The immediate impact of Covid-19 has been seen in the local community, with reduced funding available from major community funders including the	Council acknowledges the challenge of obtaining external funding at this time. Should Council not be able to obtain

		Community Trust of Southland and Invercargill Licencing Trust and Foundation.	funding as indicated this would impact project scope and in some cases require further consultation.
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3. The Service We Provide

3.1 CUSTOMER PROFILE

3.1.1 Our Stakeholders and Community

Council recognises there are a wide range of customers and stakeholders with an interest in how the stormwater activity is managed. The resident community, specific interest groups within the community and regulators are just some of the groups that Council needs to engage with to ensure they are delivering the right service at an affordable cost. The identified stakeholders are:

Table 3.1 Our Stakeholders and Community

External Stakeholders	Area of Interest	Engagement
Invercargill community	Service provision to customer	Liaise
Invercargill ratepayers	Rates impact	Consult through AMP, Annual Plans and surveys
Environment Southland	Governance	Discharge Consents – negotiation / compliance
Contractors and consultants	Service provision to Council	Liaise
Southland District Health Board and Ministry of Health	Community Health	Liaise
Ministry for Environment, Department of Conservation, Iwi, Fish and Game Southland and Environmental Groups	Environmental impact Sustainability	Liaise
Audit New Zealand	Governance and Operation	Audit

Internal Stakeholders	Area of Interest	Engagement
Councillors and Group Managers	Governance and leadership	Report
Infrastructure Managers	Common service goals	Liaise
Engineering Services and Information Technology	Technical support	Liaise
Finance and Corporate Services	Financial assistance and Group Manager – Finance and Corporate Services	Liaise
Planning and Regulatory	Compliance	Liaise

3.1.2 How We Engage our Communities

Council is currently developing an Engagement Strategy that will shape how each area of Council, including elected members and staff, will engage with our community in the future. It is anticipated that the Engagement Strategy will assist in delivering positive outcomes to the community by identifying how the different groups within our community wish to be engaged on different topics.

Although developing an Engagement Strategy, Council already engages with the District's ratepayers on a number of levels:

- Public Forums at Council and Committee meetings.

- Public requests to be heard as a specific Agenda item.
- Regular features in the newspapers and rates newsletters which inform ratepayers of issues.
- The City Focus radio show that highlights current topics that the Council is addressing.
- The Mayor holds appointments with residents who wish to raise issues of concern.
- Community Engagement processes when Council is considering making a significant decision.
- Formal consultation through the Special Consultative Procedure for issues such as the Long Term Plan and some bylaws.
- Facebook page where individuals can ask questions and express opinion to Councillors and staff.

For significant stormwater projects, which may affect a section of the community, Council may hold public meetings and specific information may be mailed to households who may benefit or be affected by the project to provide an opportunity for feedback, and for residents to communicate their desired outcomes. Where services or access to specific properties may be disrupted for a period, property owners are advised so that alternative arrangements can be made. Where traffic flows are disrupted motorists are advised by sign boards and / or advertising, and detour routes are advised.

3.1.3 Community Research

In 2013 the Council carried out a Customer Service Level Survey (Appendix 1.06) to provide information on ratepayers and residents' assessment of Council's services and to understand:

- What residents want from Council activities;
- How they perceive the value for money of those activities; and
- The level of service desired.

In 2016 a second research project was undertaken, with further research undertaken in 2020. This project had a slightly different focus. The results from both the service level survey and research project, combined with expert knowledge of staff working in the stormwater activity, have helped establish a foundation of levels of service statements.

Customer requests for service are logged by customer service staff and attended to by the activity. This information is another platform which can be used to understand the community requirements.

3.1.4 Key Service Attributes Valued by Customers

Council's 2013 Service Level Survey told Council that the community assessed the three most important aspects of the stormwater activity as:

- Protection from stormwater ponding / flooding
- Drain safety
- Pollution level

The 2016 Levels of Service Survey showed that most residents (98%) consider drainage (stormwater and sewerage) to be essential services, and that rates funding should be maintained (76%) or increased (32%) to ensure the level of service is maintained or improved. The 2020 research highlighted a

misconception about a perceived control that Council have restricting the use of onsite rainwater collection. No such bylaw exists and this could be communicated through community education.

3.2 SERVICE DRIVERS

3.2.1 Community Expectations

The 2013 survey told Council that the most important aspect of the stormwater activity to the community was the prevention of stormwater ponding or flooding. The community (55% of respondents) considered the level of protection against ponding and flooding in urban areas was good or very good.

Customers of the stormwater activity expect that stormwater system blockages will be responded to in a timely manner and that drainage systems will be adequate so as to ensure that stormwater does not pond or flood after rainfall.

Stormwater ponding in roads often occurs because there is a build-up of leaves in the roadside kerb and channel which prevents the stormwater entering the drains. This is particularly evident in autumn in suburbs which have deciduous street trees. Roads are regularly swept to minimise this risk. Council operates a 24 hour call out service to respond to reports of stormwater ponding. The community told us that they wanted all stormwater ponding to be resolved within six hours of it being reported. Council endeavours to respond to all reports of stormwater ponding within an hour. Easily resolved problems are dealt with by the responding contractor.

Following major flooding in 1984 and 1987, Council initiated a programme of stormwater capacity improvement to the standard detailed in Appendix 16.01. All properties identified as having habitable areas flooded in 1984 are now connected to the upgraded network. The current stormwater renewal programme includes upgrading of the remainder of the network to the new standard over time.

The quality of natural receiving waters (streams / rivers, lakes and beaches) can be adversely affected by contaminants in discharges from stormwater drains. The sources of these contaminants range from natural mineral sources, plant and animals, and from human activities being vehicles, commercial, industrial, farming and construction activities. The contaminants from human activities include solvents, paints, cleaners, oil, floatables, pesticides, fertilisers and faecal matter. Analysis of sediments near some stormwater outfalls indicate levels of lead, mercury, and zinc which are elevated above ANZECC Interim Sediment Quality Guidelines (ISQM). The quality of stormwater in the first flush of a storm can typically exceed contaminant levels considered safe for contact recreation.

The Regional Water Plan for Southland includes legislative requirements and rules governing the quality and quantity of stormwater able to be discharged to surface water. The Southland Water and Land Plan is now operative and new consents will need to be gained under this regional plan.

The Local Government Act 2002 requires Council to consult with affected and interested parties in making decisions. To implement level of service changes, options analysis and the selection of the best practicable and preferred option has to be done by a coherent, integrated and transparent process.

Council ensures that all interested stakeholders have an opportunity to influence level of service decisions by:

- Asset Management Plans being available on the Council website and on request.
- Engagement with key stakeholders throughout the development of significant capital proposals.
- Public opportunity to make submissions on strategic targets through the Long Term Plan process.
- Consulting with affected persons on specific projects (as required by the Resource Management Act 2001).
- Community consultation utilising focus groups.

3.2.2 Legislative Requirements

The following documents are referred to as a guide to generally accepted industry practices:

- Resource Management Act – The guiding legislation for all activities which will have an impact on the natural and human environments.
- Regional Water Plan for Southland – Resource consents for stormwater discharges to surface water are granted by Environment Southland under the provisions of this Plan.
- Southland Water and Land Plan.

Key Legislation

- **Local Government Act 2002 Schedule 10** requires that the Long Term Plan contain information on the assessment and management of the implications of changes in demand or service levels. This means that Local Authorities should disclose:
 - Whether they intend to change the service levels for an asset over the life of the plan.
 - What they expect will happen either to demand for the service and / or consumption of the service.
 - Demonstrate how risks are to be managed.
- Local Government Act 2002, section 17A** – requires local authorities to review the cost – effectiveness of current arrangements for meeting the needs of the community for good quality local infrastructure and local public service.
- **Resource Management Act 1991 and 2001** requires Council to:
 - Sustain the potential of natural and physical resources to meet the reasonable foreseeable needs of future generations.
 - Comply with the District and Regional Plans.
 - Avoid, remedy or mitigate any adverse effect on the environment.
 - Take into account the principles of the Treaty of Waitangi in exercising functions and powers under the Act relating to the use, development, and protection of natural and physical resources.
 - Comply with resource consents issued for stormwater discharges.
- **Health Act 1956** Under the Health Act 1956, the Council must promote and conserve the public health within the City. The stormwater activity ensures that adequate levels of stormwater drainage is provided so that flooding is avoided and public health is not compromised by inflows of stormwater into the sewerage network.

- **Health and Safety at Work Act 2015** requires Council to provide safe and healthy work places, identify and document work place hazards, and take steps to eliminate, isolate, and minimise hazards. Engineering works are also to be designed with health and safety in mind throughout its lifecycle, i.e. construction, operation and deconstruction. Consultants providing these designs are to document their health and safety in design processes to demonstrate and communicate the known and expected hazards and risks.

3.2.3 Discharge Consent Requirements

Council hold a discharge consent to freshwater which requires Council to identify sources of contaminants in the stormwater network. Council are to develop a plan to remove the source of the contaminants or provide treatment to limit the discharge of contaminants into the receiving environments. In early 2020, Council's consultant delivered a contaminant model of the Invercargill reticulation network which allows Council to prioritise renewal and treatment projects to target significant sources of contamination.

Council will be required to obtain a discharge consent to the Coastal Marine Area (CMA) and work has begun to obtain sufficient baseline data to support the application. The consenting process is expected to be started in 2021.

3.2.4 Industry Standards and Guidelines

The following documents are included as generally accepted industry practices:

- Southland Water and Land Plan – This plan has been produced by Environment Southland to meet their obligations under the Resource Management Act to manage all activities which will have an impact on the natural and human environments. Resource consents to discharge stormwater are granted by Environment Southland under the provisions of this plan and the Resource Management Act.
- New Zealand Infrastructure Management Manual – The accepted industry practices on which this Plan is developed.
- New Zealand Building Code.
- Invercargill City Council's *Code of Practice for Land Development and Subdivision Infrastructure*¹⁸ associated technical specifications, standards and guidelines, ensure that stormwater infrastructure is developed in a manner which protects both the public and the environment, and which can be cost effectively maintained with the appropriate design life of the various components of the system. The *Code of Practice for Land Development and Subdivision Infrastructure*¹⁹ refers to a range of New Zealand Standards for construction techniques and materials.

Key industry practice considerations included within these documents are:

- Pipe materials and design lives
- Installation details

¹⁸ <https://icc.govt.nz/wp-content/uploads/2014/11/Code-of-Practice-Land-Development-and-Subdivision-2016.pdf>

¹⁹ <https://icc.govt.nz/wp-content/uploads/2014/11/Code-of-Practice-Land-Development-and-Subdivision-2016.pdf>

- Testing and monitoring
- Procurement of services or goods

3.2.5 Potential Significant Negative Effects

The removal of stormwater from residential, industrial and commercial properties, and the provision of floodbanks, reduces the risk of property damage by flooding, and so protects public health, supports city growth, and contributes to the general wellbeing of the community. In urban areas stormwater disposal is most effectively achieved by means of reticulated (piped) stormwater systems. The activity does however carry a risk of potential adverse effects due to inadequate operational, maintenance, and renewal strategies, as a result of inappropriate material being discharged to the network, or as a result of extreme natural events including flooding and earthquakes.

The potential negative effects of the stormwater activity are:

➤ ***Environmental***

- Stormwater carries pollutants from the built environment which can cause environmental degradation.
- Stormwater systems transfer stormwater quickly to receiving waters resulting in significantly higher flows than would occur naturally during rainstorms, and low flows during dry weather. The variance in flows has detrimental effects on stream ecology, and extreme flows increases the risk of flooding.

➤ ***Sustainability***

Currently the Invercargill City Council has no sustainability strategy.

➤ ***Social***

- Health and safety risks associated with operation of the activity.
- Property damage resulting from system failures or rainstorms exceeding system capacity.

➤ ***Economic***

The cost to the Community as a result of property damage caused by system failures, or extreme rainstorms.

➤ ***Mitigation Methods***

The negative effects of poor stormwater quality and high stormwater flows during extreme rainstorms are considered significant, and are mitigated by the following measures:

- The Invercargill City Council has implemented high capacity stormwater design standards since 1985, which will progressively increase stormwater capacity throughout the network, and Environment Southland has implemented flood protection projects on major waterways through the City.
- Environment Southland's Southland Water and Land Plan regulates the quality of stormwater discharged to waterways. The Invercargill City Council holds a consent to discharge stormwater, and will need

to manage the activity to ensure discharge quality standards are maintained.

- The Invercargill City Council will develop a sustainability strategy.

3.3 CURRENT LEVELS OF SERVICE

3.3.1 Current Customer Levels of Service, Performance Measures and Targets

Measures of the overall activity, covering the aspects of service of most interest to the community. These measures are the focus for community consultation in the Long Term Plan and are reported on in the Annual Report.

The current activity measures and the target levels of performance are shown in Table 3.2.

The target levels of service are intended to apply for the initial 8-10 years of the Asset Management Plan. Changes to target levels of service may be initiated by:

- Customer expectation
- Legislative or resource consent change
- Changes to contract key performance indicators
- Analysis of performance indicating target levels are unrealistically high or low

The target levels of service are reflected in the Key Performance Indicators of Operation and Maintenance Contracts and Construction Contracts, and in conditions of consent held with Environment Southland.

3.3.2 Current Technical Levels of Service, Performance Measures and Targets

The technical measures are used by the asset managers in the day to day management of the assets and are reported on in this Asset Management Plan. These measures are aligned with, and support the achievement of, the activity measures.

3.3.3 National Non-financial Performance Measures

From 30 July 2014, in accordance with the Local Government Act 2002, Section 261B, mandatory performance measures have been applied to stormwater. These are shown in Table 3.2 with linkages to the technical levels of service in Table 3.5.

3.4 LEVELS OF SERVICE ISSUES AND CHALLENGES

3.4.1 Current Levels of Service Gaps

➤ ***Environmental Standards***

In 2011, the ICC was granted five exploratory discharge consents to five freshwater receiving environments inside the Invercargill city boundaries. These discharge consents were to be used to gather data and to establish an understanding of the stormwater discharge quality in the City and the effects it is having on the receiving environment. In September 2017, the ICC was granted a 15 year stormwater discharge consent that encompassed all five of the receiving waters. This consent comes with a large amount of very specific conditions that require the ICC to provide an improvement to the quality of the City's stormwater discharge. Gaps in the

current level of service for the ICC include the Council not currently holding a stormwater discharge consent for the Coastal Marine Area (CMA) of Invercargill or Bluff Harbour. A data collection programme is currently being undertaken by the ICC at stormwater outfalls along Invercargill's CMA and Bluff Harbour in preparation for a consent submission. With the Regional Council's now operational Water and Land Plan and the recently released 2020 National Policy Statement for the Freshwater, the ICC is under no illusions that a new consent will be required to meet specific limit setting requirements rather than being a water quality improvement consent. To meet the limits set under the new legislation may come at a significant cost to Council. Currently the ICC does not provide significant treatment to stormwater before discharging to Invercargill's receiving waters. During renewals of the stormwater network, ICC engineers have been asked to allow for the possibility of future treatment devices to be added where applicable. An annual budget has been created to allow for stormwater treatment throughout the City with areas of high risk for contamination being selected first. The ICC will continue to work on a 'worst first' basis when it comes to stormwater treatment around the City.

➤ **Reliability**

While service level targets for reliability are currently satisfactory, assets are aging, with 15% of the network reaching its assigned service life in the 2020s. Asset condition will deteriorate with age.

➤ **System Adequacy**

Expected sea level rise as a result of climate change will compromise performance of the pipe network, resulting in increased risk of flooding.

3.4.2 Possible Responses to Gaps

➤ **Environmental Standards**

- Identify contamination sources and require on-site correction of drainage defects.
- Education of public on behaviour change to reduce contamination.
- Target repair / renewal of drainage systems to reduce cross contamination.

➤ **Reliability**

- Asset Renewal Programme to maintain performance levels.

➤ **System Adequacy**

- Review drainage design criteria to accommodate higher receiving water levels.
- Partner with Environment Southland to review Flood Protection infrastructure.
- Consider retreat from areas most susceptible to flooding.

Table 3.2 Current and Future Activity Key Performance Measures

The Stormwater Activity **preserves the character** of our city through the reliable conveyance of stormwater where there is a Council Managed network, and through reducing the risk of adverse effects from flooding events that occur in the Invercargill district.

The Stormwater Activity ensures the quality of receiving water (e.g. estuary, rivers and streams) is not adversely affected by stormwater contamination discharges, and monitors interruption to the stormwater system to ensure a timely response to faults.

The following tables show the performance measures Council use in the stormwater activity. These align, and are taken verbatim, from the Department of Internal Affairs (DIA) mandatory non-financial performance measures. The wording and order of the performance measures from previous AMPs differs slightly from the DIA measures, therefore some of the previous measures have been incorporated into the proposed measures, as outlined in Tables 3.2.

The Council is required to monitor and record its performance against these measures, but national targets have not been set. The measures align with technical levels of service set by Council for the stormwater activity as indicated.

MEASURE	CUSTOMER LEVEL OF SERVICE
DIA Performance measure 1 (system adequacy) (a) The number of flooding events that occur in the Invercargill City district	Properties are protected from flooding damage
DIA Performance measure 1 (system adequacy) (b) For each flooding event, the number of habitable floors affects (expressed per 1000 properties connected to the Council's stormwater system)	
DIA Performance measure 2 (discharge compliance) Compliance with the Council's resource consents for discharge from its stormwater system, measured by the number of: - Abatement notices - Infringement notices - Enforcement orders - Convictions	Receiving waters are not adversely affected by contaminated discharge
DIA Performance measure 3 (response times)	Performance of the stormwater system is

<p>The median response time to attend a flooding event, measure from the time that the Council receives notification to the time that service personnel reach the site</p>	<p>maintained to prevent flooding of urban areas.</p>
<p>DIA Performance Measure 4 (customer satisfaction) The number of complaints received about the performance of the stormwater system (expressed per 1000 properties connected to the Council's stormwater system)</p>	

Measure	2016/2017	2017/18	2018/19	2019/20	2021/22 Target	2022/23 Target	2023/24 Target	2024-31 Target
DIA Performance measure 1 (system adequacy) (a) The number of flooding events that occur in the Invercargill City district	0	0	0	1	0	0	0	0
DIA Performance measure 1 (system adequacy) (b) For each flooding event, the number of habitable floors affected (expressed per 1,000 properties connected to the Council's stormwater system)	0	0	0	0.045	0	0	0	0
DIA Performance measure 2 (discharge compliance) Compliance with the Council's resource consents for discharge from its sewerage system, measured by the number of: <ul style="list-style-type: none"> ▪ Abatement notices ▪ Infringement notices ▪ Enforcement orders ▪ Convictions 	0	0	0	2*	0	0	0	0
DIA Performance measure 3 (response times) The median response time to attend a flooding event, measured from the time that Council receives notification to the time that service personnel reach the site	6 minutes	28 minutes	13 minutes	23 minutes	<1 hour	<1 hour	<1 hour	<1 hour
DIA Performance Measure 4 (customer satisfaction) The number of complaints received about the performance of the stormwater system (expressed per 1,000 properties connected to the Council's stormwater system)	0.82	1.03	0.63	1.00	<4	<4	<4	<4

* One conviction and one enforcement order received for a single event

4. Demand for Our Services

4.1 DEMAND FORECAST

4.1.1 Factors Influencing Demand

This Asset Plan reflects Council's assumptions for the Long Term Plan as set out in the background paper: Long Term Plan – Background and Assumption 2021-31.

