PALMY™

PAPAIOEA
PALMERSTON
NORTH
CITY

ASSET MANAGEMENT PLAN

STORMWATER

OVERVIEW

ASSET MANAGEMENT PLAN EXECUTIVE SUMMARY **STORMWATER**

Manaaki whenua, manaaki tangata, haere whakamua.
Tihei mauri ora!

No reira, e te haukainga Rangitāne, nei rā te mihi nui ki a koutou e pupuri nei i te mauri o te whenua me ngā wai e rere atu e rere mai.

Tēnā koutou, tēnā koutou, tēnā tātou katoa.

With the effects of climate change becoming more apparent over the next 30 years, our stormwater network has never been so important.

More frequent and intense rainfall means our network will need to be adapted to cope with these new risks.

The purpose of the stormwater system is to protect the environment and public health by controlling the level of pollutants and sediment in stormwater runoff that goes into streams and rivers, and to protect buildings from internal flooding by water that ponds or flows during heavy rain events.

As a member of the Manawatū River Leaders' Accord, we recognise we have a role in improving the mauri and health of the Manawatū River. Council's strategic focus is to raise the profile and quality of city urban streams, acknowledging their cultural significance as tributaries of the Manawatū River.

Taumata Arowai

In 2019, the Taumata Arowai-Water Services Regulator Bill was introduced to Parliament with the purpose to establish a new regulatory body by the same name. Initially, Taumata Arowai will be responsible for administering and enforcing a new drinking water regulatory system and a small number of complementary functions relating to improving the environmental performance of wastewater and stormwater networks.

A freshwater policy review is also underway. It is likely this will mean stronger regulations and more inter-regional coordination. We expect this would mainly have implications lead to discharge of wastewater and a stronger emphasis on protecting waterways from uncontrolled overflows.

This Asset Management Plan outlines how we plan to manage and invest in our stormwater assets for the next 30 years

Scope of this plan

This Plan informs our 10 Year Plan, Financial Strategy and 30 Year Infrastructure Strategy. It supports us in the management of our stormwater assets to:

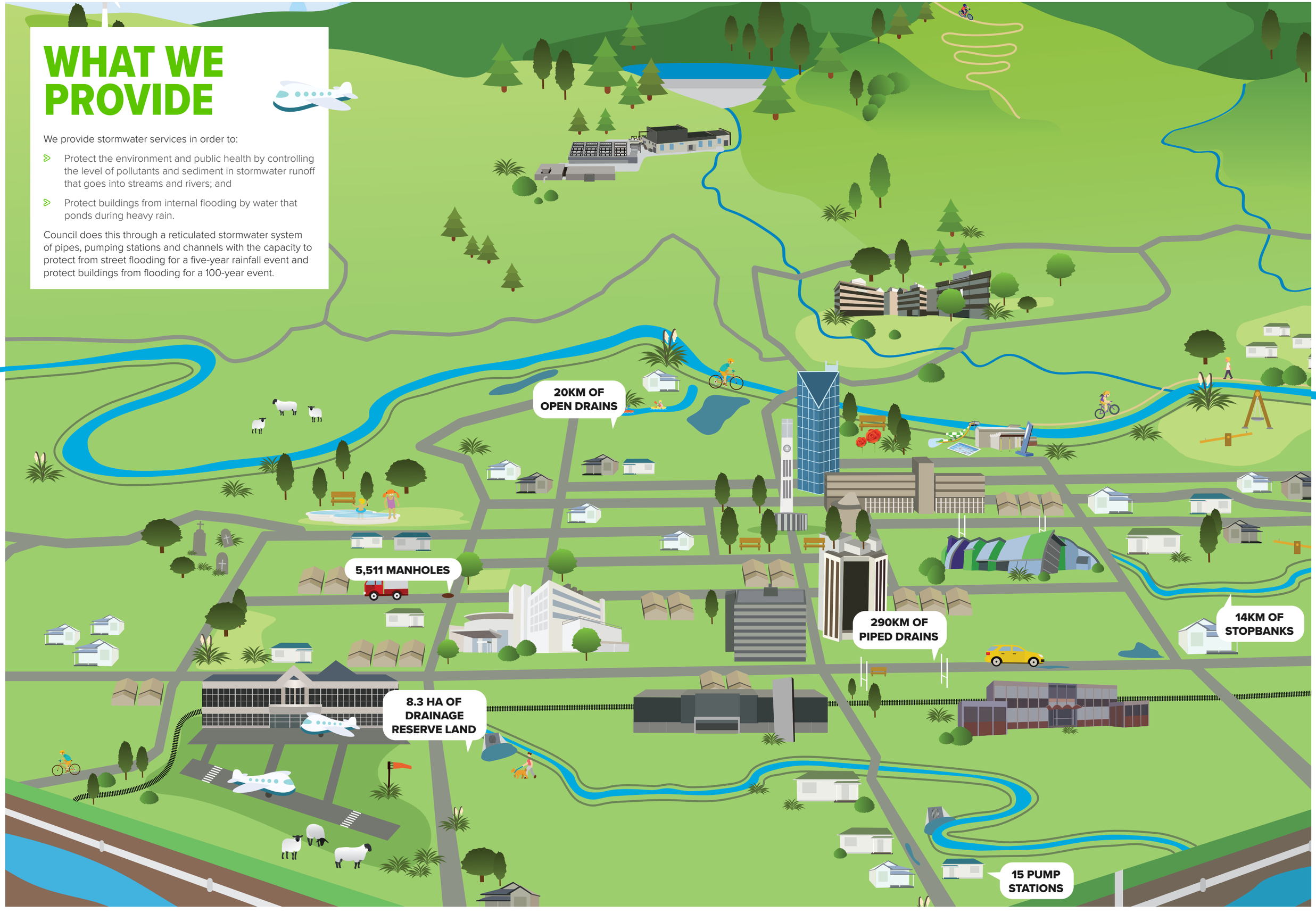
- Achieve our strategic outcomes as set by Goal 4: An Eco City and the Eco City Strategy
- Meet the levels of service we have committed to
- Plan for growth and adjust to other drivers such as climate change and new legislation
- Improve asset knowledge and monitor performance
- Minimise risk
- Plan operations

WHAT WE PROVIDE

We provide stormwater services in order to:

- Protect the environment and public health by controlling the level of pollutants and sediment in stormwater runoff that goes into streams and rivers; and
- Protect buildings from internal flooding by water that ponds during heavy rain.

Council does this through a reticulated stormwater system of pipes, pumping stations and channels with the capacity to protect from street flooding for a five-year rainfall event and protect buildings from flooding for a 100-year event.