Primary factors affecting the stormwater activity are:

- Legislation and resource consents
- Asset revaluation, and useful life of significant assets
- Climate change

Other factors that affect the stormwater activity are:

- Population and household growth, and aging population
- Inflation
- Growth in local economy
- Natural disaster

4.1.2 Projected Growth or Decline in Demand for the Service

➤ ***Population and Household Growth, and Aging Population***

Population in Invercargill is expected to increase slightly to peak at 56,300 in 2028, before decreasing to 55,500 in 2043, based on Statistic New Zealand medium population projections. The low projection shows a decrease over this time period, and the high projection indicating an increase. Refer to the Long Term Plan assumptions register for further details of this.

Table 4.1 Population Projection

Population at 30 June							Population change 2013-43	
2013	2018	2023	2028	2033	2038	2043	Number	Average annual (percent)
53,200	55,300	55,900	56,300	56,300	56,000	55,500	2,300	0.1

A demographic shift towards an older population is predicted. This is expected to result in an increase in the number of households, as more people live alone. The Invercargill City District Plan 2013 provides for limited extension of the urban zone to provide for residential development, and it is expected a further increase in households will result from infill development, as large existing urban properties are subdivided to provide additional residential sites. There will remain a demand for rural residential options. Where the stormwater needs to be extended to service these areas, it is anticipated that new drainage will be developed in accordance with Low Impact Design principles, as set out in the Code of Land Development.

➤ ***Growth in Local Economy***

The local economy is expected to grow and diversify and this is likely to result in additional industries with a need to establish within currently

unserved areas. It is anticipated these sites will be developed in accordance with Low Impact Design principles, either directly to waterways, or to Council managed networks. New infrastructure required to service these developments would be at the cost of the developers.

➤ ***Asset Valuation and Useful Life of Significant Asset***

As an asset based activity, it is critical to meeting the desired levels of service that asset life is carefully monitored, and that assets are renewed before failure. A significant number of assets are now at, or near, the end of their assigned service life and renewal programmes are part of this Asset Management Plan.

The renewal of assets is planned at the rate of asset consumption. This inherently leads to periods of increased renewal costs. The planned renewals are smoothed over a period of 5-7 years to minimise the impacts of changing renewal budgets on the ability of the local market to deliver these renewals. The renewal budgets are set from the asset valuations and therefore changes in asset valuations due to increased costs feedback to these renewal budgets. Any inconsistencies in asset valuations are corrected during the next revaluation cycle (every three years).

4.2 CHANGES IN SERVICE EXPECTATIONS (FUTURE LEVELS OF SERVICE)

➤ ***Legislation and Resource Consents***

New legislation and resource consent conditions can affect the Council's ability to meet minimum levels of service, and may require improvements to infrastructural assets. New limit setting standards will need to be adhered to as required by the 2020 National Policy Statement for Freshwater and the now operative 2018 Southland Water and Land Plan. Both documents provide tools and a more robust framework for the regulatory authorities to work within. In September 2017, the ICC was granted a stormwater discharge consent that allowed for the discharge of stormwater to the freshwater receiving environments of Invercargill.

Currently the ICC does not hold a stormwater discharge consent for the Coastal Marine Area (CMA) of the New River Estuary and Bluff Harbour. A stormwater quality data collection programme is being undertaken at the stormwater outfalls of the CMA area; these programmes are being used to gather information about the discharge water quality in preparation for a discharge consent application for the CMA and Bluff Harbour. A dedicated stormwater treatment budget has been included to provide incremental improvements to discharge quality over time.

➤ ***Climate Change***

Standards for stormwater design capacity are specified in the ICC's *Code of Practice for Land Development and Subdivision Infrastructure 2016* bylaw (2016/1)²⁰.

It is now widely accepted that sea levels will rise into the future as a consequence of global warming and that rainfall patterns will change, potentially with a trend towards more intense rainfall. The design rainfall

²⁰ <https://icc.govt.nz/wp-content/uploads/2014/11/Code-of-Practice-Land-Development-and-Subdivision-2016.pdf>

event noted in the bylaw will be amended to reflect RCP4.5 and used for the design of stormwater network renewals. Where a stormwater outfall discharges into a tidal area and is being renewed the effect of sea level rise, in accordance with RCP4.5, will be taken into account. RCP4.5 is the mid-range expected climate scenario and is in line with the report produced by NIWA for Invercargill City Council, Southland District Council, Gore District Council and Environment Southland titled *Southland Climate Change Impact Assessment – August 2018*.

The Stead Street and Cobbe Road stopbanks will also need to take into account the effects of sea level rise in the design of renewals; likewise, Environment Southland's stopbank network will need to take into account the same effects.

➤ **Technology Changes**

Technological advances applicable to the life cycle management of stormwater assets are being made in the following areas:

- *Trenchless Technology* – repair and rehabilitation techniques which do not require the excavation of pipelines offer savings in both direct and indirect costs where applicable. However, these methods are usually not employed for our stormwater renewals, as a large change in pipe size is usually required which cannot be easily accommodated with trenchless technology.
- *Treatment Systems* – new systems are continually being developed to better assure the quality of stormwater discharges.
- *Asset Management Systems* – software development is providing for more effective storage, analysis and reporting of asset information.

The Council will monitor and investigate advances in technology, and will be expected to implement technologies which improve service levels and cost effectiveness.

4.3 EXPECTED IMPLICATIONS FOR THE ACTIVITY

Renewals for stormwater mains will be designed to accommodate the expected climate change impacts.

The requirement for higher quality stormwater discharges will lead to a focus on sources of contamination and a resolve to reduce these effects both within the existing network and any new reticulation which may be added. At source and end of line treatment will be investigated as part of outlet renewals and in areas where high levels of contamination has been identified.

4.4 FUTURE DEMAND ISSUES AND CHALLENGES

➤ **Legislation and Resource Consents**

Environment Southland's "Southland Water and Land Plan" is expected to have significant implications for the stormwater activity, relating to the quality of stormwater discharges, and cross contamination between the sewerage and stormwater networks.

The ICC's stormwater discharge consent contains conditions requiring significant additional monitoring of discharges and receiving water quality as well as audits of industrial and commercial properties which are used to

identify and address potential and actual sources of stormwater contamination. The stormwater renewal / upgrading programme will address sources of contamination within the stormwater network and where contamination sources are located within properties, Council will require property owners to correct the problem.

This is expected to add significant cost to the stormwater activity, and directly to property owners required to do corrective work.

➤ ***Climate Change***

Sea level rise may result in areas of Invercargill being uneconomic to protect from flooding and sea levels. The Council will need to consider whether these parts of the City can be adequately and economically protected, or whether it is no longer viable and therefore a strategic retreat may be required. There are currently no areas of the City where this issue exists, but this should be reviewed by 2050 to ensure the assumed change in sea level is still relevant.

➤ ***Population Growth***

Population is expected to grow by a small amount over the next 10 years. This is expected to result in some demand for expansion of the urban area, and for intensification of development in some areas, as larger urban sites are subdivided to provide additional housing units. Council expect the developers to provide the necessary infrastructure for this development and have not planned to fund the extension of networks to service new areas for development.

Infill development as a result of population growth will put pressure on existing networks due to the increase in impermeable areas.

4.4.1 Possible Demand-related Responses

➤ ***Legislation and Resource Consents***

- Renewal programme to reduce cross contamination of drainage networks.
- Maintenance and Operations programmes to identify emerging issues with pump stations and pipe network.
- Increase in the water quality monitoring and sample site collection programmes.
- Promote “Low Impact” Stormwater Design Features.
- Provide source and end of line stormwater treatment.
- Prevent unsuitable roof types to be used in new development, i.e. copper and zinc (galvanised) roofing.
- Develop a stormwater bylaw to allow limit to be set on the type of stormwater discharges into Council’s network.

➤ ***Climate Change***

- Collaborate with Environment Southland to improve flood protection infrastructure to a consistent level of service.
- Review drainage design criteria to accommodate higher receiving water levels and greater intensity rainfall events.

➤ ***Population Growth***

- Ensure greenfield development provide the necessary stormwater infrastructure, including stormwater treatment.
- Design stormwater renewals to accommodate infill development where serviced by an existing stormwater network.
- Ensure impermeable areas in infill development are limited to no more than 70%, i.e. minimum 30% permeable area.
- Where an existing network is identified to be constrained and infill development is planned require onsite attenuation.

4.4.2 Possible Non-Asset Solutions

➤ **Legislation and Resource Consents**

- Behaviour Change Programme to discharge deliberate contamination of stormwater.
- Industrial Property Audits to identify and correct practices causing stormwater contamination.

➤ **Climate Change**

- Consider retreat from areas susceptible to flooding as a result of sea level rise.

4.4.3 Managing Expectations

Customers of the stormwater activity expect:

- Adequate stormwater drainage to protect property damage from flooding.
- Prompt response to request for service relating to maintenance issues.
- Protection of the receiving waters from contamination.

There is no intention to try to change these expectations.

5. Asset Profile

5.1 ASSET OVERVIEW

The City has a stormwater network consisting of 416 km of pipe, most of which is earthenware or reinforced concrete, and estimated to have a design life of 100 years. In addition, there are approximately 47 km of open drains, mostly situated in the rural residential area of Otatara.

Stormwater sumps on roads are managed and funded as part of the roading activity and are not included as stormwater assets.

In 1985, following widespread flooding in 1984, a new design standard was adopted and a major upgrading of the stormwater system began. The adopted design standard was for a five year return period storm (20% Annual Exceedance Probability (AEP)), with the focus of upgrading being on areas flooded in 1984, and the major stormwater outlets to natural waterways. Although the stormwater upgrade programme ended in 2005, pipes serving a large part of the City are still sized at old design standards, and these are being upgraded progressively as part of the asset renewal programme. As the piped stormwater catchments in the City are short, with the largest catchment having a maximum flow time (time of concentration) of less than forty minutes, the system has been designed for short duration high intensity storms.

If an event larger than the five year return period occurs, the primary piped system may surcharge, however flooding inside homes is not expected. Much larger events, such as a 50 or 100 year return period, may result in overland flow. Overland flow paths within Invercargill are usually within road corridors, however, there are some flow paths within private property. Stormwater modelling of both the primary pipe network and the overland flow path network is required to understand the risks to property and the steps to be able to manage these.

The large events, such as a 50 or 100 year return period, also have the potential to result in regional flooding and there is a risk posed to some areas of Invercargill by the Waihopai River, Otepuni Stream and the Kingswell Stream. These waterways have a flood protection system (stop banks) managed by Environment Southland.

Only limited assessment and inspection of the stormwater system using tools such as CCTV has been done to date and detailed knowledge of the condition of the stormwater system is limited. Spot inspections, especially during maintenance work, and inspection of specific pipelines to assess whether the pipeline should be repaired or replaced ahead of major roading upgrades indicate that the stormwater network is in moderate condition. The low number of system blockages and collapses tends to confirm this assessment.

The Cobbe Road (Rifle Range) and Stead Street tidal floodbanks are managed by Invercargill City Council as part of the stormwater activity. These protect the low lying areas of Lake Hawkins (including the Invercargill airport) and Otatara from tidal flooding. They have been overtopped on occasions when extreme storms have coincided with high spring tides, resulting in much higher tidal levels than normal. There is an ongoing project to raise the level of these stopbanks and this work is being done in conjunction with Environment Southland.

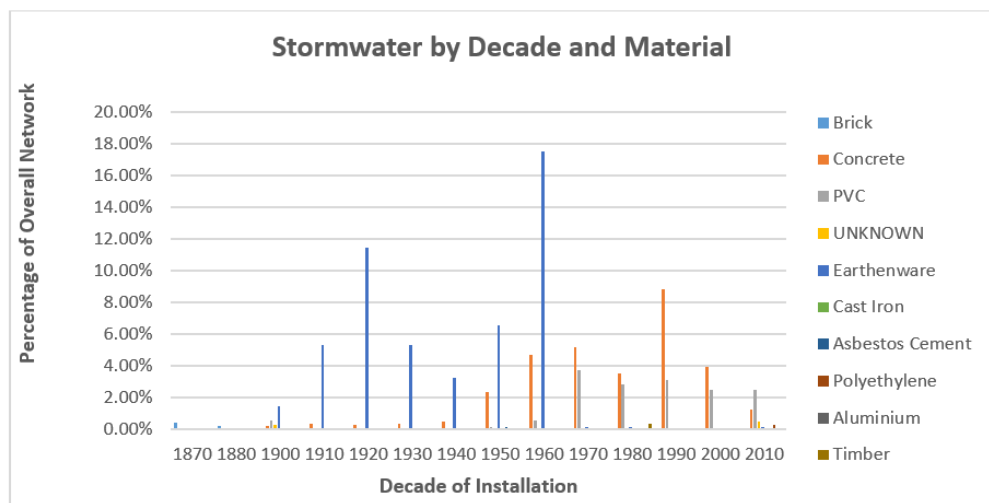
5.2 ASSET DESCRIPTION

➤ Stormwater Pipe Network

The stormwater pipe network consists of 416 km of pipes in the Invercargill urban area, Otatara and Bluff, ranging in size from 100 mm diameter to 2,100 mm diameter.

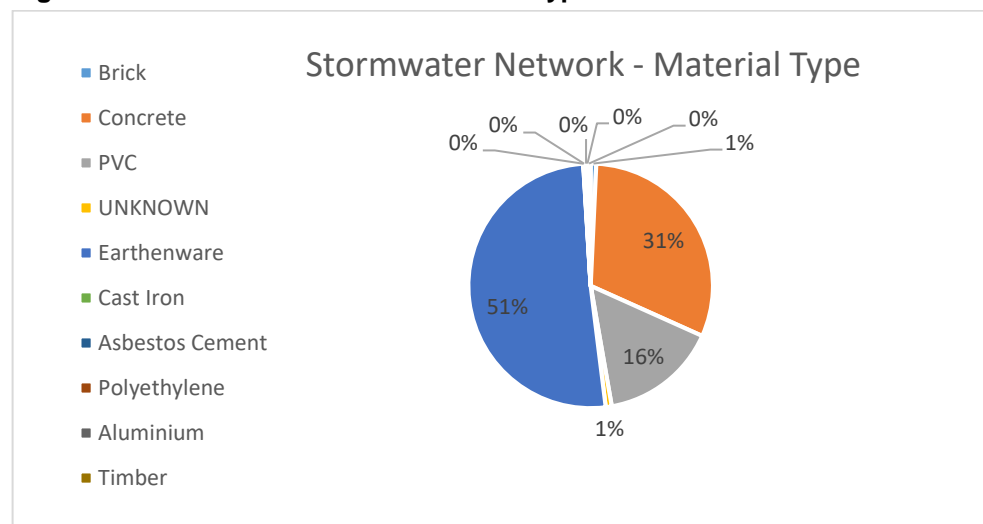
Maps of the areas served are included in Appendix 16.02, and age, size and material profiles detailed in Appendix 16.03 are summarised in Figure 5.1 below.

Figure 5.1 Stormwater by Decade and Material



- Pipe ranges in size from 100 mm diameter to 2,100 mm diameter.
- 51% of pipe is earthenware, ranging in age from 50 to 120 years old and in sizes up to 450 mm.
- 31.8% of pipe is reinforced concrete, predominantly in larger sizes and
- 15% of pipe are plastic (PVC, HDE, MPV or PE), predominantly in smaller sizes and laid since 1955.
- The full range of pipe material types and their proportion of total length are indicated in Figure 5.2 below.

Figure 5.2 Stormwater Network - Material type laid since 1950



➤ **Pump Stations**

The stormwater network includes eight pump stations located along the Waihopai Arm of the New River Estuary and the Waihopai River, and includes one pump station on the west side of the Waihopai Arm at the Rifle Range.

The pump station locations are shown on the Stormwater System Maps in Appendix 16.02, and asset details within Appendix 16.04. The pump stations are located in low lying areas which are protected by stopbanks ensuring that the stormwater service can continue to be provided in these areas when river levels are high due to flood flows or high tide.

➤ **Open Ditches**

In addition to the piped reticulated stormwater network, approximately 47 km of open drains are administered within this Asset Management Plan. The majority of these open drains are within the Otatara residential area. They provide drainage to both residential and rural areas, and to areas of native bush within the residential area. The ditch locations are shown on plans in Appendix 16.02. Information recorded in regard to depth, gradients and existing culvert size is poor, but as the open drains require a high level of maintenance, staff knowledge of the network and potential problem areas is good.

➤ **Tidal Floodbanks**

The Stead Street and Cobbe Road (Rifle Range) floodbanks were built about 1910, and have a total length of approximately 3.2 km. Construction material was estuarine silts sourced from the area adjacent to the banks. The Stead Street floodbank which is more susceptible to storm driven wave action has been armoured on the seaward with rock riprap. The Cobbe Road (Rifle Range) floodbank was built with a concrete lining to protect from storm damage, but this has now deteriorated, and protection from storm damage is provided by additional sacrificial floodbank width which was constructed in the 1980's when it was raised. The Stead Street bank has a paved cycle track along its crest. The cycle way is maintained as part of the roading activity. The Cobbe Road (Rifle Range) stopbank has a gravel road along its crest which is the responsibility of the stormwater activity. The floodbank locations are shown in Figure 4.2.

5.3 CRITICAL ASSETS

Criticality of three water assets have been reviewed by Council in a study led by ProjectMax. The results of the review are contained in the report "Invercargill City Council: Defining Asset Criticality for Water Services, June 2017". Refer to Appendix 16.08 - Invercargill City Council Defining Asset Criticality for Water Services.

Criticality reflects the consequences of failure irrespective of whether the asset is new or nearing the end of its useful working life. Typically, as an asset ages it moves from a low likelihood of failure to a higher likelihood.

Some risk factors such as earthquake or flooding are independent of asset age or condition.

The asset's criticality, as measured by the consequence of failure, does not usually change with time.

5.3.1 Asset Criticality Criteria

The following considerations were identified as covering all reasonably conceivable consequences of failure:

Table 5.1 Asset Criticality Criteria

Rank	Consideration	Description
1 =	Health (sickness)	Causing sickness for individuals or groups within the community. Typically, this might be gastro-intestinal arising from contamination of drinking water or contact with polluted water.
1 =	Health (injury)	Causing injury or death due to circumstances associated with the asset failure. Usually occurring suddenly.
3 =	Loss of Service (Domestic)	The water service is not available to the household. Initially this causes inconvenience but rapidly escalates into major health issues and disruption to normal life for the affected consumers.
3 =	Key Customers and Business Impacts	This is also related to a water service not being available to business customers and reflects impact on their ability to trade and the longer term economic welfare of the City.
5	Environment	Impacts on the natural environment, particularly flora and fauna. Also intended to reflect disruption to water based recreation when pollution occurs.
6	Damage (Property)	This is primarily associated with damage to private property, e.g. houses, vehicles, landscaping. Damage to business premises would typically be considered under Key Customers and Business Impacts as the key issue is the time to recover and any impacts on overall business viability.
7	Damage and disruption to other utilities	The failure of a water services asset might have relatively little impact on water services customers. However, if it takes out another major utility asset in the process, the impact might still be significant. This would include railways, arterial roads, bulk power transmission, key fibre-optic routes, etc.
8	Compliance	Most major compliance breaches will be accompanied by health or environmental consequences that would take priority at the time. This consideration is intended to capture multiple, lower level breaches that ultimately reflect adversely on the Council.
9	Financial (on Council)	If an asset needs to be replaced, its cost will inevitably fall on Council and this is not an avoidable consequence. However, if the cost is significant and has not been predicted then this can be very disruptive to Council's programme. It can also apply to situations where a large repair cost is incurred that could have been avoided with a pro-active renewal prior to failure.
10	Image / Legal / Reputation	These are often included in corporate risk strategies and can be relevant at the corporate level. However they are unlikely to occur in relation to water services in the absence of consequences occurring in one of the above considerations. As they do not occur in isolation they are not included as 'stand-alone' considerations. However they will inevitably occur when high criticality failures occur and need to be

Rank	Consideration	Description
		planned for as part of the response.

The general definitions of Levels of Criticality are included in the following table:

Table 5.2 General Definitions of Levels of Criticality

Criticality Level	General Description
Insignificant/ Minor 1 and 2	Insignificant is at a level of incidents affecting only a few customers and causing minor inconvenience. Failure of the asset is quite site-specific. Minor is similar but affecting groups of customers, but with the response completed within the target Levels of Service. Failure of these assets may be indicative of overall deterioration.
Low 3	This group includes several types of assets that justify management at a more intense level than 1 or 2. This would include situations where adverse effects justify an escalation of the provider's normal response. It also includes assets that receive regular (or event specific) inspections for security, graffiti, maintenance, cleaning, operational status, etc. Such inspections may be augmented by SCADA monitoring for status and operational purposes. Asset failures can occur but are expected to have relatively Minor consequences.
Moderate 4	Assets in this group are likely to be arterial and failure will produce significant impacts. Monitoring and pro-active management would be in place but not to the 'avoid at all costs' level of Major. Single failures might occur and this would trigger an urgent response to avoid recurrence.
Major 5	This is likely to be the highest Consequence of Failure that a provider would choose to adopt. The asset involved would be highly monitored and pro-actively renewed with a strong focus on avoidance of any failure occurring.
Extreme (Catastrophic) 6	This column is intended to indicate the most extreme outcomes that could conceivably occur. Ideally assets would be reconfigured to avoid this possibility even if the Likelihood of Failure is considered to be very low.

5.3.2 Identification of Critical Assets

Assets identified as having the highest criticality are included in the following table:

Table 5.3 Identification of Critical Assets

Criticality	Assets Falling into that Category
Stormwater	
Extreme	<ul style="list-style-type: none"> • Top four pump stations – Prestonville, Drury Lane, Beatrice Street and Bill Richardson Drive • Floodbanks
Major	<ul style="list-style-type: none"> • Culverts under railways • Pipes under buildings • Sealed pipes > 600 mm • Mid-size pump stations – Russell Street and Gladstone Terrace • Floodgates • Safety grilles • SCADA
Moderate	<ul style="list-style-type: none"> • Larger pipes with limited overland flowpath alternative • Crossings under roads / railway

Criticality	Assets Falling into that Category
	<ul style="list-style-type: none"> Sealed pipes ≤ 600 Pump station rising mains

5.4 ASSET CONDITION

5.4.1 Summary of Current Asset Condition

Pipe Network

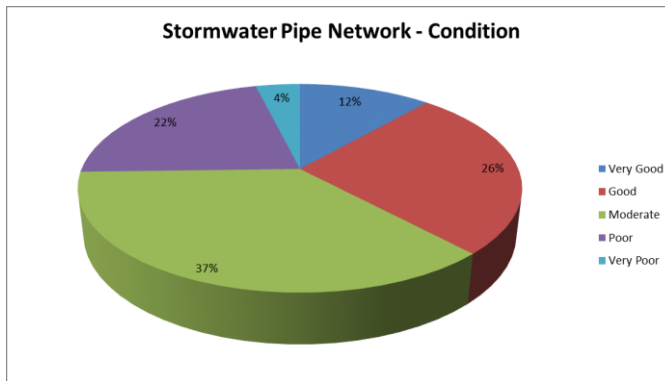
Information on condition of the pipe network is limited, with knowledge of condition based on maintenance records, and the knowledge and experience of staff. There are a relatively small number of pipe system blockages (less than 20 per 100 km of pipe) indicating that for its age, the system is in reasonable condition. Approximately 5% of the network has been inspected by CCTV, and some visual inspection has been done from manholes and excavations during maintenance work. Parts of the network have no manhole access, and the only visual inspection of these pipe lengths have resulted from maintenance work. The parts of the asset so affected are throughout the older (pre 1950) parts of the inner city, but predominantly in South Invercargill and Bluff. Approximately 28 km of pipe or 21% of the network has no manhole access. Pipe network schedules are contained in Appendix 16.03.

The following assumptions regarding material type and condition are based on construction and maintenance records, CCTV inspections as indicated above, and overall condition is summarised in Table 5.4.

Table 5.4 Parameters of Stormwater Pipe Assets

Pipe Diameter	Material	Condition	Comment
100 mm to 300 mm (68.9% of Network)	76% Earthenware 15% Plastic 8% Concrete	Generally sound structurally. Open joints on earthenware and concrete pipe allow ingress of groundwater and formation of cavities in surrounding ground.	Older pipes. Capacity upgrade required.
375 mm to 450 mm (11.4% of Network)	24% Earthenware 9% Plastic 6% Brick 60% Concrete	Brick and earthenware in poor condition, cracked and deformed. Concrete and plastic generally newer and in good condition.	Renewal of brick and earthenware a priority.
525 mm to 1,800 mm (19.6% of Network)	Reinforced concrete	Mostly laid since 1984. Rubber ring jointed. Excellent condition.	No renewals planned within 30 years.
2,100 mm (0.1% of Network)	Aluminium Hi-Flo	Structurally sound. Welded joints. Deformed during construction. Laid 1987.	No renewals planned within 30 years.

Pipe Network – Condition



The main causes of pipe failure are:

➤ **Root Intrusion**

Open joints on pipes laid prior to 1980 allow the intrusion of roots which can restrict capacity and eventually block the pipe, and is a major maintenance cost, particularly in areas with street trees and stormwater pipes laid in grass berms.

➤ **Manholes**

Many of the manholes constructed before 1950 were of brick construction, and some of these have partially collapsed, with subsequent slumping of road surfaces and have, therefore, required replacement. There is a potential of more of these manholes collapsing. A further liability exists with old style manhole lids, which were constructed with wooden inserts. The wooden inserts can be displaced and can create a hazard to pedestrians. Manhole lids with wooden inserts are replaced as the inserts become displaced. Some manholes (particularly those in non-trafficked areas) have light duty manhole lids which have been recognised as a safety hazard due to the possibility of them becoming dislodged. As these lids are identified through programmed inspections, they will be replaced.

➤ **Pump Stations**

The pump stations and their mechanical and electrical plant range in age up to 40 years with the condition of plant at each station detailed in Appendix 16.04. Pump stations are inspected several times a week by a pump operator, and are regularly maintained by electricians and fitters as part of the service maintenance contracts. The condition ratings of Appendix 16.04 are therefore considered very reliable.

➤ **Open Drains**

The open drainage system is inspected regularly and maintained in good condition through an active operational maintenance programme which includes control of vegetation by trimming or spraying, regular inspection and removal of rubbish, and annual programme to remove silt as necessary.

➤ **Floodbanks**

The Stead Street floodbank construction and foundation materials are soft estuarine silt which have low strength, low permeability and low shear strength. They are subject to settlement from the weight of any floodbank works, such as provision of additional floodbank height or width. These

issues have been managed with ongoing inspections and maintenance activities, and along with predicted sea level rise are leading to increased costs and risk to Council. The Stead Street stopbank has an ongoing project to raise the level of the stopbank. This work is being undertaken in conjunction with Environment Southland to ensure consistency with their Waihopai River and Otepunu Stream floodbanks.

The Cobbe Road (Rifle Range) floodbank has been renewed in two parts, with the northern section being rebuilt in the 1980's and the southern section in 2017. In both cases construction material was clay, and the bank has been both widened and increased in height. The bank is not typically exposed to high energy wave action, and has been constructed with additional sacrificial width to provide protection against storm damage. The crest of the Cobbe Road stopbank is still lower than the design level of the Stead Street stopbank and will be upgraded to the same level as part of the Stead Street stopbank project.

5.4.2 Condition Monitoring

The following strategies are used to monitor the condition of stormwater assets to feed into upgrading and renewal programmes, and to ensure that levels of service are maintained, and assets upgraded or renewed in the most timely and cost effective manner.

Monitoring of the various assets clauses include:

➤ **Pipe Networks**

- *Maintenance Records* – Request for service, records of maintenance activities and inspections of pipes during repair are analysed to assist in rating of pipe condition.
- *CCTV Inspections* – Critical assets are inspected by CCTV and condition is graded in accordance with the guidelines in the New Zealand Pipe Inspection Manual.
- *Pipe Material Testing* – Samples of pipe are physically tested to determine condition and decay rates.

➤ **Pump Stations**

- *Alarm Monitoring* – Most pump stations are connected by telemetry to Council's 24 hour call centre, with faults recorded. Where necessary, repair crews attend to faults, and alarm records assist in condition rating.
- *Operator Inspection* – Operators visit pump stations at least once a week to attend to operational issues, and to check mechanical and electrical systems.
- *Annual Inspection* – All pump stations are inspected annually by the maintenance contractor to determine maintenance and renewal needs.

➤ **Open Drains**

Repair crews inspect ditches on a fortnightly basis, and clear debris and repair damaged sections.

➤ **Floodbanks**

Floodbanks are regularly inspected and assessed for storm damage, with repairs being undertaken as required. Ongoing maintenance includes mowing of the Stead Street floodbank and pest plant control on the Cobbe Road (Rifle Range) floodbank.

5.5 ASSET CAPACITY AND PERFORMANCE

5.5.1 Capacity and Utilisation

➤ ***Pipe Network***

Current design standards for new stormwater systems are for a five year return period storm. The “time of concentration” for the longest stormwater system is 40 minutes, and most are much shorter. The designed rainfall intensity varies inversely with time of concentration, so that short systems are designed for high intensity rainfall, and larger systems for shorter duration rainfall. In the Invercargill situation, with relatively small individual stormwater catchments, the designed intensity is high when compared with the intensities of the storms that have caused flooding in the City. The stormwater systems are, therefore, able to deal with long duration storms of a much greater return period than five years. While some stormwater ponding is expected during short duration, high intensity rain storms of greater than five years return period, it is considered that the ponding so created would not cause a significant risk of flooding buildings, as there are generally acceptable secondary flow paths throughout the City down road corridors.

Records of flood events since the 1984 flood are analysed to determine priorities for upgrading projects, and indicate the flood potential has been significantly reduced throughout the stormwater system since the upgrading programme was commenced in 1985.

The stormwater network has a high degree of reliability, with maintenance records showing a relatively low number of blockages. The major causes of blockages are tree root intrusion into older, mostly earthenware, open jointed pipes, and collapse of pipes.

➤ ***Pump Stations***

Pump stations are designed for five year return period storm flows and are located in low lying areas protected by stop banks. The pump stations are of particular importance when stream and river levels are elevated by tidal storm surges, or by storm flows resulting from long duration low intensity rainstorms.

The following are considered in pump station design:

- The volume of stormwater ponding available
- The levels at which adjacent buildings would flood
- Availability of alternative storm flow paths
- Public safety

➤ ***Open Drains***

Open drains provide and maintain a system to convey stormwater in conjunction with pipe networks, with sufficient capacity and reliability to meet projected demand.

The main open drainage network administered within this Plan is located at Otatara. Otatara is an area of low-density 'lifestyle' development. There is no water reticulation provided to Otatara, and household water is collected from roof catchments. Properties therefore have poorly developed or no on-site stormwater drainage. Streets are, in general, developed to a rural standard without footpaths or kerb and channelling. There are significant areas of native bush requiring reasonably high water tables for their health. It is intended that Otatara retain its 'rural lifestyle' attributes, and a predominantly open ditch drainage system is considered appropriate. However, drains are piped in areas of higher density development or where safety considerations dictate. Piped sections of drains in Otatara are included within the pipe network sections of this Plan. Proposals to pipe drains in Otatara are often requested by landowners or as a result of other infrastructure works. These proposals must be considered carefully as the piping of drains is not an optimal solution and other options must be considered before drains are piped.

The open drainage network includes approximately 47 km of ditches and consists of:

- *Ditches* – Collect stormwater from roads and private properties, and convey it to waterways.
- *Culverts* – Provide access over ditches to properties.
- *Timber Supports* – Provide support to banks of ditches where required.

The location of ditches is shown on plans but information recorded in regard to depths, gradients or existing culvert size is poor. As open drainage systems require a high level of maintenance, staff knowledge of the network and potential problem areas is good. Ongoing work to update Council's records in an electronic format is important.

➤ **Floodbanks**

The Stead Street and Cobbe Road (Rifle Range) tidal floodbanks have provided a high level of protection to the Lake Hawkins and Rifle Range areas for a century. Occasional over topping by extreme weather events have not caused significant flooding events, and banks have been adequately repaired when damaged. However, the functionality of the floodbanks will be compromised by expected sea level rise into the future. Renewal of the Stead Street and Cobbe Road (Rifle Range) floodbank is in the detailed design phase with works expected to commence early 2021 with funding assistance from central government.

➤ **Maintenance Standards**

Assets are maintained to a high standard to ensure that service levels are maintained and in order to effectively meet environmental standards.

5.5.2 Performance

Environmental Standards

Stormwater systems, with many ground surface entry points on roads and private properties, are susceptible to accidental or deliberate discharge of contaminants. In order to reduce the incidence of contamination, mud sumps are required on all ground level entry points to the stormwater, and these have the

ability to settle silts and a limited quantity of floatable liquids for collection during regular sump maintenance activities.

ICC's new stormwater discharge consent requires extensive monitoring of discharge water quality in both dry and wet weather conditions. Where contaminants are identified, investigation programmes are undertaken to identify sources of the contamination, and have them corrected by either the ICC or property owner.

5.6 SUMMARY OF ASSET TRENDS, ISSUES AND CHALLENGES

The measured levels of service show the stormwater activity to be performing at a high level, consistently meeting the target levels of service. However, levels of service may be compromised in future years by the following issues:

➤ ***Asset Service Life***

The renewal plan has been developed based on assumed service lives of assets, coupled with known condition ratings. Over 15% of assets will reach their renewal age in the 2020's, which can lead to a larger than normal renewal programme for some years. The proposed renewal programme smooths renewals over a 5-7 year period to allow a sustainable and achievable renewal programme to be delivered.

➤ ***Environmental Standards***

The new stormwater discharge consents requires increased levels of monitoring and investigation to identify and correct sources of contamination. The consent also provides for review of conditions when the limit setting process within the Southland Water and Land Plan is completed, and this is expected to require significantly improved quality in Invercargill's stormwater discharges. Where sources of contamination are found within the stormwater network, Council will be required to have these corrected, at significant cost.

6. Sustainability, Risk and Resilience

6.1 SUSTAINABILITY

The stormwater activity contributes to the sustainable development of the City by provision of:

- Adequately sized stormwater collection system to ensure properties are protected from flooding.
- Adequate protection of stormwater from contamination with sewage and other contaminants to enhance public and environmental health.

6.1.1 Social and Cultural

The stormwater activity provides one of the building blocks for a safe, friendly city.

A condition of the stormwater discharge consent requires that the ICC undertake a Cultural Monitoring Programme (CMP) in collaboration with Te Ao Marama throughout the life of the consent. The CMP is used to identify any cultural impacts the City's stormwater discharges are having on Invercargill's receiving waters and surrounding environment.

This Asset Management Plan aims to provide a system that is continuously available for the drainage of stormwater. The Plan utilises maintenance and renewal strategies to replace assets prior to failure, to upgrade capacity where required and to minimise times when the service is unavailable to any property.

6.1.2 Environmental

The Council holds consents for the discharge of stormwater to rivers and streams passing through the City.

The consents include conditions requiring Council to monitor the discharges and where contamination is found, to trace this to source and to have corrected. Further conditions require industrial properties to be audited to ensure production practices are not contaminating stormwater and the hazardous substances are appropriately contained.

Council seeks to operate the activity in ways that minimise the use of resources and effects on the environment.

Strategies include:

- Selection of plant and pipe material to maximise useful service life.
- Minimisation of wastage during construction.
- Selection of energy efficient plant and energy audits of operating plant.
- Use of low impact stormwater designs where appropriate to reduce the risk of stormwater contamination.
- Inclusion of stormwater treatment devices as part of outfall renewal projects.

6.1.3 Economic and Financial

Council's goal is to continue to provide the stormwater activity in ways which achieve the desired levels of service in the most effective manner by:

- Recognising the consumption of assets over their lifetime and programming renewals to coincide with the expected end of life.
- Separately itemising capital versus operational expenditure.
- Allocating costs and preparing forecasts over the long term (30 years and beyond).
- Reporting on financial performance.
- Researching and identifying practical and cost effective alternative service delivery options.

6.1.4 Summary of Sustainability Challenges and Issues

➤ ***Increasing Environmental Standards for Effluent Discharges***

The Southland Water and Land Plan sets higher standards for stormwater discharges and will require additional resources to monitor discharges and to identify and remove sources of contamination.

➤ ***Serviceability of Aging Pipe Network***

As both public pipe networks and on property drainage systems age, leakage and cross contamination between sewerage and stormwater networks can be expected to increase, and may result in stormwater discharge consent conditions being compromised. As part of the strategy to improve stormwater quality, Council will need to continue to improve the integrity of both the stormwater and sewerage networks, and to require property owners to address issues with on property cross contamination.

➤ ***Climate Change***

The stormwater activity will be significantly impacted over the next 80-100 years and beyond, both by a change in rainfall intensities and sea levels which are expected to rise by at least 700 mm by 2100. Council assumes climate change, and its impacts, to follow RCP 4.5. This will place strain on the existing network and stormwater renewals will be designed to accommodate the assumed rainfall intensities and sea levels. It is likely that additional pump stations will also be required and that stopbanks protecting areas from flooding will need to be raised.

In some cases, Council may need to consider retreating from areas of the City, however, this strategy is not addressed within this Plan.