EVERYONE IS A CUSTOMER

RESIDENTIAL

VISITORS

INDUSTRIAL

RURAL

EDUCATION

FIRE AND EMERGENCY NEW ZEALAND

HEALTHCARE

COUNCIL

DEVELOPERS

COMMERCIAL

Our strategic focus is to raise the profile and quality of city urban streams, acknowledging their cultural significance to Rangitāne as tributaries of the Manawatū River. Stormwater quality is an issue across the city due to contamination from wastewater during heavy rain and land use. We are working with Horizons Regional Council as we have overlapping responsibilities. Complaints about the urban waterways have increased since maintenance budgets and activities were reduced.

People expect their properties to be safe from flooding. We ensure that at the very least, habitable floors are protected by requiring minimum floor levels to be set on new houses where appropriate. Some properties have been flooded in recent years and we are in the process of upgrading the network to address these capacity issues. Complaints about nuisance ponding of water on roads has increased but no action is justified as this is part of the stormwater system design.

Even though certain complaints have increased, the overall satisfaction of residents has improved for the Stormwater Activity.

WE HAVE SOME CHALLENGES + RISKS

Our city is growing

In most areas where the City is growing there are existing sensitive receiving environments such as urban streams and wetlands. Many of these are already degraded. As these areas are urbanised there is an opportunity to improve water quality and ecology by applying water sensitive design.

Water quality is poor in our urban streams

Cultural health monitoring of the urban streams carried out by Rangitāne o Manawatū under our joint programme Hei Manga Ora. Previous water quality monitoring indicates that the urban streams are contaminated by sewage from urban environment and our wastewater network.

Inspections in 2019 identified significant areas of poorly managed vegetation in our open drains and streams and other issues causing hydraulic capacity problems. More appropriate species are needed to improve capacity, water quality and amenity.

Infill / intensification

We're seeing more subdivisions of existing properties (infill). This is putting the existing level of service at risk due to more hardstand surfaces contributing to direct more rapid rainfall runoff.

Climate change will have an impact

Current research suggests that the main impacts of climate change on the stormwater activity will be a significant increase in rainfall in winter, and a higher frequency of extreme rainfall events. This could increase both nuisance surface water ponding and flood events.

Overland flow paths have been piped and built over

We now have better modelling and GIS tools to manage overland flow paths. However a lack of controls in the past has meant that there are some problematic areas that need rectifying.

Related to this, some urban streams are accessible only through private property, preventing us from effectively managing them.

Regional stormwater management

We are working regionally to better manage stormwater, but this work has slowed while water reforms take place as some issues will be addressed nationally. However, progress towards integrated management of our stormwater discharges.

Asset condition knowledge is limited

While the risk profile of our stormwater pipes is acceptable as they tend to last a very long time, we have limited knowledge of the actual condition of these assets.

Pump stations are vulnerable

Our pump stations are vulnerable due to the lack of dedicated emergency backup system.

WHAT'S OUR PLAN?

Partnership with Rangitāne and the community

Applying water sensitive design to renewal work will be a key change. It will help achieve improved outcomes for water quality, hydraulic capacity and amenity.

Our new approach is to fund a "one time" clean up and vegetation removal exercise for all the urban streams over the next five years. As sections are cleared, they will be planted with appropriate species with support from Rangitāne and community groups/businesses.

Operationalise our new stormwater framework

The framework will set out the performance requirements and challenges for each catchment in the city and other work to renovate our open streams and drains. Once adopted by Council it will empower Council officers to set specific requirements of developers.

Respond to growth

Requiring hydraulic neutrality will be a key response to growth but some capacity upgrades of existing infrastructure will be required.

We are expecting increased operational costs to maintain stormwater treatment devices that are vested to us.

As our city grows, we will need to maintain our stormwater model to reflect the changes.

Improve resilience and reduce risk

Purchasing additional mobile generators and emergency pumps will provide the much needed resilience in the stormwater system.

Areas where more capacity is needed has been identified for upgrading, and retention of flows at the Linklater Reserve is planned.

Where possible, we intend to purchase land adjacent to urban streams to enable us to better manage them and facilitate access for walking and cycling.

Design for climate change

We will continue to design new infrastructure with provision for climate change. Where infill is occurring, the impacts of heavier, more frequent rainfall is expected to be mitigated by developers adopting rainwater tanks for retention and minimising the area of impervious surfaces.

Use data to prioritise repairs

New condition assessment data will confirm our service failure risk profile and provide us with a prioritised backlog of pipe defects. This will help us maintain our level of service and plan and optimise future pipe replacements.

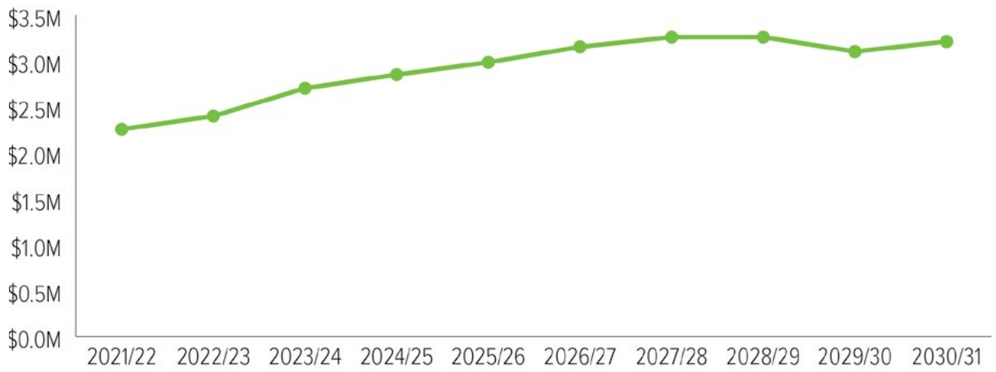
Obtain consents for our discharges

Our partnership with Rangitāne on Hei Manga Ora has provided us with invaluable information on the cultural health of our waterways. This information combined with the roll out of an improved water quality monitoring programme will inform future discharge consent applications.

HOW MUCH WILL IT COST?

In order to increase the capacity and performance of our stormwater services to meet our agreed levels of service, we need to invest significantly across all areas of the stormwater network in the first five years of the 10 Year Plan. This includes investing in planning and investigations, the maintenance of urban waterways, and the renewal and/or upgrading of pump stations and pipe network.