6.2 RISK

The Council recognises that it is obliged to manage effectively and to review regularly its risks at a strategic, operational and project level. The Council has done this by developing a Risk Management Framework and a range of risk management processes that apply across the organisation. Risk assessment is a major consideration in planning and budgeting processes at all levels within the Council. Risks must be considered and documented as part of the justification for undertaking our activities. Risk assessment and monitoring must form part of the management of operational activities. The Chief Executive and Council encourage the taking of controlled risks to better improve the effectiveness and efficiency of the services and functions that the Council

provides on behalf of the community, provided the resultant exposures are acceptable.

6.2.1 Risk Framework / Standard

Council has previously adopted a risk management process that is consistent with Australian / New Zealand Standard AS/NZ 4360 which defines risk assessment and management. The key risk criteria adopted for assessing the consequences of identified risks are:

- Community Health and Safety
- Loss of Service – Extent / Duration
- Service Delivery – Customer Impact
- Invercargill City Council Financial Impact
- Financial Community
- Corporate Image and Reputation
- Legal Compliance

The Corporate Framework for assessing Risk is included in the Long Term Plan document itself.

It should be noted that Council is undertaking an organisation wide review of risk management practices and this may impact on how risk is assessed and managed. Results from this review will be included in Management Plans where necessary and risk assessments will be updated as required.

6.2.2 Critical Assets Decision-Making

Critical assets are “those which have a high consequence of failure, but not necessarily a high probability of failure”. This is important as it draws attention to those assets which are the most important, irrespective of the likelihood of failure of the asset. Critical assets typically require more proactive management to minimise or eliminate this risk.

The likelihood of failure of an asset is often difficult to assess, however condition and age are parameters that provide an indication. The worse the condition of the asset, the more likely it is to fail.

Assets which are both extremely critical and more likely to fail should have higher priority and be replaced or rehabilitated earlier in their life cycle than others, and at lower levels ‘run to failure’ may be perfectly acceptable.

6.2.3 Risk Identification and Assessment

Table 6.1 Risk Identification and Assessment

Risk Criteria	Level of Service Failure Indicators	Asset Sub Group	Caused by	Consequences							Weighted Averaged Consequence Score	Likelihood	Risk Severity	Control	
				Legal Compliance (0.20)	Corporate Image and Reputation (0.10)	Service Delivery – Customer Impact (0.15)	ICC Financial Impact (0.20)	Financial – Community (0.15)	Health and Safety (0.20)	Current Practice				Recommended Actions	
Community Health and Safety	Stormwater ponding on roads and properties	Pipe network	Major pipe blockage / collapse	3	3	2	3	2	1	2.3	D	L	Renewal programme reactive maintenance emergency response	Review secondary flow path locations	
			Minor pipe blockage / collapse	1	1	2	1	1	1	1.15	A	H	Renewal programme reactive maintenance emergency response		
			Sumps blocked with debris / silt	1	1	2	1	1	1	1.15	A	H	Maintenance response 24 hour		
			Flood event – greater than 5 year return period	1	3	3	3	2	2	2.25	E	L	Emergency response lifelines		
			Earthquake	1	4	5	6	5	2	3.7	F	M	Emergency response		
			Climate change (rainfall intensity changes and sea level rise)	1	3	3	3	2	2	2.3	F	L			Review design standards
			Flood gate failure	1	2	4	2	1	1	1.75	D	L	Inspect / maintain		
Legal Compliance	Contaminated discharge	Pump stations	Pump failure	1	2	3	2	1	1	1.6	D	L	Asset Management Plan / renewal Emergency 24 hour response	Consider treatment devices	
		Pipe networks	Accidental or deliberate discharge of contaminants	4	3	2	2	2	1	2.3	C	M	Monitor / trace contaminants to source		
Financial Impact	Stormwater ponding in buildings and on roads	Pipe network	Flood event – greater than 5 year return period	1	3	3	3	2	2	2.3	E	L	Asset Management Plan – Renewal / development District Plan – Reticulation extension	Review design standards	
			Increased density of development	1	3	3	3	2	2	2.3	E	L			

6.2.4 Summary of Key Risk Issues

Key risks with the stormwater activity are:

- Pipe blockage or collapse causing back up and overflow of stormwater.
- Floodgate failure causing backflow from receiving water during flood events.
- Pump station failure, causing flooding of low lying areas.
- Flood event greater than system design capacity.
- Discharge of contaminants, causing environmental damage and non-compliance with consent conditions.

6.2.5 Possible Approaches to Risk Mitigation

- **Pipe Blockage / Collapse**
 - Maintenance response to clear blockage / repair pipe.
 - CCTV inspection and condition rating to feed into renew programme.
 - Improved understanding of system condition and performance.
 - Undertake renewals according to renewal programme, taking into account pipe criticality.
- **Floodgate Failure**
 - Scheduled maintenance to inspect and ensure structures are in good condition.
- **Pump Station Failure**
 - Scheduled maintenance activities to ensure optimum operation and renewal programmes.
 - Standby gensets and duplicate pumping capability.
- **Flood event greater than system design**
 - Emergency Lifelines Response
 - Maintenance attendance to minimise damage
 - Renewal plan
 - Ensure secondary flow paths are appropriate
- **Discharge of Contaminants**
 - Identify through Monitoring Programme
 - Identify source and repair defects
 - Behaviour Change Programme

6.3 RESILIENCE

The working definition of resilience to Invercargill City Council is the ability of the organisation to survive a crisis and thrive in a world of uncertainty. Resilience includes both planned risk management (Section 6.2) and adaptive capacity. In this context resilience refers to our capacity to adapt, rather than preparedness or recovery, which is the capacity of people, the community and systems to adapt in the face of unpredictable change the 'unknown unknowns'.

100 Resilient Cities²¹ has four dimensions and three drivers within each:

- **Health and Well-being**
 - Meet basic needs
 - Support livelihoods and employment
 - Ensure public health services
- **Economy and Society**
 - Foster economic prosperity
 - Ensure social stability, security and justice
 - Promote cohesive and engaged communities
- **Infrastructure and Environment**
 - Provide reliable communication and mobility
 - Ensure continuity of critical services
 - Provide and enhance natural and man-made assets
- **Leadership and Strategy**
 - Promote leadership and effective management
 - Empower a broad range of stakeholders
 - Foster long-term and integrated planning

6.3.1 Current and Desired Resilience Assessment

The need to build a resilient community is learning from events such as the earthquakes in Christchurch, Kaikoura and Wellington, and recent major storm events in New Zealand and across the world. Invercargill City Council is seeking to make the City and its infrastructure more resilient as part of the review of risk management being undertaken.

6.3.2 Business Continuity and Emergency Response Arrangements

Emergency Management Southland (EMS) is a shared service between Invercargill City Council, Southland District Council, Environment Southland and Gore District Council. It focuses on ensuring communities are prepared for emergencies and that they are able to respond to and recover from these when they do happen. Specific actions include public education and ensuring a pool of trained personnel. Having this combined organisation results in streamlined decision making, faster response times and cost savings.

Catastrophic events such as earthquakes or extreme weather events like tsunamis are likely to damage the stormwater infrastructure, and compromise its ability to continue to provide the service for which it is designed. Damage to other infrastructural services (particularly power and roading) can compromise the recovery strategies. Some of the strategies in the risk mitigation section will assist in the recovery of the service (e.g. availability of the 24 hour response crews and standby gensets at pump stations) but resilience includes the ability of the community to continue to function while services return to normal. It is unlikely in these events that the stormwater activity would be able to rely on its own resources, and the assistance of the wider community may be required. It is likely the resources will be rationed, and the community may decide that

²¹ <http://www.100resilientcities.org/resilience>

recovery in other areas should take precedence over the stormwater activity. The protection of human health and safety will be of paramount importance.

6.3.3 Summary of Resilience Issues and Challenges

- Recovery of the stormwater activity may require resources from other areas of the community.
- Risk mitigation strategies will be a start to recovery but may not be sufficient.
- Community Health and Safety is of prime importance.
- Resilience requires the community to work in unity.

7. Managing Our Activities

7.1 RESPONDING TO THE ISSUES AND CHALLENGES

The Problem (Why)

Invercargill has a good stormwater drainage system which protects its residents from flooding. The pipe network is aging and investment in maintenance and renewal is required if the activity is to continue to meet its objectives. A new discharge consent has recently been issued by Environment Southland, with conditions that require significant improvement in discharge quality. This will require further investigation in treatment devices and a corresponding increase in operational costs to operate the treatment devices. Climate change, with expected sea level rise through this century, will require a proportional increase in budget for the renewal programme.

The Benefits (What)

Investment to address these problems would ensure that the pipe network continues to protect the community from flooding, and that quality of receiving waters is improved. It would contribute to social wellbeing, economic growth and productivity of the City.

The Strategic Responses (How)

Strategies would include:

- Maintenance and renewal of infrastructure.
- Identification of sources of contamination and remedial action.
- Installation of appropriate treatment devices.
- Update of stormwater design standards and adequacy of River and Tidal Flood Protection Infrastructure.

Table 7.1 Managing Issues and Challenges

Topic	Issue or Challenge	Potential Response	Chosen Response – 2021 AMP
Environmental Standards	Meeting Resource Consent Conditions	<ul style="list-style-type: none"> - Develop monitoring programme and investigation programme to identify contamination sources - Require property owners to fix defects - Maintenance and Renewal programmes to fix network defects - Encourage public behaviour changes to reduce contaminant discharge - Industrial Site Audits to promote cleaner 	<ul style="list-style-type: none"> - Develop monitoring programme and investigation programme to identify contamination sources - Maintenance and Renewal programmes to fix network defects - Encourage public behaviour changes to reduce contaminant discharge

Topic	Issue or Challenge	Potential Response	Chosen Response – 2021 AMP
		production - Low impact stormwater design features	
Climate Change	Sea Level Rise	- Collaborate with Environment Southland for stopbank redesign - Consider drainage improvements to areas susceptible to flooding (including pump stations) - Consider retreat from some areas	- Collaborate with Environment Southland for stopbank redesign
Population Growth	Demand for New Development	- Extend drainage network to green-fields developments - Promote Low Impact design to reduce runoff from infill development - Require onsite attenuation for infill development - Design renewals to accommodate infill development	- Promote Low Impact design to reduce runoff from infill development - Design renewals to accommodate infill development
New Technology	Opportunity for improved performance at less cost	- Willingness to adopt and change in procurement of services and use of innovation - Research and assess new products and techniques - Monitor developments and respond quickly where possible	- Willingness to adopt and change in procurement of services and use of innovation - Research and assess new products and techniques - Monitor developments and respond quickly where possible
Levels of Service	Reliability	- Have maintenance and renewal programmes to ensure reliability - Improve knowledge of asset condition and performance to lead decision making	- Have maintenance and renewal programmes to ensure reliability - Improve knowledge of asset condition and performance to lead decision making
	System Adequacy	- Review network design standards to ensure adequate capacity - Collaborate with	- Review network design standards to ensure adequate capacity - Collaborate with

Topic	Issue or Challenge	Potential Response	Chosen Response – 2021 AMP
	Environment	Environment Southland to review flood protection infrastructure	Environment Southland to review flood protection infrastructure
	Service Response Times	- Monitor contractor performance to ensure time frames are achieved	- Monitor contractor performance to ensure time frames are achieved
	Quality	- Monitor contractor performance to ensure quality standards are achieved	- Monitor contractor performance to ensure quality standards are achieved
	Health and Safety	<ul style="list-style-type: none"> - Check quality of services and products when purchased - Ensure all stormwater features are safe, or restrict public access - Review contractors and employees Health and Safety Plan and ensure they are complied with - Use health and safety in design methods in renewals 	<ul style="list-style-type: none"> - Check quality of services and products when purchased - Ensure all stormwater features are safe, or restrict public access - Review contractors and employees Health and Safety Plan and ensure they are complied with - Use health and safety in design methods in renewals
Resilience	No documented contingency plans	- Develop contingency plans on Council wide basis	- Develop contingency plans on Council wide basis

7.1.1 Alternative Investment Approaches

The funding of operational and capital projects is managed by the finance department, including the appropriateness of alternative investment approaches.

As part of land development, new stormwater assets are funded by the developer to Council’s “Code of Land Development” standards, and are taken over by Council at no cost.

7.1.2 Do-Minimum Programmes

A key assumption of this Asset Management Plan is that maintenance and renewal programmes will ensure that the activity continues to meet the level of service targets. The work programmes are designed to meet the targets at the least possible cost, and to ensure that asset life is extended to the fullest extent possible.

7.1.3 Programmes Evaluation

The areas which are considered when evaluating programmes:

- Meets sound asset management principles
- Best value for money
- Meets demands
- Delivers customer Levels of Service
- Is integrated with the requirements of other infrastructural services
- Complies with Regional Council Requirements and consent conditions
- Is delivered on a timely fashion
- Is affordable within the life cycle budgets of this Plan

7.2 OPERATIONS AND MAINTENANCE

7.2.1 Operation / Maintenance Strategy

The stormwater network is operated and maintained to ensure the efficient utilisation of the assets and to achieve the stipulated levels of service. Operational strategies include the efficient control and monitoring of mechanical and electrical plant at pump stations and ensuring the pipe network is free of obstructions to ensure continuity and quality of service. Maintenance strategies aim to ensure efficient operation over the useful service life of assets, to ensure target standards are met, and to prevent premature asset failure or deterioration. Operation and maintenance strategies are detailed in Appendix 16.05.

7.2.2 Operation / Maintenance Standards and Specifications

The following are the major documents specifying the standards of service provisions for the stormwater asset. Included as part of these documents are a wide range of New Zealand and international standards, and code of practice which regulate aspects of the activity, and which will be updated on a regular basis.

Stormwater assets will be operated and maintained in compliance with:

- Long Term Plan for Invercargill
- This Asset Management Plan
- Contract 807 – Piped Network Utility Maintenance
- Contract 803 – Water and Drainage Network – Electrical and Mechanical Maintenance
- Invercargill City District Plan 2019
- Resource Management Act 1991
- Regional Water Plan for Southland
- Resource consents
- Local Government Act 2002
- Construction Act 1959
- Building Act
- Health and Safety in Employment Act
- Invercargill City Council Code of Practice for Land Development and Subdivision Infrastructure (2016/1)
- Invercargill City Council Specification for Laying Stormwater and Foul Sewers
- Invercargill City Council Standard Conditions for Excavation and Reinstatement of Trenches

7.2.3 Operation / Maintenance Options and Alternatives

The stormwater network is operated and maintained with the goal of assuming that it is always available for the drainage of stormwater, to ensure that residents are afforded the maximum possible protection from flooding of their properties.

Alternative maintenance options are routinely considered and will be implemented if they are more cost effective and level of service targets are not compromised.

Alternative maintenance options include:

➤ ***Reduction of Planned Maintenance Activities***

Within the pipe network, most maintenance is reactive to reported faults and blockages, with planned maintenance activities including the checking and repair of floodgates on discharges to receiving water, and the checking and cleaning of structures where debris and silt can accumulate and reduce the operational efficiency of the system.

Pumps stations are routinely visited by operators and maintenance contractors who inspect, clean, adjust and monitor pumps and other items of plant to ensure they continue to operate at optimum performance levels, and that significant maintenance issues are identified early to ensure appropriate maintenance is undertaken and service life is maximised.

The open channel drainage network is inspected every two weeks to ensure that culverts are clear of debris and that banks are stable, so that drainage efficiency is maintained. Ditches are sprayed at least once a year (and more often if required) to control vegetation, and are mechanically cleaned as required, usually at four yearly intervals.

While reduced maintenance activities may initially reduce costs, it is likely that levels of service will be compromised, and that service lives of mechanical and electrical plant will be reduced. These possibilities need to be considered in any decision to reduce maintenance activities. Assets identified as critical need to be actively managed.

➤ ***Data Collection Programmes***

Collection of data on condition, performance and remaining service life of assets is necessary for decisions on the optimum performance and renewal of assets, but can be expensive. These programmes need to be carefully considered to ensure they are cost effective and consistent with business needs.

➤ ***System Control and Monitoring***

Electronic monitoring systems can provide continuous control and surveillance of mechanical plant, and can effectively warn of plant failure requiring operator intervention, thus reducing the need for scheduled attendance. Stormwater pump stations are monitored by telemetry systems which can alert operators to system malfunction and improve response times to maintenance issues. An upgraded system, including the water and sewerage activities is now being considered.

7.3 ASSET RENEWAL / REPLACEMENT

7.3.1 Renewal Strategy

This renewal programme is intended to maintain the overall standard of the stormwater system at a level which reflects its age profile by providing for the rehabilitation or replacement of individual assets as they reach the end of their useful life. It must be funded adequately to maintain current levels of service and the overall quality of the network. The level of expenditure on cyclic asset renewal will vary from year to year, reflecting the remaining life profile of the assets within the stormwater network. Life cycle management strategies are included in Appendix 16.05.

Failure to maintain an adequate cyclic renewal programme will result in a decline in the overall standard of the system of assets.

Asset revaluations are programmed at three yearly intervals, and take into account inflationary influences on new plant or construction costs, and any changes that have been made to predicted lives of assets. The updated valuation will feed into the renewal cost allocation, and renewal expenditure will be adjusted to match.

➤ **Pump Stations**

The predicted lives of components of pump stations are listed below. Renewal budgets provide for renewal of individual assets at the end of their predicted life. Asset lives are reviewed at three yearly intervals, depending on assessed condition and performance of the asset, and renewal budgets adjusted accordingly.

▪ Building and Structure	60-80 years
▪ Pipe and Fittings	30-60 years
▪ Mechanical Plant	5-40 years
▪ Electrical Motors and Switchgear	20 years
▪ Electronic Control and Telemetry Systems	10-15 years

➤ **Pipe Network**

The predicted lives of pipes of various materials are listed below, and predicted renewal decade, based on assets life, is summarised in Figure 7.1 below:

▪ Earthenware Pipes (up to 300 mm diameter)	110 years
▪ Earthenware Pipes (greater than 300 mm diameter)	80 years
▪ Concrete Pipes	115 years
▪ uPVC Pipes	75 years

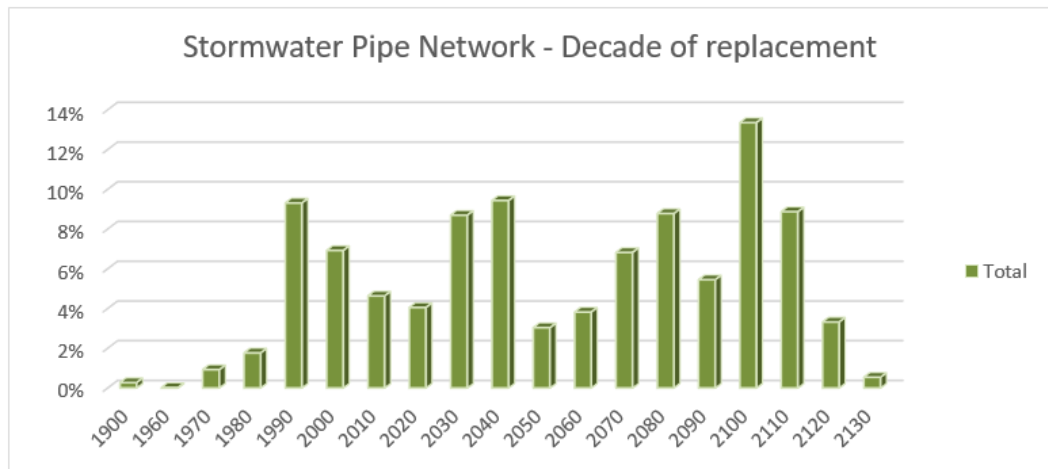
Detailed pipe age and material profiles are contained in Appendix 16.03.