OPERATIONS + MAINTENANCE
STORMWATER ACTIVITY

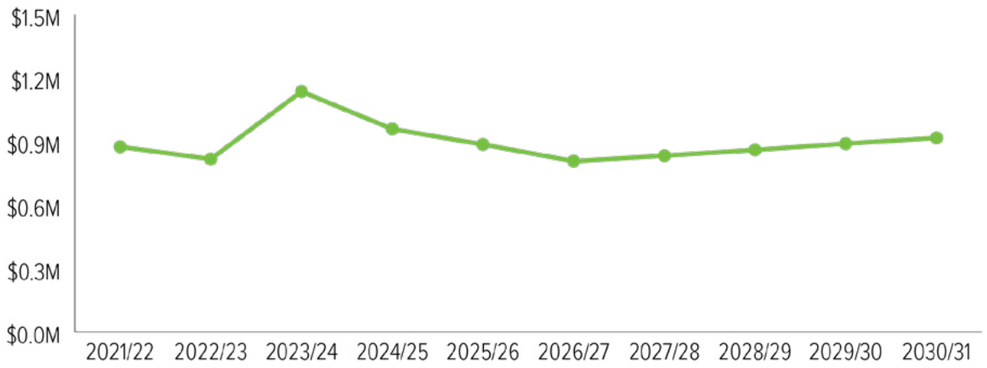


Maintenance budgets for open channels have been exceeded in recent years as we respond to the significant backlog of deferred maintenance of open channel and drains. A reasonable increase in operations and maintenance budgets ($0.25M per year) is required to meet the required levels of service reflecting the acquisition of new assets associated with treating stormwater before discharge to the receiving environment. There are small increases proposed to meet a shortfall in pump station maintenance costs and operations and maintenance costs associated with new assets.

Investment is also required to better understand network capacity and performance as well as the impact of land use on water quality. This is a high priority. Associated with this is the need to update and extend the stormwater model to cover new growth areas to inform applications for stormwater discharge consents where required under the One Plan. An extra $1.7M is needed for each of these issues ($3.7M in total over ten years).

The asset failure risk profile of stormwater mains is relatively low but informed by a limited amount of condition information.

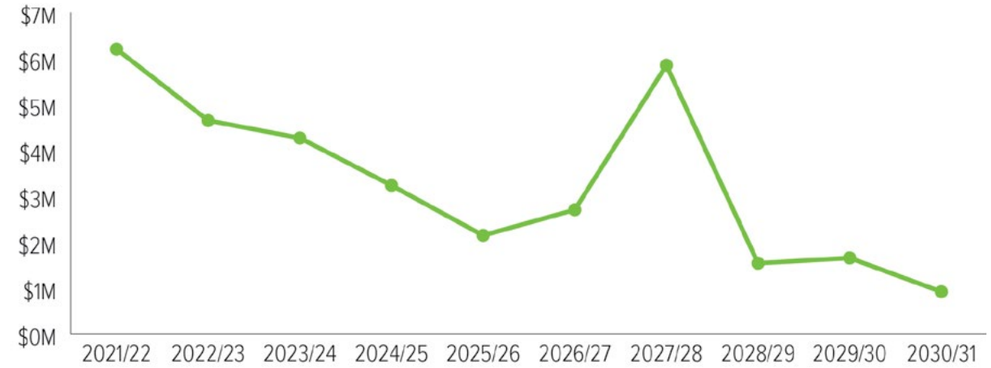
RENEWAL
STORMWATER ACTIVITY



Most renewal investment (75%) is associated with our stormwater pipe network. Due to the long life of the pipe assets, their renewal needs ($0.6M per year) are relatively modest compared to our Water and Wastewater Network assets.

Most of the stormwater pump stations have equipment that is at or near the end of its useful life. We plan to overhaul these in the next five years. We have also included budget provision for the replacement of minor pump station equipment as that comes up each year.

CAPITAL NEW EXPENDITURE
STORMWATER ACTIVITY



Of the $30M capital new budget, $7M is earmarked initially on resolving known capacity issues in the network and at pump stations. Some allowance has also been made for the ongoing resolution of capacity issues as they arise in the future.

$7M is also needed for flood mitigation, which is expected to become more of a focus in years three, four and seven as we improve the accuracy of our network performance modelling and understand how best to mitigate the impact of climate change.

More than a third of capital new investment ($12M) is required to provide for urban and industrial growth. Most of this is needed in the first five years but there is a need for new stormwater infrastructure to meet growth throughout the 10 Year Plan.

This document was prepared by:

Palmerston North City Council | Infrastructure | Asset and Planning Division.

Version No.	Reason for Amendment	Date
0	DRAFT TO SUPPORT 10 YEAR PLAN CONSULTATION	9 Apr 2021
1	FINAL	12 Jul 2021

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OASIS Document No.	15093959

Contents

Glossary

The following terms and acronyms (in brackets) are used in this AMP.

Term or Acronym	Description
Activity	An activity is the work undertaken on an asset or group of assets to achieve a desired outcome.
Annual Budget	The Annual Budget 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 which 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, lifecycle management and funding of existing assets.
Asset Management Plan (AMP)	A plan developed for the management of one or more infrastructure assets that combines multi-disciplinary management techniques (including technical and financial) over the lifecycle 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 Management Team	The team appointed by an organisation to review and monitor the corporate asset management improvement programme and ensure the development of integrated asset management systems and plans consistent with organisational goals and objectives.
Asset Register	A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, construction, technical and financial information about each.
Business Plan	A plan produced by an organisation (or business units within it) which translate the objectives contained in an Annual Budget 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.

Term or Acronym	Description
Cash Flow	The stream of costs and/or benefits over time resulting from a project investment or ownership of an asset.
Components	Specific parts of an asset having independent physical or functional identity and having specific attributes such as different life expectancy, maintenance regimes, risk or criticality.
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.
Facility	A complex comprising many assets (e.g. a hospital, water treatment plant, recreation complex, etc.) which represents a single management unit for financial, operational, maintenance or other purposes.
Geographic Information System (GIS)	Software which provides a means of spatially viewing, searching, manipulating, and analysing an electronic data-base.

Term or Acronym	Description
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.
Level Of Service	The defined service quality for a particular activity (i.e. roading) or service area (i.e. street-lighting) against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost.
Life	A measure of the anticipated life of an asset or component; such as time, number of cycles, distance intervals etc.
Life Cycle	Life cycle has two meanings: • 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 design to decommissioning or disposal. • The period 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 are 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, per maintenance quality objectives.
Net Present Value (NPV)	The value of an asset to the organisation, derived from the continued use and subsequent disposal in present monetary values. It is the net amount of discounted total cash inflows arising from the continued use and subsequent disposal of the asset after deducting the value of the discounted total cash outflows.
Objective	An objective is a general statement of intention relating to a specific output or activity. They are longer-term aims and are not necessarily outcomes that managers can control.
Operation	The active process of utilising an asset which will consume resources such as manpower, energy, chemicals and materials. Operation costs are part of an assets life cycle costs.
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.

Term or Acronym	Description
Performance Indicator (PI)	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	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 3 categories: • Periodic - necessary to ensure the reliability or sustain the design life of an asset. • Predictive - condition monitoring activities used to predict failure. • 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 sewer 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.
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, to provide a similar, or agreed on alternative, level of service.
Remaining Economic Life	The time remaining until an asset ceases to provide service level or economic usefulness.
Risk Cost	The assessed annual cost or benefit relating to the consequence of an event. Risk cost equals the costs relating to the event multiplied by the probability of the event occurring.
Risk Management	The application of a formal process to the range of possible values relating to key factors associated with a risk 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.

Term or Acronym	Description
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 materially improves the original service potential of the asset.
Valuation	Estimated asset value 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.

1 Introduction

Manaaki whenua, manaaki tangata, haere whakamua. Tihei mauri ora!

No reira, e te haukainga Rangitāne, nei rā te mihi nui ki a koutou e pupuri nei i te mauri o te whenua me ngā wai e rere atu e rere mai.

Tēnā koutou, tēnā koutou, tēnā tātou katoa.

Our vision for Papaioea Palmerston North is "he iti rā, he iti pounamu | small city benefits, big city ambition", where every resident enjoys the benefits of living in a small city yet has the advantages of a big city.

The city is fortunate to have a range of quality assets that are managed in a way that supports this vision and provides our community with essential services, including the Stormwater Activity.

At the Palmerston North City Council (PNCC) we provide stormwater services to:

- Protect the environment and public health by controlling the level of pollutants and sediment in stormwater runoff that goes into streams and rivers; and
- Protect buildings from internal flooding by water that ponds during heavy rain.

1.1 Purpose and Scope

This Asset Management Plan (AMP) informs anyone with an interest in our Stormwater Activity of the state of our assets, how we intend to operate them effectively, and the investment we will need to maintain and develop them over the long term.

In other words, this AMP is the basis for the long-term planning of the Stormwater Activity and its overarching goal is to:

"deliver the required level of service to existing and future customers in the most cost-effective way"

This plan should be read in conjunction with Part A 'Palmerston North City Council Strategic Asset Management Plan (SAMP)'. The SAMP includes the overall strategic approach to managing council assets and overarching issues, practices and systems. The SAMP reflects our aspiration to lift the standard of asset management planning throughout the organisation. It is one of several improvements that represents the beginning of a new, more strategic approach to managing the City's assets.

"Part B", this document, the Stormwater Asset Management Plan provides detail on how the practices in Part A are applied to the Stormwater Activity. In preparing the current AMP (2020) the previous version (2018) was revised and most of the generic strategic content was moved to the SAMP.

In this context, the specific objectives for this AMP are:

- Supporting evidence for the 10 Year Plan and 30yr Infrastructure Strategy[1]
- To translate Our Strategic Vision and Goals into activity strategies and action plans that align with National and Regional policies and strategies. The plan identifies forward works programmes based on strategic outcomes sought, and financial forecasts required to meet agreed service levels and cater for growth;
- To document current asset management practices used by us based on clear evidence as part of a sustainable and optimised lifecycle management strategy for the Stormwater Activity infrastructure;

[1] AMP demonstrates regulatory compliance with section 93(7) & 94(1) of the Local Government Act (LGA) 2002 which in summary requires the 10 Year Plan to be supported by the information required by Part 1 of Schedule 10

- Project justification through alignment with activity management and operational requirements;
- Driving AM within BAU activities through decision making and activity management practices;
- To understand drivers of demand for services and the implications for the asset;
- To define the services to be provided, the target service standards that we aim to achieve, and the measures used to monitor the performance of the Rubbish and Recycling Activity;
- To comply with the requirements of relevant legislation such as the Local Government Act 2002 and Resource Management Act.

1.2 Iwi, Key Partners and External Stakeholders

1.2.1 Rangitāne o Manawatū

We work in partnership with Rangitāne o Manawatū to ensure Rangitānenuiarawa[2] is reflected in the city's approach to water management, including the Stormwater Activity. We collaborate on urban waterway improvement projects.

The Rangitāne o Manawatū Claims Settlement Act 2016 places specific requirements on us to inform and consult Rangitāne o Manawatū on developments adjacent to the Manawatū River and its tributaries. Rangitāne o Manawatū are informing our understanding of the sensitive sites located along waterways to ensure development is undertaken in a culturally appropriate matter.

A cultural monitoring framework, Hei Manga Ora, has been developed to ensure appropriate management of waterways.

Rangitāne o Manawatū have opportunities for early involvement in all stormwater projects and initiatives.

1.2.2 Stakeholders

Table 1 contains a summary of stakeholders that we regularly engage with on waste management issues. The level of engagement (whether we inform, consult, involve, co-operate with or empower) depends on how significant the issue is and who is ultimately responsible for resolving the issue.

Table 1: External Partners and Stakeholders

Name	Description
Ratepayers	People who own properties within the Palmerston North City Council boundaries but may or may not reside in the city.
Residents	People who live within the Palmerston North City Council boundaries.
Businesses	Individuals or organisations who carry out their business in the city.
Visitors to Palmerston North	Palmerston North and the Manawatū District represent the 13th largest domestic visitor spend.
Environmental Groups	As represented by the Environmental Network Manawatū
Manawatū-Whanganui Regional Council, trading as Horizons	The environmental, regulatory, and monitoring body under the Resource Management Act for the natural resources in the Manawatū-Whanganui region.

[2] Rangitānenuiarawa is the Rangitāne expression of kaitiakitanga, or customary authority and guardianship, and affirms their customary leadership in ensuring the health and regeneration of their tribal rohe.

Figure 1 shows the relationships between our key planning documents.