Individual assets are assessed as they come near the predicted service life, and depending on conditions, may be replaced earlier or later than the assigned life.

Further work on determination of predicted service life is planned as part of the Improvement Plan (Section 10) including CCTV inspection and analysis of maintenance records. It is possible that predicted service lives listed above will be adjusted, and this would increase or decrease the time before pipe assets need to be renewed, and may lead to an adjustment in renewal programmes.

A renewal programme has been developed to smooth yearly spikes in renewals as based on the expected lives of particular assets. As asset lives are further refined there may be a need to increase or decrease the renewal budgets.

Figure 7.1 Stormwater Pipe Network – Decade of Replacement



7.3.2 Renewal Criteria / Intervention Standards

The general renewal strategy is to rehabilitate or replace assets when justified by:

- *Asset Performance* – An asset is renewed when it fails to meet the required level of service. Non-performing assets are identified by the monitoring of asset reliability, capacity and efficiency during planned maintenance inspections and operational activity. Indicators of non-performing assets include:
 - Repeated asset failure
 - Repeated pipe blockages or overflows
 - Ineffective and / or uneconomic operations
 - Inefficient energy consumption
- *Economics* – An asset is renewed when it can no longer be economically repaired (i.e. the annual cost of repairs exceeds the annualised cost of its renewal). Council will actively research the effectiveness of new technology which may improve the overall performance of the assets.
- *Risk* – An asset is renewed when the risk of failure has been increased to the point that the environmental, public health, financial and social impacts are no longer acceptable to the community.
- *Criticality* – Assets identified in the extreme and major criticality categories in Section 5.3.2 carry an increased risk of environmental, public health, financial and social impact to the community. These assets will be replaced before failure is imminent.

Planned and reactive replacement works are prioritised in accordance with the following priority ranking table and then programmed or, in urgent cases, undertaken immediately.

A more detailed renewal strategy is included in Appendix 16.05.

Table 7.2 Priority Ranking for Planned and Reactive Replacement Works

Priority 1 (High)	<p>Asset failure has occurred and renewal is the most cost-effective treatment.</p> <p>Asset failure is imminent and failure is likely to have major impact on the environment, public health or property.</p> <p>Asset performance is non-compliant with resource consent requirements.</p>
Priority 2	<p>Asset failure is imminent, but failure is likely to have only a minor impact on the environment, public health or property.</p> <p>Asset failure is imminent and proactive renovation is justified economically.</p> <p>Associated work scheduled for the current financial year.</p> <p>Asset renewal is justified on the basis of minimal life cycle costs and deferment would result in significant additional costs.</p>
Priority 3 (Low)	<p>Asset failure is imminent but failure is likely to have a negligible impact on the environment, public health or property.</p> <p>Asset renewal is justified on the basis of minimal life cycle costs but deferment would result in minimal additional costs.</p>

The renewal strategy will be reviewed at least annually, and any deferred works reprioritised alongside new renewal projects. Indirect costs such as disruptions to traffic or business, temporary denial of access or nuisance are currently not considered in the evaluation of renewal options.

The standards and specifications for renewal work are generally the same as listed in Section 7.2.2.

7.3.3 Renewal Options and Alternatives

Pump Stations

Pump station renewals are scheduled over the 30 year Asset Management Plan period, based on predicted service life, in Appendix 16.04. Renewal requirements are assessed annually, and scheduled renewals can be brought forward or extended based on criteria set out in Section 7.3.2. Alternative renewal strategies are:

- *Replace at failure* – Mechanical and electrical equipment would continue to be maintained until ultimate failure and then replaced. Possible consequences are poor performance as assets require more frequent and urgent maintenance, additional costs of maintenance, difficulty in obtaining parts, and decreased reliability.
- *Replace at predicted service life* – Asset would be maintained until they reach their predicted service life and then replaced irrespective of performance. Some assets may incur significant maintenance costs, and others would be replaced while still in very good condition.

The recommended renewal strategy gives a better assurance of serviceability, and is likely to be the most economic option.

Pipe Network

Pipes are assigned service lives depending on pipe material. Individual pipes are assessed as they come near renewal age, depending on the criteria set out in Section 7.3.2. This will provide a budget to renew pipes at the appropriate rate of

deterioration of asset condition. The renewal programme will replace pipes to the current design standard, as detailed in Appendix 16.01. The budget to renew pipes is based on the upgrade size of the pipe.

7.4 CAPITAL DEVELOPMENT PLAN

7.4.1 Asset Development Strategy

The Asset Development Plan provides for extensions to the stormwater system, or increases in capacity to provide for growth in the City, or to meet higher service standard targets.

Assets are acquired as a result of:

- Taking over new reticulation constructed as part of subdivision development (constructed at the developer's expense).
- Extensions constructed by Council to service new areas.
- Asset upgrading constructed by Council to provide additional system capacity to overcome inadequacies or provide for growth (e.g. larger drains or pumps).

Over the life of this Asset Management Plan, the following development priorities have been identified:

➤ ***Capacity Increase of Existing Network***

New capacity design flow rates were adopted by Council in 1985, and pipes laid since then have been designed to the new standards. However, much of the network remains at the previous lesser capacity designs, and will be upsized to the new capacity design as part of the pipe asset renewal programme. Overall, this upgrade will add approximately 8% to the cost of renewal in existing sizes. This is taken into account in the renewal programme costs, as the upgrade size and the associated cost of any particular pipe is used for budgeting purposes.

➤ ***Residential Development***

Due to slow population growth anticipated for Invercargill, there is a low demand for the extension of stormwater to new residential areas of Invercargill, and no specific development projects have been included in this Asset Management Plan. However, the District Plan does identify potential residential development areas to the north of the urban area (Retreat Road, Rockdale Road, Tramway Road area and in Otatara), and Council staff are developing scheme plans with preliminary budgets for residential development in the Retreat Road area. It is anticipated that any new stormwater infrastructure or required upgrading within the existing infrastructure as a result, will be funded by the developers. Council will take over and manage such assets as part of the stormwater infrastructure when they have been developed in accordance with the Invercargill Code of Land Development and conditions of subdivision consents. Council staff will have input into and approve the design of infrastructure built for new subdivisions, and have checking and approval systems in place to ensure infrastructure is completed in accordance with the Code of Land Development prior to its acceptance as stormwater assets.

7.4.2 Capital Development Selection Criteria

The stormwater network will be developed during the life of the Plan to meet community expectations, technical and environmental standards and community growth projections.

Additional new development projects will be identified on the basis of:

- *Growth* – Where development is needed to meet projected increased demand.
- *Regulatory* – Development of systems to improve stormwater quality or to reduce contamination may be required to meet conditions of stormwater discharge consents, or the quality requirements of the Regional Water Plan for Southland.
- *Operational Efficiency* – New projects will be considered when annual costs are reduced by improving efficiencies.

The selection, prioritising and programming of stormwater asset development projects will take into account:

- Council preference
- Risk analysis
- Cost and benefits
- Affordability
- Ranking and co-ordination with other projects

For new development projects, Council will consider all available options (including new technologies and renovation techniques, life cycle costs and replacement of existing assets) to achieve the most cost effective options.

7.4.3 Capital Development Options and Alternatives

Apart from the service level improvement component of the pipe renewal budget, no capital development projects are proposed within this Asset Management Plan.

7.5 DISPOSAL PLAN

7.5.1 Forecast Future Disposal of Assets

Because the stormwater asset is intended to operate in perpetuity to provide a continuing stormwater drainage service to the developed areas of the City, it is intended that individual assets will only be disposed of at the end of their service life, at which time they will be replaced with new assets or become obsolete as part of new development projects. In general, where assets are in the same location, the old asset will be removed as part of the renewal project.

7.5.2 Forecast of Income / Expenditure from Asset Disposal

Because assets will usually be at the end of useful life at disposal, they are expected to have zero value. Specific funding is therefore not allocated to disposal of assets, but where costs are incurred in their removal, these will be included in development and renewal project costs.

7.6 RECOMMENDED PROGRAMME

The recommended renewal programme is designed to ensure that the activity is operated effectively and efficiently to ensure that levels of service are achieved over the 30 years of this Asset Management Plan life.

7.6.1 Evaluation of Options / Alternative Programmes

The evaluation of a range of options is standard practice within the design and procurement phases of projects. For example, a range of pump types and brands may be considered for a pump renewal project, with performance and life cycle costs taken into account.

7.6.2 Recommended Operation / Maintenance Programmes

The recommended programme includes significantly increased monitoring programmes for stormwater discharge quality, and investigation programmes to identify and correct sources of contamination. This is necessary to meet the conditions of the new stormwater discharge consent granted in September 2017. Maintenance and Operational programmes for pump stations and network features include regular inspections to ensure operational efficiency and maintenance as required at pump stations to ensure optimal over lifetime performance. Operational programmes include annual inspection of pumps and electrical equipment to optimise maintenance programmes.

7.6.3 Recommended Renewal Programmes

Pump Stations

A detailed renewal programme for pumps and associated electrical and control systems is included in the pump station schedule in Appendix 16.04. The renewal programme is assessed annually within the operational programme, and renewal programmes adjusted to ensure equipment is replaced when declining performance or economy of operation warrants.

Pipe Network

The proposed renewal programme is to renew pipes at the end of their expected lives. This would provide for pipes to be replaced at the rate of condition deterioration, and so, overall, would maintain the condition profile of the network. This programme is smoothed over a 5-7 year period to minimise yearly peaks and allow for a consistent renewal programme.

Renewal projects would be selected based on maintenance serviceability and capacity issues, and where possible, projects would be co-ordinated with the development and renewal projects of other utilities.

7.6.4 Recommended Capital Development Programme

No Capital Development projects are included within this Asset Management Plan.

It is anticipated that new assets may be added to the activity as a result of extensions to the network which will be funded by developers.

7.7 HOW THE ACTIVITY WILL BE RESOURCED

7.7.1 Internal Resourcing

The activity is resourced from Council's Asset Team, Engineering Services and the 3 Waters Operational Team.

The Asset team provides for programming activities, budget supervision, programme and performance monitoring, asset management, bylaws, advice for planning, resource and subdivision activity, negotiation of resource consents for the activity, and council reporting.

Engineering Services is Council's in house consulting team, providing engineering advice for maintenance and construction as the role of Engineer to Contract and Engineer's Representative, and direct liaison with the contractor in the delivery of contracts. Where needed in specialist areas, Engineering Services will subcontract those resources on an as and when needed basis, such as for pump station design or structures associated with the network.

The 3 Waters Operational Team is Council's in house management and operations of the three waters activities. They provide laboratory services to monitor the stormwater discharges as required by the discharge consent, and operators to manage the stormwater pump stations.

7.7.2 Procurement Strategy

Council procures its physical works via the open tender market.

The maintenance contracts are:

➤ ***Mechanical and Electrical Maintenance***

This contract provides for the maintenance of the mechanical and electrical plant across the three water activities for the pump stations and treatment plants.

➤ ***Pipe Network Maintenance***

This contract provides for the operational and maintenance of pipe networks across the three waters activities.

Renewal contracts for Pipe Network and Pumping Stations are typically tendered on a project basis.

8. Financial Management

8.1 OVERVIEW

The Local Government Act 2002 requires local authorities to manage their finances “*prudently and in a manner that promotes the current and future interests of the community*”. This implies compliance with Generally Accepted Accounting Practice (GAAP). Of particular relevance is the International Public Sector Accounting Standard IPSAS17 (Property, Plant and Equipment).

In determining how activities will be funded, local authorities are required to take the following into consideration:

- The contribution to the achievement of Community Outcomes (strategic alignment).
- Beneficiaries of each activity (beneficiary / user pays principles).
- The period over which benefits from the activity will occur (intergenerational equity issues).
- The costs and benefits of funding the activity compared to other activities (cost / benefit and prioritisation principles).
- The impact of funding the activity on the wellbeing of the community (ability to pay principles).

Asset Management Plans provide the basis for meeting these requirements for infrastructure based activities.

8.2 FINANCIAL SUMMARY – WHAT THE ACTIVITY COSTS

The following graphs show the forecast in categories over the first 10 years of the Plan, and summarised in five year blocks over the 30 years of the Plan.

Expenditure categories are identified as follows:

- *Operational* – Rates, insurance, contract data management system costs, investigations and monitoring, and attendance to pump stations operation requirements.
- *Maintenance* – Recurrent expenditure, periodically or regularly required as part of the anticipated schedule of works required to keep assets operating, e.g. maintenance of pump station mechanical and electrical plant, clearance of debris from structures and repair of drainage structures.
- *Capital Development* – Expenditure, which creates a new asset to meet additional service level requirements or which improves an existing asset to provide a higher level of service.
- *Capital Renewals / Rehabilitation* – Expenditure on an existing asset which restores, rehabilitates or replaces existing asset to its original capacity, e.g. replacing parts of the pipe network or replacement at the end of economic life, or the rehabilitation of assets to extend their life.

Figure 8.1 Operating Expenditure (10 years)

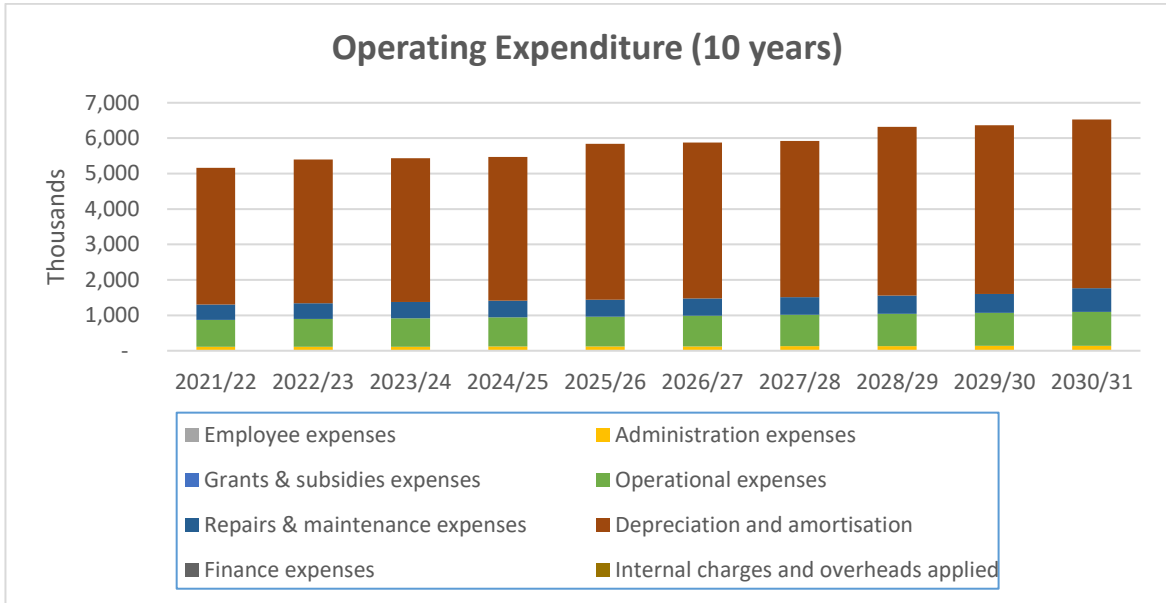


Figure 8.2 Capital Expenditure (10 years)

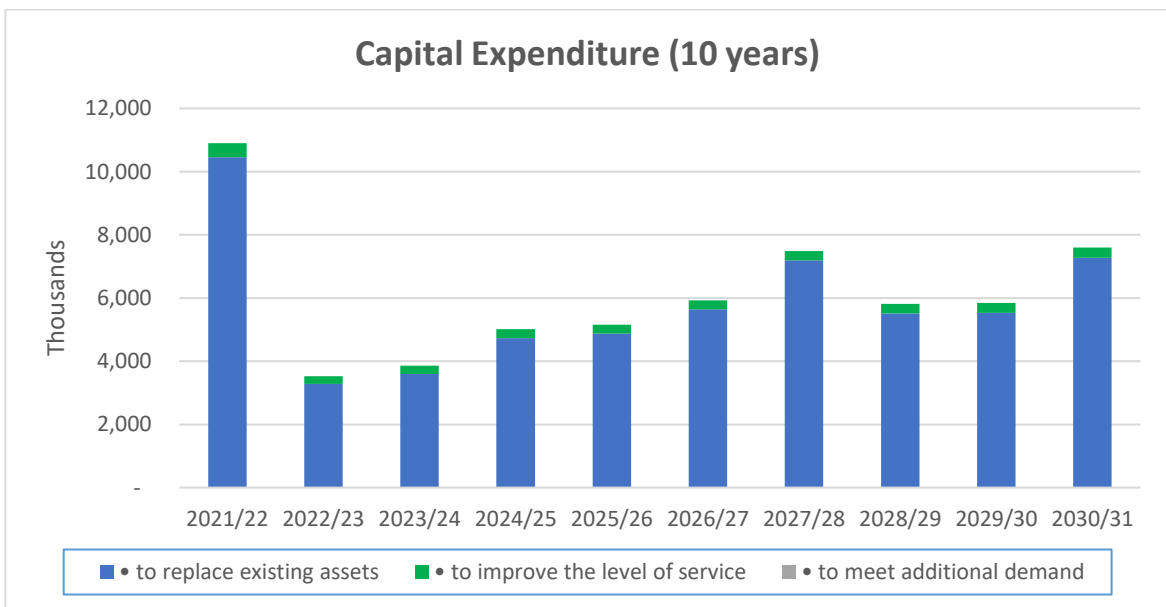


Figure 8.3 Operating Expenditure (30 years)

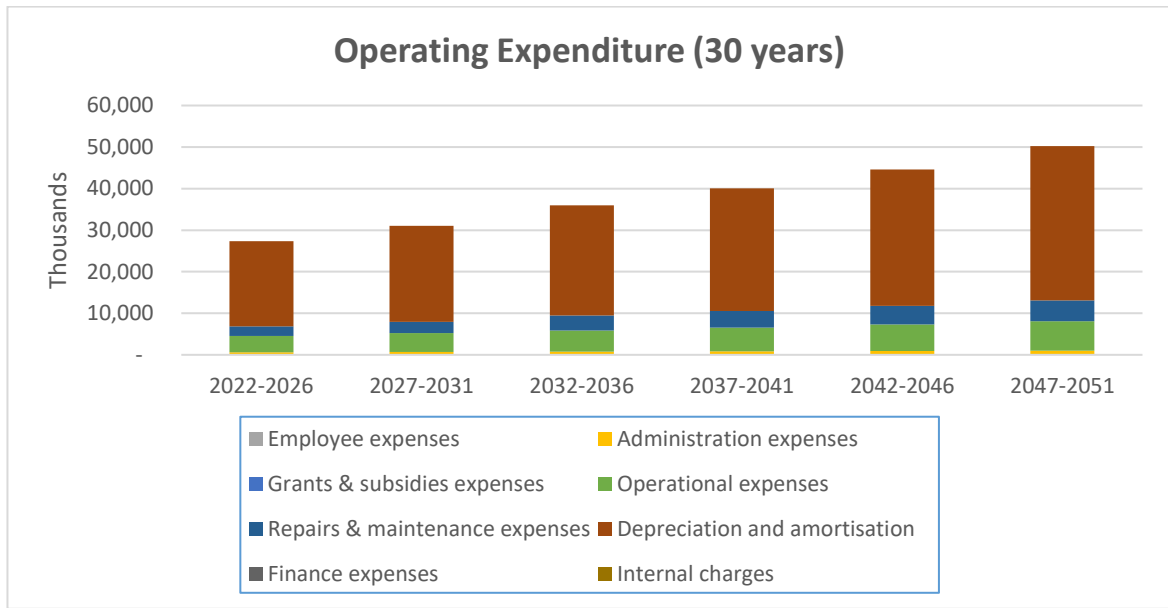
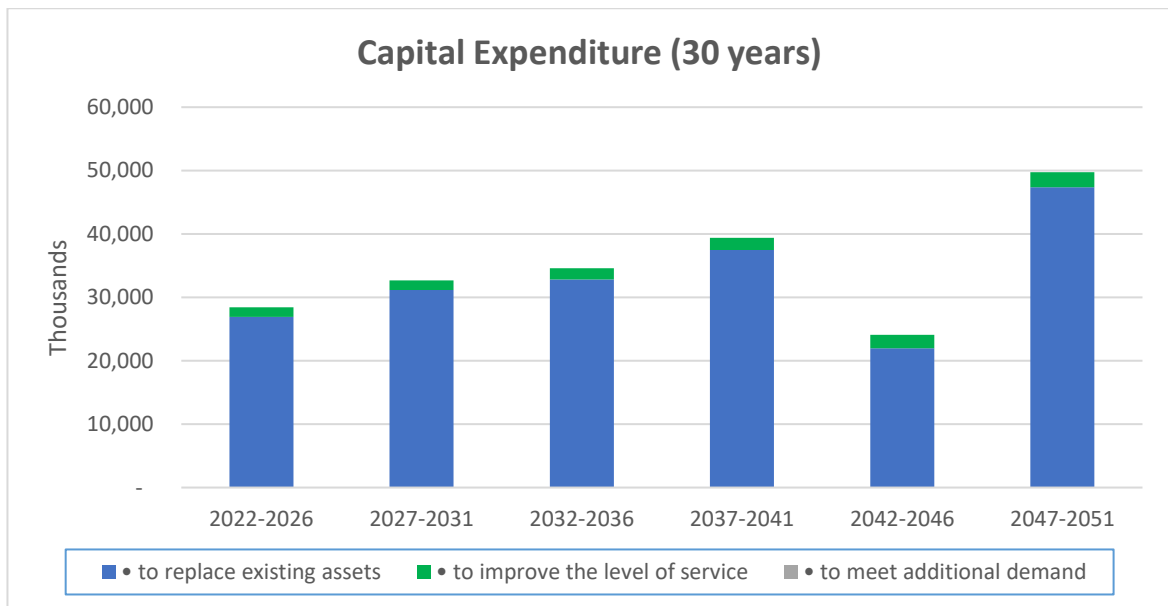


Figure 8.4 Capital Expenditure (30 years)



8.2.1 Council Funded Programmes

The following tables show the 10 year and 30 year financial summary in spreadsheet form. Table 8.3 and Figure 8.5 show the capital programme based on the asset management plan programme compared to the allocated funding as determined by Council. This results in some years with less funding allocated than required. This has an implication on the asset management programme proposed, as some infrastructure will need to be “sweated” to some degree, however, this is only over an approximate 5 year period before funding is reallocated. Over the 10 year period of the AMP this results in approximately \$11M of under funding, however over the 30 year period of the infrastructure strategy there is no net under funding.

Table 8.1 Stormwater

	2020/21 Annual Plan (\$000)	2020/21 Forecast (\$000)	2021/22 LTP (\$000)	2022/23 (\$000)	2023/24 (\$000)	2024/25 (\$000)	2025/26 (\$000)	2026/27 (\$000)	2027/28 (\$000)	2028/29 (\$000)	2029/30 (\$000)	2030/31 (\$000)
OPERATING												
Rates revenue	4,344	4,344	5,156	5,394	5,644	5,905	6,178	6,464	6,697	6,940	7,191	7,451
Subsidies and grants (Capital)	-	-	-	-	-	-	-	-	-	-	-	-
Subsidies and grants (Operational)	-	4,830	5,320	-	-	-	-	-	-	-	-	-
Direct charges revenue	-	-	-	-	-	-	-	-	-	-	-	-
Rental revenue	3	3	3	3	3	3	3	3	3	4	4	4
Finance revenue	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-
Fines	-	-	-	-	-	-	-	-	-	-	-	-
Other revenue	6	6	6	6	6	6	7	7	7	7	7	8
Internal charges and overheads recovered	-	-	-	-	-	-	-	-	-	-	-	-
Total revenue	4,353	9,183	10,485	5,403	5,653	5,914	6,188	6,474	6,707	6,951	7,202	7,463
Employee expenses	-	-	-	-	-	-	-	-	-	-	-	-
Administration expenses	97	110	110	112	115	119	122	125	127	131	136	139
Grants & subsidies expenses	-	-	-	-	-	-	-	-	-	-	-	-
Operational expenses	782	768	759	782	801	821	842	862	885	910	934	958
Repairs & maintenance expenses	434	434	434	445	458	469	481	493	505	520	534	673
Depreciation and amortisation	3,862	3,862	3,862	4,061	4,063	4,066	4,398	4,401	4,404	4,755	4,758	4,761
Finance expenses	13	-	-	-	-	-	-	-	-	-	-	-
Internal charges and overheads applied	367	-	-	-	-	-	-	-	-	-	-	-
Total expenses	5,555	5,174	5,165	5,400	5,437	5,475	5,843	5,881	5,921	6,316	6,362	6,531
OPERATING SURPLUS / (DEFICIT)	(1,202)	4,009	5,320	3	216	439	345	593	786	635	840	932
CAPITAL EXPENDITURE												
• to meet additional demand	-	-	-	-	-	-	-	-	-	-	-	-
• to improve the level of service	-	-	450	247	269	276	283	290	297	305	314	322
• to replace existing assets	-	9,064	10,454	3,281	3,595	4,734	4,870	5,641	7,190	5,507	5,531	7,277
TOTAL CAPITAL EXPENDITURE	-	9,064	10,904	3,528	3,864	5,010	5,153	5,931	7,487	5,812	5,845	7,599
Gross proceeds from sale of assets	-	-	-	-	-	-	-	-	-	-	-	-

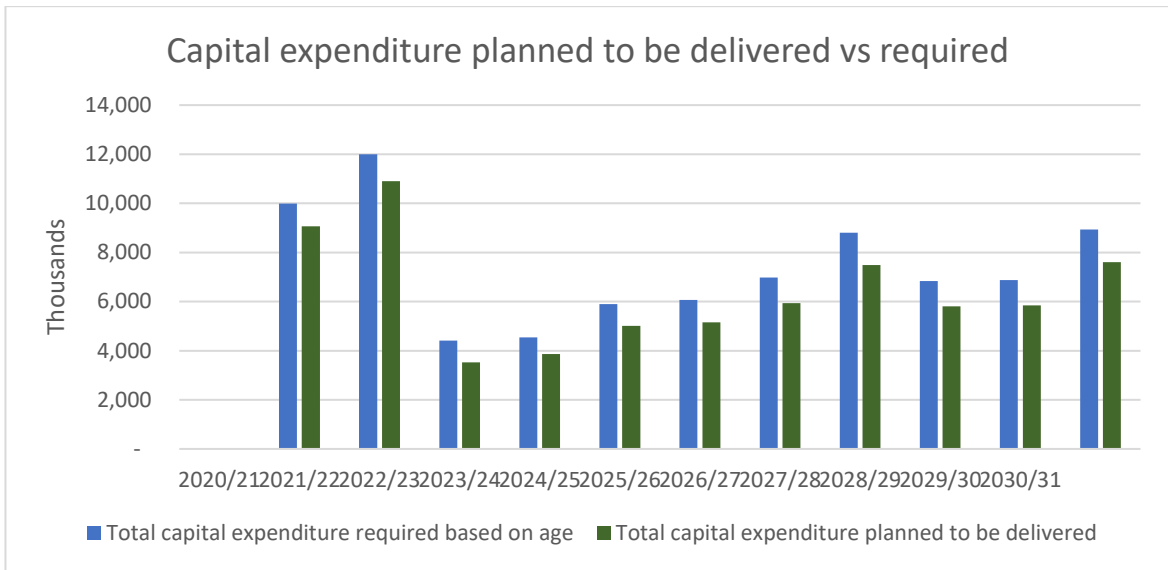
Table 8.2 Stormwater - 30 Year Plan (as required)

	2022-2026 LTP (\$000)	2027-2031 LTP (\$000)	2032-2036 LTP (\$000)	2037-2041 LTP (\$000)	2042-2046 LTP (\$000)	2047-2051 LTP (\$000)
<u>OPERATING</u>						
Rates revenue	28,277	34,743	41,499	49,570	59,209	70,725
Subsidies and grants (Capital)	-	-	-	-	-	-
Subsidies and grants (Operational)	5,320	-	-	-	-	-
Direct charges revenue	-	-	-	-	-	-
Rental revenue	15	18	20	23	25	28
Finance revenue	-	-	-	-	-	-
Dividends	-	-	-	-	-	-
Fines	-	-	-	-	-	-
Other revenue	31	36	40	45	50	56
Internal charges	-	-	-	-	-	-
Total revenue	33,643	34,797	41,559	49,638	59,284	70,809
Employee expenses	-	-	-	-	-	-
Administration expenses	578	658	743	830	919	1,029
Grants & subsidies expenses	-	-	-	-	-	-
Operational expenses	4,005	4,549	5,115	5,703	6,361	7,093
Repairs & maintenance expenses	2,287	2,725	3,600	4,014	4,475	4,987
Depreciation and amortisation	20,450	23,079	26,506	29,530	32,874	37,090
Finance expenses	-	-	-	-	-	-
Internal charges	-	-	-	-	-	-
Total expenses	27,320	31,011	35,964	40,077	44,629	50,199
OPERATING SURPLUS / (DEFICIT)	7,290	7,025	12,195	19,069	27,369	37,374
<u>CAPITAL EXPENDITURE</u>						
• to meet additional demand	-	-	-	-	-	-
• to improve the level of service	-	-	-	-	-	-
• to replace existing assets	28,459	32,674	34,571	39,393	24,114	49,741
TOTAL CAPITAL EXPENDITURE	36,719	27,315	29,957	28,541	16,838	31,147
Gross proceeds from sale of assets	-	-	-	-	-	-

Table 8.3 Capital Expenditure planned to be delivered vs required

	2020/21 Annual Plan (\$000)	2020/21 Forecast (\$000)	2021/22 LTP (\$000)	2022/23 LTP (\$000)	2023/24 LTP (\$000)	2024/25 LTP (\$000)	2025/26 LTP (\$000)	2026/27 LTP (\$000)	2027/28 LTP (\$000)	2028/29 LTP (\$000)	2029/30 LTP (\$000)	2030/31 LTP (\$000)
<u>Capital expenditure required based on age</u>												
• to meet additional demand	-	-	-	-	-	-	-	-	-	-	-	-
• to improve the level of service	-	600	309	316	324	333	341	350	359	369	379	
• to replace existing assets		9,991	11,404	4,101	4,231	5,5569	5,729	6,636	8,459	6,479	6,507	8,561
Total capital expenditure required based on age		9,991	12,004	4,409	4,547	5,893	6,062	6,977	8,809	6,838	6,876	8,940
<u>Capital expenditure planned to be delivered</u>												
• to meet additional demand	-	-	-	-	-	-	-	-	-	-	-	-
• to improve the level of service	-	450	247	269	276	283	290	297	305	314	322	
• to replace existing assets		9,064	10,454	3,281	3,595	4,734	4,870	5,641	7,190	5,507	5,531	7,277
Total capital expenditure planned to be delivered		9,064	10,904	3,528	3,864	5,010	5,153	5,931	7,487	5,812	5,845	7,599

Figure 8.5 Capital Expenditure planned to be delivered vs required



8.2.2 NZTA Assisted Programmes

Not applicable to the stormwater activity.

8.3 FINANCIAL POLICIES

The Local Government Act 2002 requires Council to manage its finances prudently and in a manner which promotes the current and future needs of the community. Council must ensure that each year's projected operating revenues are set at a level sufficient to meet the years projected operating expenses.

The Revenue and Financing Policy states Council's policy on the funding of its operating and capital expenditure, and the sources of those funds.

Council, for each activity, must give consideration to who benefits from the activity and the appropriate level of private versus public benefit when funding the activity. Public benefit is gained from having access to activities provided by Council. Private benefit is gained from receiving goods or services provided by Council, i.e. a building consent for work carried out by private residents.

8.4 HOW WE PAY FOR THE ACTIVITY

The finance strategy provides the detail of the funding for the stormwater activity.

8.5 ASSET VALUATION FORECASTS

Council stormwater assets were revalued as at 30 June 2019 in accordance with the Financial Reporting Standard PBE IPSAS 17 and the New Zealand Infrastructure Valuation Guidelines.

The pipe network was valued by Council staff and audited by AECOM NZ Limited. Treatment Plants and Pump Stations were valued by AECOM NZ Limited and reviewed by Council staff.

The unit costs applied to the pipe network assets were derived from Council analysis of previous contracts with comparison to those experienced in other Councils, plus comparison to those stated in the New Zealand Infrastructure Valuation Guidelines. Asset lives are generally those stated in the valuation guidelines with some modification by Council Asset Management staff.

Depreciation is calculated on all costs except land to allocate their costs (less residual value) over their expected economic life. Details of the basis and rates of various categories of asset are as follows:

- Pipe Network - 1%-2% Straight Line
- Mechanical and Electrical Plant - 2.5%- 20% Straight Line
- Buildings - 1%-2% Straight Line

The valuation is as follows:

Table 8.3 Asset Valuation

Asset Group	Optimised Replacement Cost	Optimised Depreciated Replacement Cost	Depreciation
Fittings (manholes, cleaning eyes, etc.)	\$26,590,283	\$15,301,783	\$275,960
Pipes	\$321,898,007	\$154,135,980	\$3,329,255

Stopbanks	\$13,787,400	\$5,698,792	\$137,874
Pumping Stations	\$4,678,708	\$2,874,755	\$117,457
Total	\$366,954,398	\$178,011,310	\$3,860,546

8.5.1 30-year Renewal Forecast

Figure 8.5 Cost to Renew at Estimated Failure vs Capital Renewals over 10 Years

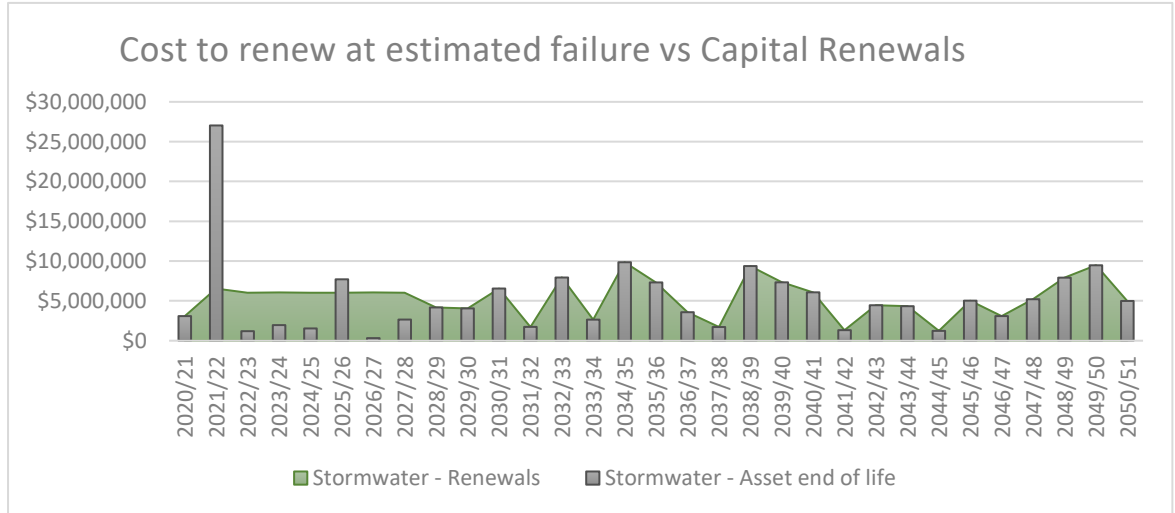
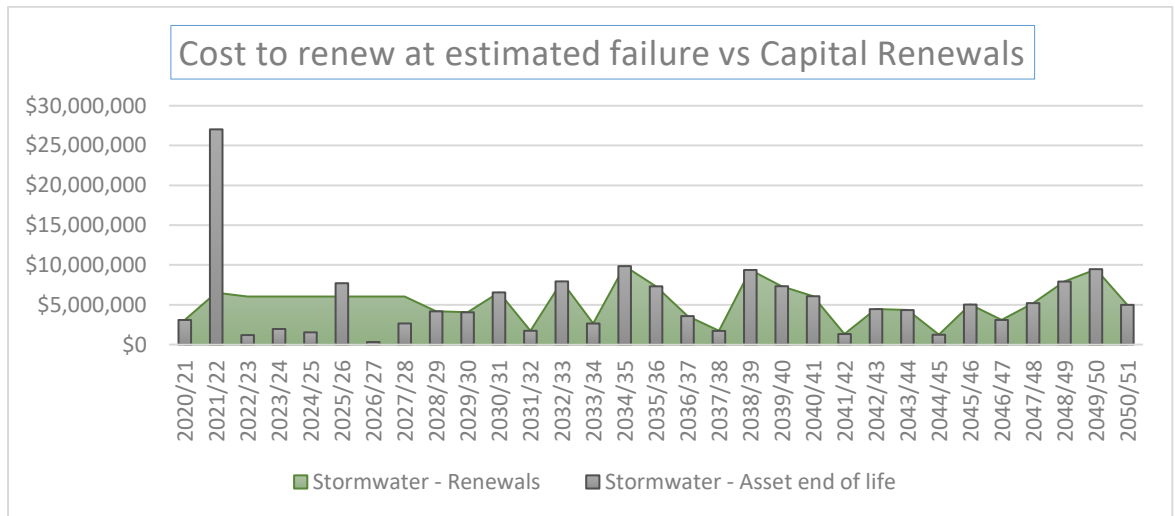


Figure 8.6 Yearly Renewal Costs and Capital Renewals Programme over 30 Years



8.6 CONFIDENCE LEVELS IN PROGRAMMES

The confidence in the programmes in this Asset Management Plan has been assessed in terms of the data on which the programmes are based and in terms of the programmes themselves.