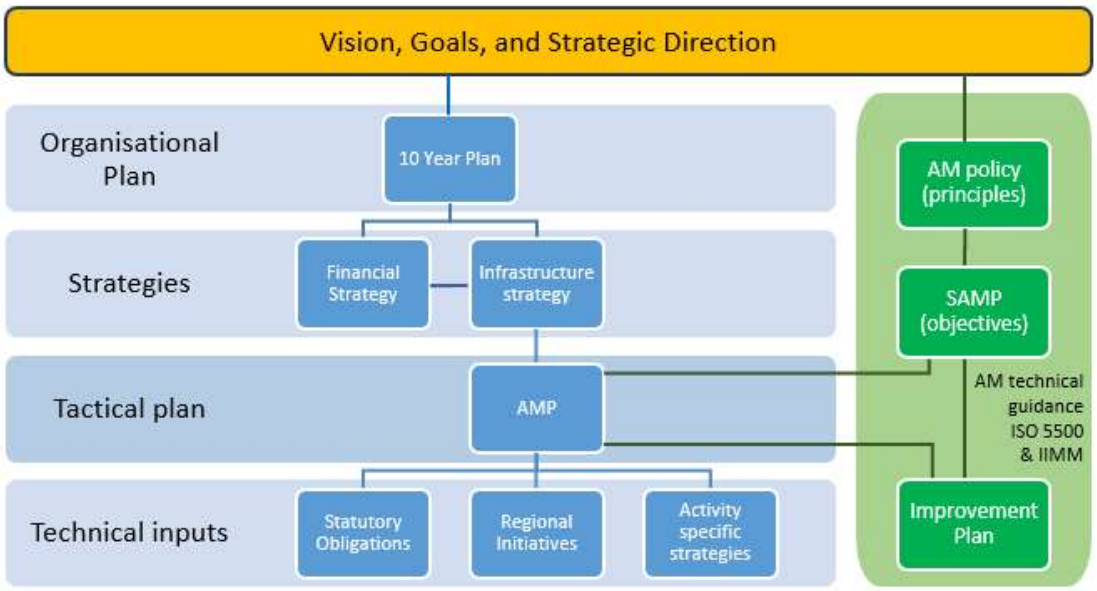

Figure 1: Asset Management framework

This section outlines the relationships between the Stormwater AMP and other AMPs. All Asset Management Plans can be found on our website.

1.2.3 Relationship to Other Asset Management Plans

The following relationships between this AMP and other AMPs have been identified:

- **Transportation AMP:** There can be unclear or overlapping asset responsibility demarcation, which can lead to double-up or neglect in some circumstances, for example with catch pit outlets, culverts, and open drains following road alignments. Council works to coordinate the timing of stormwater works that are in the carriageway with reinstatement and renewal of pavements and other horizontal infrastructure.
- **Parks and Reserves AMP:** Some detention facilities exist as recreational areas during dry weather, and some open channels and overland flow paths may also be in parks land areas.
- **Wastewater AMP:** In some areas, there is an interplay between Inflow and Infiltration (I&I) issues in the Wastewater network and deficiencies or capacity issues in the stormwater network.

1.3 AMP Framework

Our Asset Management Process is based on the sixteen Asset Management practices as defined by the International Infrastructure Management Manual as shown in Figure 2 below.

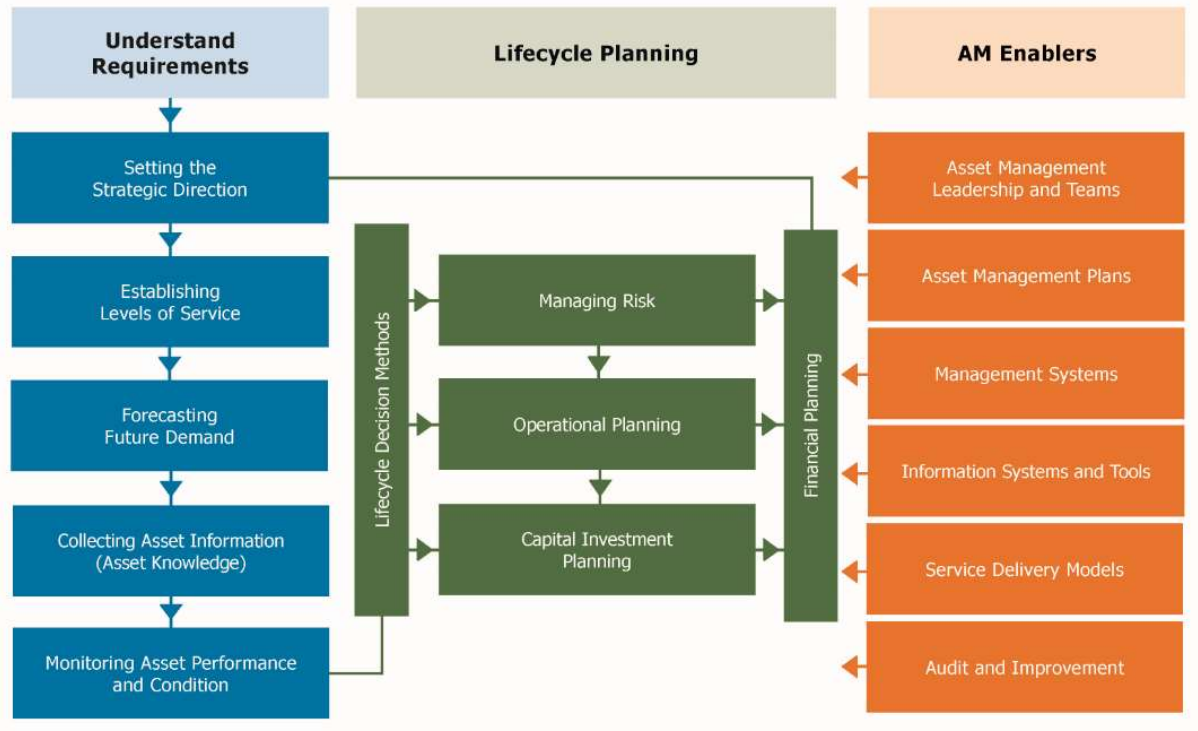

Figure 2: Schematic of Internationally Recognised Asset Management Practices

This AMP documents the key outcomes of each step of our Asset Management process to provide better accountability, sustainability, risk management, service management and financial efficiency. Table 2 contains an outline of the AMP structure.

Table 2: Framework for Navigating the AMP

Section	Description
1. Introduction	What is the purpose of this Asset Management Plan?
2. Strategic Context	Why we invest in the Activity?
3. Description of the Stormwater Activity	What are the services we provide? Who do we provide services to?
4. How we Manage the Stormwater Activity	How do we deliver the Activity? Are we getting value? (Section 17A Review)
5. Description of Assets	What are our assets? How are our assets performing?
6. Risk Management	What are our risks?
7. Levels of Service	What level of service do we provide? The desired future state of the service?

Section	Description
8. Impact of Demands and Drivers	How does Our strategic direction relate to the Activity? What type of growth should we plan for? What are the trends affecting the Activity?
9. Lifecycle Management	What programmes of work do we need to do?
10. Financial Summary	What will it cost? How will we pay for it?
11. Plan Monitoring and Improvements	How do we get better? How do we track progress?