Table 8.4 Confidence Levels in Programmes

Confidence Grade	General Meaning
A	<p>Highly Reliable</p> <p>Data based on sound records, procedures, investigations and analysis which is properly documented and recognised as the best method of assessment. Dataset is complete and estimated to be accurate $\pm 2\%$.</p>

B	<p>Reliable</p> <p>Data based on sound records, procedures, investigations and analysis which is properly documented but has minor shortcomings, for example the data is old, some documentation is missing and reliance is placed on unconfirmed reports or some extrapolation. Dataset is complete and estimated to be accurate $\pm 10\%$.</p>
C	<p>Uncertain</p> <p>Data based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolation from a limited sample for which grade A & B data is available. Dataset is substantially complete but up to 50% is extrapolated data and accurately estimated $\pm 30\%$.</p>
D	<p>Very Uncertain</p> <p>Data is based on unconfirmed verbal reports and / or cursory inspection and analysis. Dataset may not be fully complete and most data is estimated or extrapolated. Accurately $\pm 40\%$.</p>

The assessment of confidence levels is based on the following assumptions:

Growth

- Population change will follow the Statistics New Zealand medium population projection.
- Climate change will be in line with climate change scenario RCP4.5.
- The majority of infrastructure required to service new developments will be funded by developers.

Levels of Service

- There will be no significant changes in levels of service.
- Quality improvements to stormwater discharges requiring network upgrades due to resource consent conditions or the Southland Water and Land Plan will be accommodated within renewal programmes and the stormwater treatment budget.
- No upgrading of existing infrastructure will be required as a result of urban development provided the anticipated development is evenly spread across the urban area. If development is concentrated in part of the urban area, or one of the areas identified for growth of the urban area, some upgrading of existing infrastructure is likely to be required.
- Future condition assessments will not indicate additional remedial / replacement works to those scheduled in work programmes.

Natural Disasters

- This Plan is based on the assumption that there will be no natural disasters affecting the Council's stormwater network.
- No provisions have been made in programmes for the cost of repairing damage or other additional costs consequent upon a natural disaster such as a major flood or substantial earthquake. Costs associated with these disasters will be covered by Council's participation in the Local Authority Protection Programme Disaster Fund (LAPP) scheme and insurance of assets excluded from coverage by the LAPP scheme.

Climate Change

- Climate change will be in line with climate change scenario RCP4.5 and it will be taken into consideration for pipe renewal projects, particularly where they incorporate an outfall to a tidal area.

Assessment of Confidence in Key Inputs to Programmes

Table 8.5 Confidence Assessment Grades of Pipe Network and Pump Stations

Pipe Network Attributes	Grade	Pump Station Attributes	Grade
Unit Replacement Cost	B+	Structural Condition	A
Condition/Remaining Life	B-	Pump Description	A
Diameter	A	➤ Date Installation	A
Material	A	➤ Performance	A
Age	A	➤ Condition / Remaining Life	B
Length	A	➤ Replacement Cost	B+
		Switchboard / Telemetry	
		➤ Condition	A
		➤ Date Installation	A
		➤ Performance	A
		➤ Replacement Cost	B±

Confidence in asset attributes are rated as highly reliable (A grade).

For pipe network attributes confidence is based on comprehensive construction records maintained through the life of the network. When work is done on individual assets, information is checked for accuracy and corrected when found to be inaccurate. A small number of records require correction in any year, representing a high level of confidence in the data.

For mechanical and electrical plant (pump stations and treatment plants) inspections are scheduled annually to determine maintenance requirements and to update condition and performance ratings, providing a high level of confidence in the data.

Assessment of Confidence in Financial Programmes

Table 8.6 Confidence Assessment Grades of Financial Programmes

Parameter	Confidence Grade
Management Costs	A
Asset Management	A-
Pump Stations – Maintenance Costs	B
– Replacement Costs	B
Pipe Network – Maintenance Costs	B-
– Replacement Costs	B-
Capital Costs – Asset Renewal	B
– Asset Development	B
Overall Confidence in Financial Programme	B

8.7 RELIABILITY OF FINANCIAL FORECASTS

A full sensitivity analysis has not been completed and this will be an item in the improvement plan. Assumptions that will affect the activity are identified below. Resource consents are the most critical assumption as they have the potential for the largest impact on financial forecast, however, these impacts are not expected to be sudden as they would be in response to legislative changes with typically 2-3 year lead times. The remaining uncertainty on the items below are also manageable over the LTP cycles and can be reforecast each cycle in response to changes in the expected impacts.

8.7.1 Renewal Forecasts

- Population
- Household growth
- Aging population

The activity relies predominately on rates for revenue. Significant variance in the population related assumptions may affect the community's ability to pay, or require significant development expenditure.

8.7.2 Operational Forecasts

➤ **Resource Consents**

Council was issued a new consent for stormwater discharge in September 2017. Budget allocations have been made for monitoring and investigations required by the consent.

➤ **Natural Disasters**

Significant flood events or earthquake may require significant increases in operational expenditure.

➤ **Climate Change**

Sea level rise, if faster than anticipated, may require new operational programmes for the activity but these are not anticipated within the immediate future.

8.7.3 Maintenance and Renewal Forecasts

➤ **Resource Consents**

Significantly increased discharge quality requirements as a result of resource consent conditions may require upgraded renewal programmes. An allowance for stormwater treatment has been made in the capital programme budget.

➤ **Useful Life of Significant Assets**

If the useful life of assets varies significantly from the assumptions of Section 7.3.1, renewal programmes will require adjustment, potentially with significant positive or negative effect on budgets.

➤ **Climate Change**

Faster increase in sea level than predicted will require adjustment to renewal programmes. Renewals will be designed in line with climate change scenario RCP4.5 and the associated rainfall intensity and sea level rise.

8.7.4 Development Forecasts

No development plans are proposed by this Asset Management Plan. If population increases at a greater rate than assumed, or new industry is established in the City, development programmes will need to be considered.

8.8 SUMMARY OF PROGRAMME ASSUMPTIONS

The stormwater activity is particularly susceptible to the following assumptions:

➤ ***Resource Consent***

The new stormwater resource consent will require significant improved stormwater quality. The extent of improvement required is not yet determined.

➤ ***Useful Life of Significant Asset / Asset Valuation***

Asset renewals accounts for over 60% of the activity budget. Changes in useful life and valuation of assets will significantly affect the overall budget.

➤ ***Climate Change***

Sea level rise will need to be managed through this century, and variance from climate change scenario RCP4.5 will significantly affect activity budgets.

9. Delivering and Monitoring the Programme

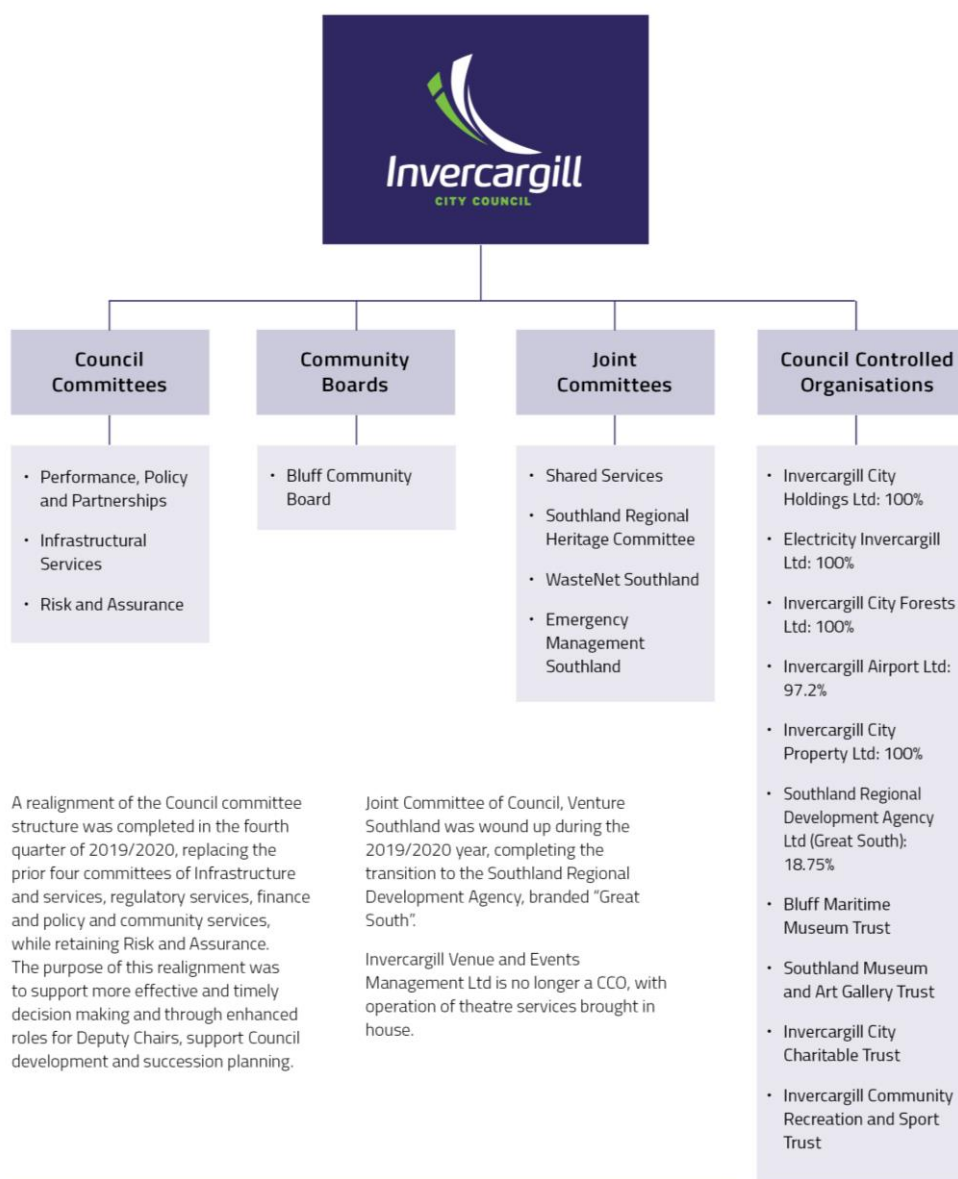
9.1 PROGRAMME GOVERNANCE AND REPORTING

Council operates on a monthly cycle with committees meeting before a full Council meeting. These committees accept and receive reports from their relevant Group as per the delegations register, and Management Staff are at these meetings to answer any questions that arise.

This reporting process ensures accountability to Councillors and allows for transparency to the public.

The Bluff Community Board is established as a committee who reports to Council on behalf of the Bluff area and deals with any issues relating to their area. Council provides direction to this committee and has a representative sitting on this Board.

**Figure 9.1 Programme Governance and Reporting
Council Structure**



Councillors are elected on a triennial basis through local government elections with the community voting for 12 Councillors and a Mayor. The Chief Executive role is reviewed every five years. In addition to this, Council undertakes a Representation Review every six years to ensure that the community is aware and accepting of the current Council structure.

Council develops their Long Term Plan every three years in line with their obligations under the Local Government Act 2002. Every year following this, Council will adopt an Annual Plan which will make any amendments to the existing Long Term Plan and allows for members of the community to submit on this process.

Further, Council will provide an Annual Report, which is a full year financial snapshot of Council's activities for that financial year. This is also compared to the financial projections in Council's Long Term Plan.

9.2 STAKEHOLDER ENGAGEMENT AND COMMUNICATIONS

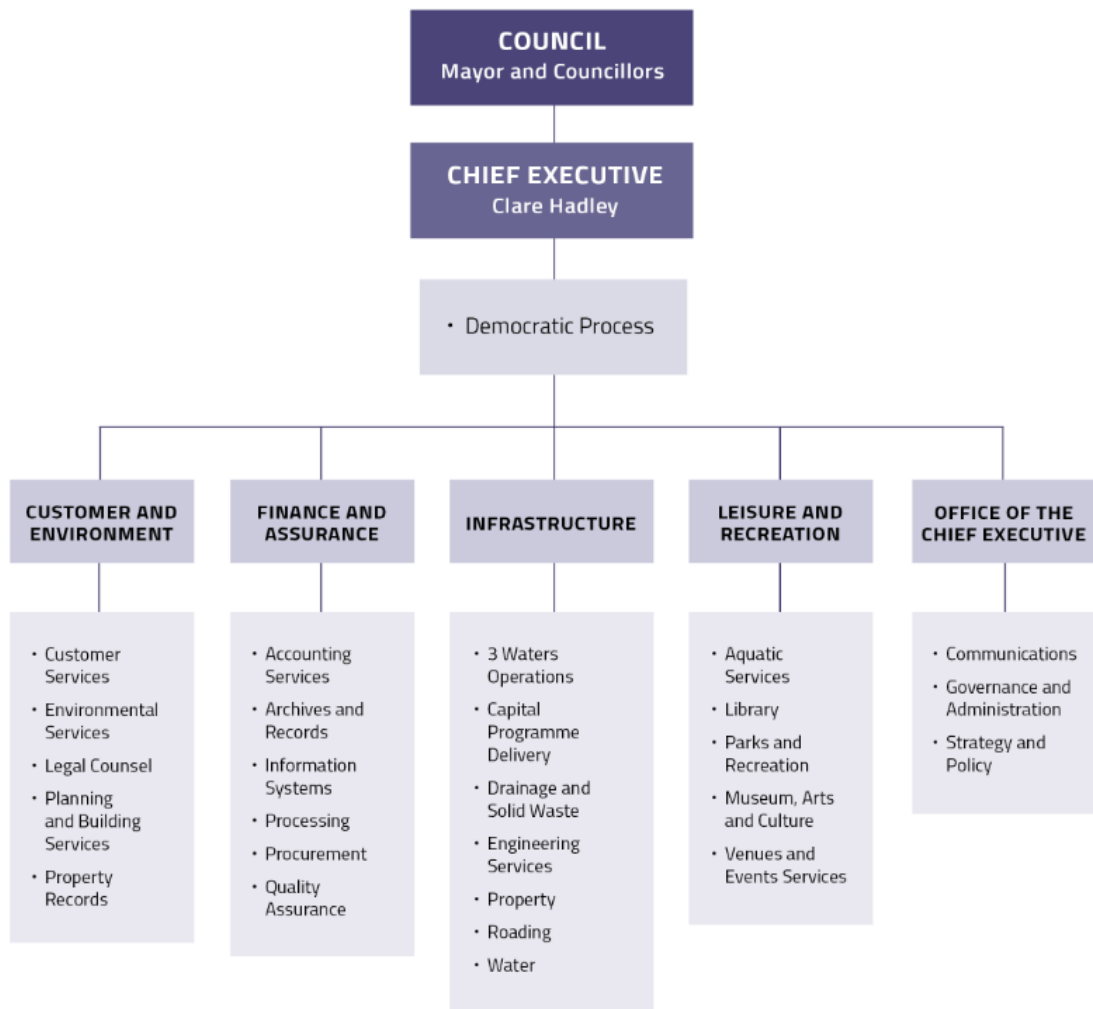
Council currently utilises a myriad of methods to engage in consultation with members of the community. The Local Government Act 2002 states specific methods of consultation to be utilised by Council for certain processes, Council adds to this through innovative and community-tailored engagement techniques.

9.3 BUSINESS PROCESSES

The management structure of the Invercargill City Council is as follows:

Figure 9.2 Management Structure of Invercargill City Council

Management Structure



Council staff operates under a Delegations Register that is adopted by Council. This Register lists every department with specific delegations that are required under legislation or Council policies so that staff members are able to carry out their specific job requirements.

INFORMATION SYSTEMS AND DATA

Geographical Information Systems (GIS)

Provides mapping and spatial analysis tools for Council to graphically determine and understand where Council facilities or assets are located. This includes geocoding data, putting it on a map, and symbolizing it in ways that can help visualize and understand the data. The software displays how places are related which helps make more informed decisions about the best locations and paths for infrastructure and planning. Utilising these attributes we can use the software to help make predictions and better understand our environment.

Infor Pathway

Delivers a comprehensive offering of fully integrated functionality for managing council related business processes including:

- *Customer Service and People Management* – central name / address register and customer request management.
- *Land and Property Management* – administration tools to assist with land and property management.
- *Revenue Management* – capabilities such as rates accounting, property valuations, debtors and water billing.
- *Regulatory Management* – a comprehensive range of workflow-driven modules to ensure that local and national regulatory legislation for consents processing, parking and animals, and health and liquor licensing are complied with.
- *Internet-enabled customer self-service* – ePathway enables Council customers to conduct local government e-commerce online.

Infor Public Sector (IPS)

IPS is a centralised Asset Management Information System (AMIS) that allows for the effective management of infrastructure assets. IPS provides tools to improve asset efficiency, conduct planned and unplanned maintenance, manage work costs, provide asset inspection scheduling, and assists in optimising assets life cycles. Asset needs analysis in IPS can be used to determine and recommend which maintenance and renewal programmes are likely to be needed, to assist with long term maintenance and budgeting plans.

Objective

Delivers an Electronic Document and Records Management (EDRMS) service across all of Council providing information management processes and business process automation with robust security, version control and audit management to ensure Council complies with recordkeeping standards; this reduces the risk associated with managing information in multiple locations.

SCADA / InTouch

SCADA (Supervisory Control and Data Acquisition) is a control system installed at the Clifton Wastewater Treatment Plant and the City Control Room. It includes electronic devices networked to a computer to allow remote control and record keeping of all actions, faults and alarms.

InTouch is the computer programme which allows human interfacing with SCADA to facilitate the exercising of control and access of data (a form of human / machine interface referred to as HMI).

Telemetry

Telemetry is the communication system that allows communication between the Clifton Wastewater Treatment Plant and City Control Room to all remote sites including the Bluff Wastewater Treatment Plant and pump stations. Communication technology currently in service is a combination of several direct point to point radio links and micro wave / fibre optic network links. The telemetry system reports alarms from remote sites to the Treatment Plant SCADA system which can then be actioned by operators, or by Council's 24 hour Water Control Centre.

9.4 PROGRAMME PERFORMANCE MONITORING AND REVIEW

9.5.1 Monitoring Approach

Council operates on a monthly cycle with meetings for the committees of Council that look into each group at Council and are provided with extensive monitoring and reporting of levels of services for activities and assets that come out of that group, alongside monthly financial accounts for each group. The Committee will question these reports with managers present to answer any questions that arise from the reports.

The information for these reports is entered into various software systems as detailed in Section 9.4. This monitors the performance (which is both fiscal and service based) against targets and budgets from Council's Long Term Plan. Targets can be key performance indicators, internally driven targets or provided from a Ministry that oversee that area, e.g. Department of Internal Affairs.

9.5.2 Frequency of Review

Every financial year Council prepares an Annual Report that is the key document in ensuring the expenditure for the year was efficient and is pertinent in ensuring accountability to the community and ratepayers.