2 Strategic Context

2.1 Our Strategic Direction

Our vision is He Iti Rā, He Iti Pounamu | Small City Benefits, Big City Ambition. The Manawatū River forms the geographic, recreational, and spiritual heart of the city and the wider region. The river is of great historical, cultural, spiritual, and traditional significance to Rangitāne. The name 'Manawatū' refers to a pūrākau (story) of Hau, a significant ancestor in the region, whose heart stood still when he beheld the beauty of the river. The river's flow connects the people of Norsewood to those of Foxton Beach, linking all who live between. The tributaries of the river connect the city with its neighbours, the mountain ranges, and the sea.

The Manawatū River is the heart of the city and region, and the mauri of the river reflects our values. The Manawatū River Leaders Accord sets out the commitment to working in collaboration to improve the mauri of the river. We acknowledge the significance of the entire river system to the well-being of the city.

To achieve our City's vision, we have aligned the Stormwater Asset Management Plan (AMP) with:

- Goal 4: an Eco City, the Eco City Strategy; and
- The Waters Plan.

2.2 Priorities under Goal 4: An Eco City

Figure 3 below outlines our strategic priorities and high-level approaches relevant to the Stormwater Activity.

Strategic Priority	Eco City Strategy	Waters Plan
Enhance the mauri of the Manawatū River **Invest in infrastructure that protects the environment** **Use Council's legislative powers to ensure urban development is sustainable**	We will collaborate with Rangitāne to: 1. Improve the city's stormwater network; 2. Re-establish wetlands; and 3. Undertake cultural monitoring of the quality of waterways. We will look for more opportunities to transform drainage corridors and urban waterways. Water-sensitive design principles should be applied to other parts of the city when the District Plan is reviewed	We will monitor these measures of success and report on these through the City Dashboards: 1. District Plan is updated to address stormwater detention, water sensitive design and restrict impervious surface by June 2024 2. City-wide stormwater discharges are consented by Horizons Regional Council by June 2024

Figure 3: Strategic Priorities

2.3 Iwi Aspirations and Values

We work in partnership with Rangitāne o Manawatū and Rangitānenuiarawa is reflected in the city's approach to water management. Many of the following Iwi aspirations are also shared by us:

- Water sensitive design;
- Flooding as a result of climate change;
- Restoration of urban waterways;
- Wetlands should be enhanced, protected, and created wherever possible;
- Hei Manga Oranga cultural monitoring of waterways;
- A high proportion of Māori communities live in downstream locations susceptible to flooding. Improvements are needed to stormwater infrastructure to protect these communities.

2.4 Te Mana o te Wai

The National Policy Statement for Freshwater Management 2020 (Freshwater NPS) came into effect in September 2020 and provides local authorities with direction on how to manage freshwater under the Resource Management Act 1991.

Rangitāne o Manawatū are actively involved in the planning and delivery of infrastructure that will have an impact on water quality. This process is yet to be formalised and a timeframe is not available yet for reviewing the District Plan against the new Freshwater NPS. However, we will update infrastructure planning to give effect to any future freshwater management agreements or Plan Changes.

The Freshwater NPS sets out the following relevant policy:

3.4 Tangata whenua involvement

(1) Every local authority must actively involve tangata whenua (to the extent they wish to be involved) in freshwater management (including decision-making processes), including in all the following:

(a) **identifying the local approach to giving effect to Te Mana o te Wai**

(b) making or changing regional policy statements and regional and **district plans** so far as they relate to freshwater management

3.5 Integrated management

(1) Adopting an integrated approach, ki uta ki tai, as required by Te Mana o te Wai, requires that local authorities must:

(a) recognise the interconnectedness of the whole environment, from the mountains and lakes, down the rivers to hāpua (lagoons), wahapū (estuaries) and to the sea; and

(b) recognise interactions between freshwater, land, water bodies, ecosystems, and receiving environments; and

(c) manage freshwater, and land use and development, in catchments in an integrated and sustainable way to avoid, remedy, or mitigate adverse effects, including cumulative effects, on the health and well-being of water bodies, freshwater ecosystems, and receiving environments; and

(d) encourage the coordination and sequencing of regional or urban growth.

(3) To give effect to this National Policy Statement, local authorities that share jurisdiction over a catchment must co-operate in the integrated management of the effects of land use and development on freshwater.

(4) Every territorial authority must include objectives, policies, and methods in its district plan to promote positive effects, and avoid, remedy, or mitigate adverse effects (including cumulative effects), of urban development on the health and well-being of water bodies, freshwater ecosystems, and receiving environments.

2.5 Taumata Arowai / Regulatory Context

2.5.1 Overview

In 2019, the Taumata Arowai-Water Services Regulator Bill was introduced to Parliament with the purpose to establish a new regulatory body by the same name. Initially, Taumata Arowai will be responsible for administering and enforcing a new drinking water regulatory system and a small number of complementary functions relating to improving the environmental performance of wastewater and stormwater networks.

A freshwater policy review is also underway. This will likely mean stronger regulations and more inter-regional coordination. We expect this would mainly lead to a stronger emphasis on protecting waterways.

2.5.2 Regional Response to Three Waters Review

In 2018, before the government-led three waters review, the collective councils of the Whanganui-Manawatū Region collaborated in commissioning a study of the regions collective three waters infrastructure. These local authorities recognised that a move towards greater regional collaboration is a way to help support the Government's Three Waters objectives.

The study found that for the stormwater activity:

- Data gaps exist across all councils; and
- The high number of outfalls is likely to become an issue as discharge consenting becomes a wider requirement.

This early collaboration as a region has resulted in every Council signing a Memorandum of Understanding under the Three Waters Reform Programme.

2.5.3 Memorandum of Understanding Signed

Rangitāne o Manawatū and our Council have signed a Memorandum of Understanding (MOU). The MOU triggered the release of the first tranche of stimulus funding from the central Government in response to Covid-19 ($9.34M of additional investment in our 3 Waters assets) and sets out principles for working together:

"The Parties shall promote a relationship in their dealings with each other, and other Parties related to the three waters services reform, based on:

- mutual trust and respect; and
- openness, promptness, consistency and fairness in all dealings and communication including through adopting a no-surprises approach to any matters or dealings related to the reform programme; and
- non-adversarial dealings and constructive problem-solving approaches; and
- working co-operatively and helpfully to facilitate the other Parties perform their roles; and
- openly sharing information and analysis undertaken to date on the state of the system for delivering three waters services and the quality of the asset base.