The Annual Report does not just show the current financial status, but also shows the levels of service for all Council activities and assets measured against the yearly targets set in the Long Term Plan. As noted in Section 9.1, these are measured and reported six weekly in the Council meetings. The Annual Report is a holistic overview of their performance.

10. Continuous Improvement

10.1 CURRENT ASSET MANAGEMENT PRACTICE

The Asset Management Improvement Plan is set over a three year period from July 2020 to June 2023 and is designed to produce an ongoing improvement to Asset Management processes. Current practice and areas for improvement are tabulated in Table 10.1.

Table 10.1 Improvement Programme 2021

	Current Practice	Areas for Improvement	Timeframe	Budget	Responsibility
Knowledge of Assets / Data Management	Pipe Network				
	<ul style="list-style-type: none"> ➤ Data – knowledge of pipe age, materials, sizes and location is very good ➤ Condition – knowledge of pipe condition from 5% of asset record on CCTV and graded in accordance with pipe inspection manual 	<p>Continue to update records</p> <p>Continue pipe inspection programme to improve knowledge of asset condition</p>	<p>Ongoing</p> <p>Ongoing</p>	<p>Within existing budgets</p> <p>\$50,000 p.a.</p>	<p>Engineering Services</p> <p>Engineering Services</p>
	Electro Mechanical Plant				
	<ul style="list-style-type: none"> ➤ Condition regular maintained and inspected ➤ Condition assessed annually ➤ Rated 3 yearly 	Current practice adequate	Ongoing	\$20,000 p.a.	3 Waters Operations Group – Maintenance Contract
Valuation, Depreciation and Effective Lives	Structures (buildings, manholes, etc.)				
	<ul style="list-style-type: none"> ➤ Buildings maintained and assessed regularly – upgrading needs assessed for Asset Management Plan 	Current practice adequate	Ongoing	Within existing budgets	Drainage Manager
Asset Costing	<ul style="list-style-type: none"> ➤ Valuation guidelines 	Reassess effective lives of pipe network based on improved condition assessment	Ongoing	Within existing budgets	Engineering Services
Asset Renewal and New Works Strategy	<ul style="list-style-type: none"> ➤ Replacement costs based on continuing records of renewal contracts 	Current practice adequate	Ongoing	Within existing budgets	Engineering Services
Service Level Specification and Measurement	<ul style="list-style-type: none"> ➤ Forward 30 year plan based on age and condition ➤ Annual Plans consider: <ul style="list-style-type: none"> ▪ Condition ▪ Age ▪ Capacity ▪ Co-ordination with other asset upgrades / renewals 	Improve asset condition assessment to better identify renewal needs	Ongoing	Within existing budgets	Drainage Manager
Review, Audit and Continuous Improvement	<ul style="list-style-type: none"> ➤ Meeting most performance measures ➤ Customer focussed service levels only recently measured ➤ Surveys used to assess customer needs 	Continue to measure and assess performance against service levels	Ongoing	Within existing budgets	Drainage Manager
Operations and Maintenance Strategy	<ul style="list-style-type: none"> ➤ Annual financial audit ➤ Annual service level audit ➤ Peer review of Asset Management Plans 	Current practice adequate	Ongoing	Within existing budgets	Group Manager - Finance
	<ul style="list-style-type: none"> ➤ Competitively tendered maintenance contracts in place for major maintenance and operational items ➤ Quality contract management procedures in 	Continue current practice	Ongoing	Within existing budgets	3 Waters Operations Group

	Current Practice	Areas for Improvement	Timeframe	Budget	Responsibility
Consent Compliance	place ➤ Discharge consents to five freshwater streams	New consent (issued in September 2017) requires more intensive monitoring programmes, and investigations to identify and correct sources of contamination to be implemented	March 2018 for programme development, then ongoing implementation	Within existing budgets	Drainage Manager 3 Waters Operations Group
Risk Plans	➤ Lifelines Project identifies risk and response strategies for major events ➤ Asset Management Plan identifies asset failure risk and response strategies	Current practice adequate Improve risk management strategies Identify high value risk assets	Ongoing Ongoing	Within existing budgets Within existing budgets	Drainage Manager Drainage Manager
Sustainability	-	Strategy requires development	Further work required		
Resilience	➤ Develop strategy	-	June 2020	Within existing budgets	Infrastructure Group

Table 10.2 Improvements from 2018 Asset Management Plan

	Current Practice	Areas for Improvement	Progress Towards Achievement
Knowledge of Assets / Data Management	<p>Pipe Network</p> <ul style="list-style-type: none"> ➤ Data – knowledge of pipe age, materials, sizes and location is very good ➤ Condition – knowledge of pipe condition from 5% of asset record on CCTV and graded in accordance with pipe inspection manual <p>Electro Mechanical Plant</p> <ul style="list-style-type: none"> ➤ Condition regular maintained and inspected. ➤ Condition assessed annually ➤ Rated three yearly <p>Structures (buildings, manholes, etc.)</p> <ul style="list-style-type: none"> ➤ Buildings and manholes maintained and assessed regularly – upgrading needs assessed for Asset Management Plan 	<p>Current practice adequate</p> <p>Continue pipe inspection programme to improve knowledge of asset condition</p> <p>Current practice adequate</p> <p>Current practice adequate</p>	<p>Data migrated to Infor IPS Improved data fed into 2020 Asset Management Plan</p> <p>Data migrated to Infor IPS Pump Station Asset Data and Condition Ratings improved in 2020 Asset Management Plan</p> <p>Annual programme to inspect manholes and upgrade continues</p>
Valuation, Depreciation and Effective Lives	➤ Valuation guidelines	Reassess effective lives of pipe network based on improved condition assessment	Records updated
Asset Costing	➤ Replacement costs based on continuing records of renewal contracts	Current practice adequate	Replacement costs updated June 2019 based on contract costs

	Current Practice	Areas for Improvement	Progress Towards Achievement
Asset Renewal and New Works Strategy	<ul style="list-style-type: none"> ➤ Forward 30 year plan based on age and condition ➤ Annual Plans consider: <ul style="list-style-type: none"> ▪ Condition ▪ Age ▪ Capacity ▪ Co-ordination with other asset upgrades / renewals 	Improve asset condition assessment to better identify renewal needs	Asset condition continues to be assessed to improve renewal needs forecasting
Service Level Specification and Measurement	<ul style="list-style-type: none"> ➤ Meeting most performance measures ➤ Customer focussed service levels only recently measured ➤ Surveys used to assess customer needs 	Continue to measure and assess performance against service levels	KPIs aligned with DIA requirements
Review, Audit and Continuous Improvement	<ul style="list-style-type: none"> ➤ Annual financial audit ➤ Annual service level audit ➤ Peer review of Asset Management Plans 	Current practice adequate	Audits completed
Operations and Maintenance Strategy	<ul style="list-style-type: none"> ➤ Competitively tendered maintenance contracts in place for major maintenance and operational items ➤ Quality contract management procedures in place 	Continue current practice	Existing contracts continuing
Consent Compliance	<ul style="list-style-type: none"> ➤ Discharge consents to five freshwater streams 	Monitor and implement identified improvements	Compliance with consent conditions achieved with one exception. Monitoring has identified some sources of contamination, and these have been rectified
Risk Plans	<ul style="list-style-type: none"> ➤ Lifelines Project identifies risk and response strategies for major events ➤ Asset Management Plan identifies asset failure risk and response strategies 	<p>Current practice adequate</p> <p>Improve risk management strategies Identify high value risk assets</p>	Further work required

10.2 IMPROVEMENT PROGRAMME

Areas for improvement of the Asset Management system are identified in Section 10.1, and will be addressed by the following programmes:

➤ ***Pipe Asset Condition Assessment***

Parts of the network have been inspected by CCTV and graded in accordance with the New Zealand Pipe Inspection Manual. This inspection programme will continue, and along with maintenance records, will be used to determine effective lives of pipe assets and renewal programmes.

➤ ***Operational and Maintenance Strategies***

A new maintenance contract was awarded to Downers for pipe network maintenance since 2016, and the contract for electrical and mechanical plant maintenance was tendered and awarded to Wallace Murray. Council continues to review operational and maintenance strategies with its contractors to ensure the delivery of stormwater services continues to improve.

➤ ***Risk Management***

Asset risks have been tabulated in Section 7 of this Plan, and response strategies identified. Further work is intended to identify risks, particularly those associated with deteriorating asset condition and serviceability, and to improve response strategies.

➤ ***Stormwater Discharge Consent***

Council was awarded a new consent to discharge stormwater to five freshwater streams within Invercargill in September 2017, for a term of 15 years. The consent conditions require monitoring conditions intended to identify and reduce contamination of the stormwater from various sources. The monitoring programme will be developed over the first six months of the consent, and remedial actions will be included as part of maintenance and renewal programmes.

10.3 IMPROVEMENTS FROM PREVIOUS ASSET MANAGEMENT PLAN

➤ ***Pipe Asset Condition Assessment***

Progress has been made in the condition assessment of pipe assets and further work is intended.

➤ ***Consents for Stormwater Discharges***

Monitoring of stormwater discharges and remedial work to reduce contamination was undertaken. A contaminant load model has been developed and submitted to Environment Southland and will inform the implementation of stormwater treatment devices.

10.4 MONITORING AND REVIEW

The improvement plan will be assessed annually by reporting on progress towards the goals listed in Section 10.2.

11. Glossary

The following terms and acronyms (in brackets) are used in this Asset Management Plan.

Activity	An activity is the work undertaken on an asset or group of assets to achieve a desired outcome.
Advanced Asset Management	Asset management which employs predictive modelling, risk management and optimised renewal decision-making techniques to establish asset life cycle treatment options and related long term cashflow predictions. (See Basic Asset Management).
Annual Plan	The Annual Plan provides a statement of the direction of Council and ensures consistency and co-ordination in both making policies and decisions concerning the use of Council resources. It is a reference document for monitoring and measuring performance for the community as well as the Council itself.
Asset	A physical component of a facility that has value, enables services to be provided and has an economic life of greater than 12 months.
Asset Management (AM)	The combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective manner.
Asset Management System (AMS)	A system (usually computerised) for collecting, analysing and reporting data on the utilisation, performance, life cycle management and funding of existing assets.
Asset Management Plan	A plan developed for the management of one or more infrastructure assets that combines multi-disciplinary management techniques (including technical and financial) over the life cycle of the asset in the most cost effective manner to provide a specified level of service. A significant component of the plan is a long term cashflow projection for the activities.
Asset Management Strategy	A strategy for asset management covering, the development and implementation of plans and programmes for asset creation, operation, maintenance, renewal, disposal and performance monitoring to ensure that the desired levels of service and other operational objectives are achieved at optimum cost.
Asset Register	A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, construction, technical and financial information about each.
Basic Asset Management	Asset management which relies primarily on the use of an asset register, maintenance management systems, job / resource management, inventory control, condition assessment and defined levels of service, in order to establish alternative treatment options and long term cashflow predictions. Priorities are usually established on the basis of

	financial return gained by carrying out the work (rather than risk analysis and optimised renewal decision making).
Benefit Cost Ratio (B/C)	The sum of the present values of all benefits (including residual value, if any) over a specified period, or the life cycle of the asset or facility, divided by the sum of the present value of all costs.
Business Plan	A plan produced by an organisation (or business units within it) which translate the objectives contained in an Annual Plan into detailed work plans for a particular, or range of, business activities. Activities may include marketing, development, operations, management, personnel, technology and financial planning.
Capital Expenditure (CAPEX)	Expenditure used to create new assets or to increase the capacity of existing assets beyond their original design capacity or service potential. CAPEX increases the value of an asset.
Condition Monitoring	Continuous or periodic inspection, assessment, measurement and interpretation of resulting data, to indicate the condition of a specific component so as to determine the need for some preventive or remedial action.
Critical Assets	Assets for which the financial, business or service level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation. Critical assets have a lower threshold for action than non-critical assets.
Current Replacement Cost	The cost of replacing the service potential of an existing asset, by reference to some measure of capacity, with an appropriate modern equivalent asset.
Deferred Maintenance	The shortfall in rehabilitation work required to maintain the service potential of an asset.
Demand Management	The active intervention in the market to influence demand for services and assets with forecast consequences, usually to avoid or defer CAPEX expenditure. Demand management is based on the notion that as needs are satisfied, expectations rise automatically and almost every action taken to satisfy demand will stimulate further demand.
Depreciated Replacement Cost (DRC)	The replacement cost of an existing asset after deducting an allowance for wear or consumption to reflect the remaining economic life of the existing asset.
Depreciation	The wearing out, consumption or other loss of value of an asset whether arising from use, passing of time or obsolescence through technological and market changes. It is accounted for by the allocation of the historical cost (or revalued amount) of the asset less its residual value over its useful life.
Disposal	Activities necessary to dispose of decommissioned assets.
Economic life	The period from the acquisition of the asset to the time when the asset, while physically able to provide a service, ceases to be the lowest cost alternative to satisfy a particular level of service. The economic life is at the maximum when equal to the physical life, however obsolescence will often ensure that the economic life is less than the physical life.

Enforcement Order	An order made under section 319 of the Resource Management Act 1991 for any of the purposes set out in section 314 of that Act; and includes an interim enforcement order made under section 320 of that Act.
Facility	A complex comprising many assets (e.g. hospital, water treatment plant or recreation complex) which represents a single management unit for financial, operational, maintenance or other purposes.
Flooding Event	An overflow of stormwater from a territorial authority's stormwater system that enters a habitable floor.
Geographic Information System (GIS)	Software that provides a means of spatially viewing, searching, manipulating, and analysing an electronic database.
Habitable Floor	A floor of a building (includes a basement) but does not include ancillary structures such as sand-alone garden sheds or garages
Infrastructure Assets	Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the continuing replacement and refurbishment of its components. The network may include normally recognised 'ordinary' assets as components.
Life	A measure of the anticipated life of an asset or component; such as time, number of cycles, distance intervals etc.
Level of service	The defined service quality for a particular activity (i.e. stormwater) or service area (i.e. stormwater disposal) against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost.
Life Cycle	Life cycle has two meanings: <ul style="list-style-type: none"> ➤ The cycle of activities that an asset (or facility) goes through while it retains an identity as a particular asset, i.e. from planning and designs to decommissioning or disposal. ➤ The period of time between a selected date and the last year over which the criteria (e.g. costs) relating to a decision or alternative under study will be assessed.
Life Cycle Cost	The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, rehabilitation and disposal costs.
Maintenance	All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal.
Maintenance Plan	Collated information, policies and procedures for the optimum maintenance of an asset, or group of assets.
Maintenance Standards	The standards set for the maintenance service, usually contained in preventive maintenance schedules, operation and maintenance manuals, codes of practice, estimating criteria, statutory regulations and mandatory requirements, in accordance with maintenance quality objectives.

Objective	An objective is a general statement of intention relating to a specific output or activity. They are generally longer term aims and are not necessarily outcomes that managers can control.
Operation	The active process of utilising an asset that will consume resources such as manpower, energy, chemicals and materials. Operation costs are part of the life cycle costs of an asset.
Optimised Renewal Decision Making (ORDM)	An optimisation process for considering and prioritising all options to rectify performance failures of assets. The process encompasses NPV analysis and risk assessment.
Performance Measure	A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other target. Performance indicators commonly relate to statutory limits, safety, responsiveness, cost, comfort, asset performance, reliability, efficiency, environmental protection and customer satisfaction.
Performance Monitoring	Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards.
Pipeline Asset Management System (PAMS)	The computerised utilities asset management software system (Hansen IMS) supplied by MITS-Hansen under a bulk supply agreement with ALGENZ for use by New Zealand local authority asset managers.
Planned Maintenance	Planned maintenance activities fall into three categories: <ul style="list-style-type: none"> (a) Periodic - necessary to ensure the reliability or sustain the design life of an asset. (b) Predictive - condition monitoring activities used to predict failure. (c) Preventive - maintenance that can be initiated without routine or continuous checking (e.g. using information contained in maintenance manuals or manufacturers' recommendations) and is not condition-based.
Rehabilitation	Works to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification. Generally involves repairing the asset using available techniques and standards to deliver its original level of service (i.e. heavy patching of roads, slip-lining of stormwater mains, etc.) without resorting to significant upgrading or replacement.
Renewal	Works to upgrade, refurbish, rehabilitate or replace existing facilities with facilities of equivalent capacity or performance capability.
Renewal Accounting	A method of infrastructure asset accounting which recognises that infrastructure assets are maintained at an agreed service level through regular planned maintenance, rehabilitation and renewal programmes contained in an Asset Management Plan. The system as a whole is maintained in perpetuity and therefore does not need to be depreciated. The relevant rehabilitation and renewal costs are treated as

	operational rather than capital expenditure and any loss in service potential is recognised as deferred maintenance.
Repair	Action to restore an item to its previous condition after failure or damage.
Replacement	The complete replacement of an asset that has reached the end of its life, so as to provide a similar or agreed alternative, level of service.
Resilience	The ability of the organisation to service a crisis, and thrive in a world of uncertainty.
Risk Management	The application of a formal process to the range of possible values relating to key factors associated with a risk in order to determine the resultant ranges of outcomes and their probability of occurrence.
Routine Maintenance	Day to day operational activities to keep the asset operating (replacement of light bulbs, cleaning of drains, repairing leaks, etc.) and which form part of the annual operating budget, including preventative maintenance.
Service Potential	The total future service capacity of an asset. It is normally determined by reference to the operating capacity and economic life of an asset.
Sustainability	The ability of the activity to continue to function at the desired Levels of Service.
Stormwater System	The pipes and infrastructure (excluding roads) that collect and manage rainwater run-off from the point of connection to the point of discharge.
Strategic Plan	Strategic planning involves making decisions about the long term goals and strategies of an organisation. Strategic plans have a strong external focus, cover major portions of the organisation and identify major targets, actions and resource allocations relating to the long term survival, value and growth of the organisation.
Unplanned Maintenance	Corrective work required in the short term to restore an asset to working condition so it can continue to deliver the required service or to maintain its level of security and integrity.
Upgrading	The replacement of an asset or addition / replacement of an asset component that materially improves the original service potential of the asset.
Valuation	Estimated asset value which may depend on the purpose for which the valuation is required, i.e. replacement value for determining maintenance levels or market value for life cycle costing.

12. Appendices

The Appendices for all of Council's Asset Management Plans are kept separate. The list below highlights the appendices that relate to this Asset Management Plan and where to find them in the Corporate Appendices Register.

Number	Type	Title
16.01	Stormwater	Stormwater Drainage Design Standards
16.02	Stormwater	Stormwater System Maps
16.03	Stormwater	Stormwater Pipe Schedule
16.04	Stormwater	Stormwater Pumping Station – Replacement and Maintenance Schedule
16.05	Stormwater	Management Strategies
16.06	Stormwater	Schedule of Stormwater Consents
16.07	Stormwater	Asset Inspection Grading Standards
16.08	Stormwater	Invercargill City Council Defining Asset Criticality for Water Services