This Memorandum is intended to be non-binding in so far as it does not give rise to legally enforceable obligations between the Parties."

The Department of Internal Affairs (DIA) is engaging directly with iwi/Māori including Rangitāne o Manawatū. On Saturday 17 October 2020, DIA held the final formal hui in the current series of Crown engagement with iwi/Māori. This series of hui included an introductory webinar with Hon Nanaia Mahuta, 17 in-person hui across the country, and an online hui. A report on the hui is expected in December 2020.

We have also responded to the Request for Information from the DIA which included over 1000 questions.

2.6 Regulatory Context

Table 3 below contains a summary of the major Acts of Parliament that govern the Rubbish and Recycling Activity.

Table 3: Acts of Parliament that Govern the Rubbish and Recycling Activity

Statutory Requirement	Description
Local Government Act 2002	The Local Government Act empowers councils to promote the well-being of communities. The purpose of local government is to: • enable democratic local decision-making and action by, and on behalf of, communities • promote the social, economic, environmental, and cultural well-being of communities in the present and for the future. The Stormwater Activity is identified as a core service to be considered by a local authority.
Resource Management Act 1991	Requires Council to: • Sustain the potential of natural and physical resources to meet the reasonably foreseeable needs of the future generation • Comply with the District and Regional Plan • To 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.
National Policy Statement for Freshwater Management 2020	The National Policy Statement for Freshwater Management 2020 sets out the objectives and policies for freshwater management under the Resource Management Act 1991. It comes into effect on 3 September 2020 and replaces the National Policy Statement for Freshwater Management 2014 (amended 2017).
Health and Safety at Work Act 2015	Provision of a framework to secure the health and safety of workers and work. Sets out the principles, duties, and rights concerning workplace health and safety.

Statutory Requirement	Description
Civil Defence and Emergency Management Act 2002	The purpose of the Act is to: • Improve and promote the sustainable management of hazards in a way that contributes to the social, economic, cultural and environmental well-being and safety of the public and the protection of property • provide for planning and preparation for emergencies and response and recovery in the event of an emergency • require local authorities to coordinate Civil Defence Emergency Management (CDEM) through regional groups across the "4Rs" (reduction, readiness, response and recovery) and encourage cooperation and joint action between those groups • integrate local and national CDEM planning and activity through the alignment of local planning with a national plan and strategy • encourage the coordination of emergency management across the range of agencies and organisations with responsibilities for preventing or managing emergencies.

3 Description of the Stormwater Activity

3.1 Overview of Our Services

The purpose of the stormwater system is to protect the environment and public health by controlling the level of pollutants and sediment in stormwater runoff that goes into streams and rivers and to protect buildings from internal flooding by water that ponds during heavy rain.

Through the Stormwater Activity we provide the following:

- Reliable collection and disposal systems, with the capacity to cope with frequent rain events.
- A degree of Flood Protection during rain events and/or high water levels in natural water bodies.
- Treatment of stormwater before disposal (relatively new area)

Broadly, these services are arranged under the sub-activity "stormwater collection and disposal".

We provide these services in the urban areas of Palmerston North, Ashurst, Bunnythorpe and Longburn. Properties outside these areas are catered for by on-site soakage, roadside drains (managed under the Transport Activity), privately owned drains and streams, and Manawatū River (managed by Horizons).

Where a piped stormwater network is available, the point of service or discharge for stormwater drainage is the property boundary. All drains, pipework and plumbing upstream of the point of service, including watercourses within private property, are the responsibility of the property owner. This includes private pipelines discharging directly to watercourses.

3.2 Major Challenges

Table 4 contains a description of the major challenges and their impact on the Service.

Table 4: Service Delivery Challenges

Challenge	Challenge Description	Impact on Service
Drainage		
Highly modified streams	Since the Highways and Watercourses Diversion Act in 1858 to the Water and Soil Conservation Act in 1967 the Crown introduced 11 Acts nationally and locally that have impacted water ways. All urban streams are highly modified, as they are either piped and/or diverted and/or stripped of vegetation	Reduced ability to provide naturalise "drainage" and restore stream ecology, mahinga kai, amenity and access.
Water Quality		
Land use	Overlapping and unclear demarcation of responsibilities with Horizons Regional Council for managing land use makes it difficult to manage the impacts of runoff.	A collaborative approach with Horizons Regional Council is required to consent stormwater discharges.

Challenge	Challenge Description	Impact on Service
Drainage Continued		
Infill and hard surfaces	As existing residential sections are subdivided (infill) and industrial sites are paved the amount of hard, impervious surfaces increases. When it rains this results in an increased direct runoff, i.e. higher peak flows that take up more pipe capacity. Less water soaks into the groundwater and therefore there is reduced baseflow entering urban streams from the groundwater.	A gradual reduction in the level of service over time for existing parts of the network. Secondary, overland flow paths are being utilised more than is desirable. Reduced water quality due to reduced minimum flows, including tuna die-off in droughts.
Customer expectations	It is impractical and unaffordable to provide a primary stormwater system with the capacity to accommodate runoff from all rainfall events.	Instead, a primary network designed to provide for frequent rainfall events is combined with a secondary system comprising overland flow along roads or over designated overland flow paths is provided.
Flood Protection		
Low-lying properties	Areas of Palmerston North have stop banks to protect them. When the Mangaone and Kawau streams are high stormwater cannot drain from the city into them.	An increased consequence of failure. Pump stations are required to lift rainwater out of the city into the streams.
Growth	Some future growth areas are onto land with a known flood hazard.	Requires significant investment in planning, design and infrastructure to protect properties.

3.3 Significant Negative Effects

Table 5 contains a summary of the significant negative effects for the Activity and mitigation measures.

Table 5: Mitigation of Significant Negative Effects of the Stormwater Activity

Significant Negative Effect	Description of Effect	Mitigation Measures
Flooding of Property	Failure of the system resulting in flooding of habitable residential and commercial buildings.	Capital works to address capacity constraints, effective building control to set minimum building floor levels, site-specific detention and attenuation of stormwater in new growth and infill sub-divisions.

Significant Negative Effect	Description of Effect	Mitigation Measures
Poor water quality	Pollution and contamination of the stormwater from runoff and cross-connections with the wastewater network, resulting in contaminants entering the stormwater network and discharging to streams and the Manawatū River.	Identifying and targeting sites that are at high risk of discharging significant contaminants. Runoff from industrial areas with the potential for adverse stormwater contamination is managed through the building consenting and trade waste regulatory processes. The clean-up for any pollution incidents is managed by emergency response plans (with Horizons Regional Council). Behaviour change initiatives within the community focus on reducing illegal dumping, littering and discharging of hazardous substances into the stormwater system.
Excessive wastewater volumes	Stormwater entry to the wastewater network through cross-connections and illegal connections resulting in excess volumes of wastewater to be treated and potential detrimental impacts on the quality of treated effluent discharged.	A comprehensive programme of monitoring, inspection and corrective work to reduce the volume of stormwater infiltration and inflow into the wastewater system.

3.4 What the Activity Currently Costs

Costs associated with this activity have been shown in Figure 4 below for operational, capital renewal and new. Operational expenses are around $3.5M but have increased significantly in recent years due to under-investment from 2011 to 2015. The increase in capital new in recent years is associated with the replacement of undersized pipes where there is an associated flooding issue.

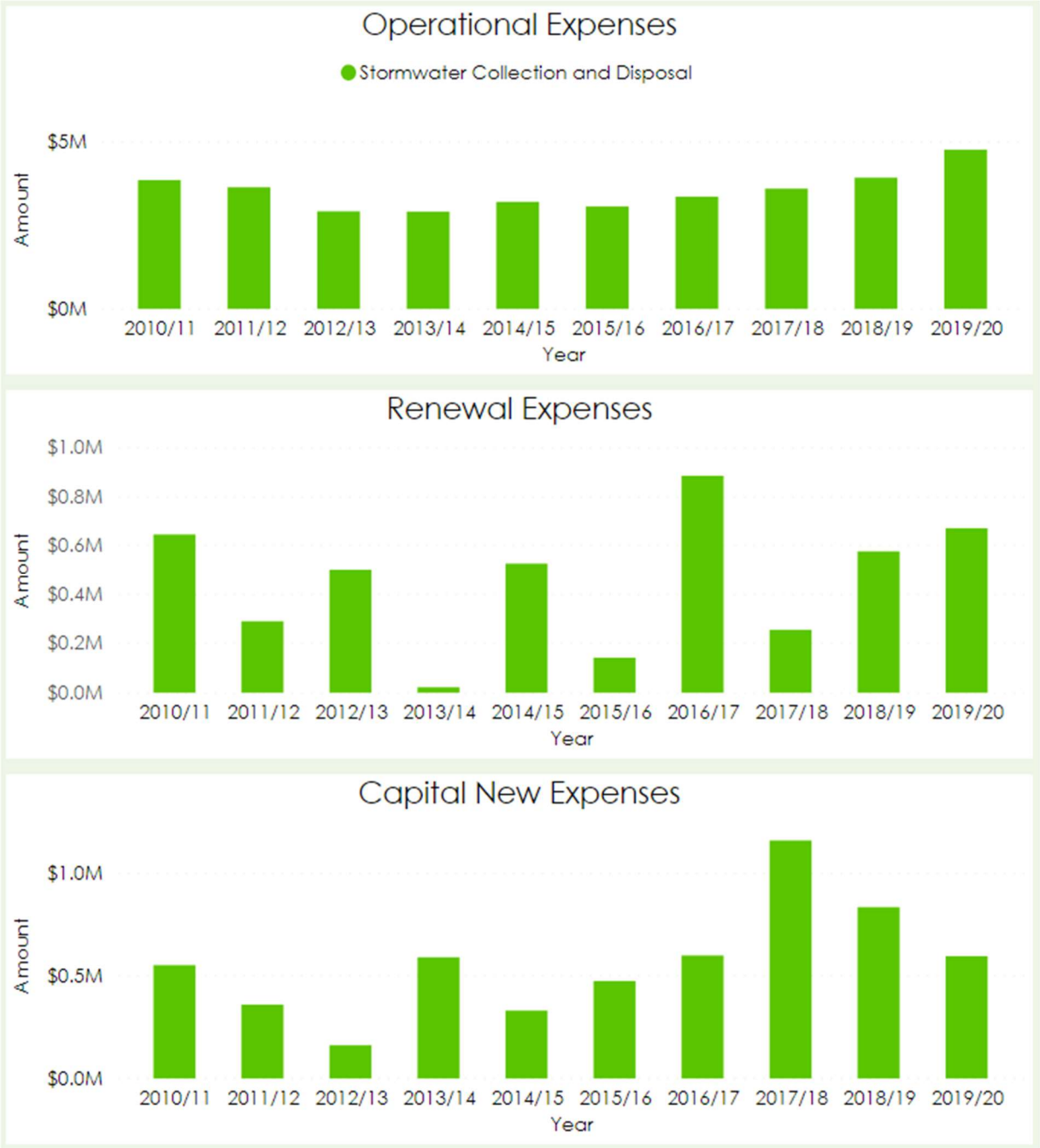

Figure 4: Activity Expenses for the Last 10 Years

4 How we Manage the Stormwater Activity

4.1 Asset Management Leadership and Teams

The Transport and Infrastructure Division is primarily accountable for the management of the Stormwater Activity. Our inaugural Asset Planning Division (Infrastructure Unit) was formed in 2019 and provides centralised asset management leadership for the Stormwater Activity by providing the Transport and Infrastructure Division with:

- Asset Management advice,
- Asset Information services; and
- Asset Planning support including lifecycle planning.

The Transport and Infrastructure Division is also supported by functions that sit within other Units of Council as summarised in Table 6. In time, Asset Management leadership will largely transfer to a cross-functional Steering Group (yet to be established).

Table 6: Asset Management Functions and Teams

Function	Unit / Division / Team
Leadership	Elected Members
	Executive Leadership Team
	Infrastructure Unit / Asset Planning Division
Finance	Finance
	Infrastructure Unit / Asset Planning Division / Asset Planning
IT	People and Performance / Information Management
HR	People and Performance / HR Services
Asset Management	Infrastructure Unit / Asset Planning Division / Asset Management
	Infrastructure Unit / Transport and Infrastructure
Risk Management	Customer / Risk and Resilience
Performance Management	Strategy and Planning
	People and Performance
Continual Improvement	Infrastructure Unit / Asset Planning Division / Asset Planning
Construction	Infrastructure Unit / Transport and Infrastructure
Operations	Infrastructure Unit / Water Operations
Maintenance	Infrastructure Unit / Water Operations
Customer Interface	Customer
Technical Specialists	Various Internal and External
GIS	People and Performance / Information Management

Function	Unit / Division / Team
Asset Management System	Infrastructure Unit / Asset Planning Division / Asset Management
	Infrastructure Unit / Asset Planning Division / Asset Information
	People and Performance / Information Management
	Infrastructure Unit / Water Operations
Records	People and Performance / Information Management

An organisation chart is provided for reference in Figure 5 below.

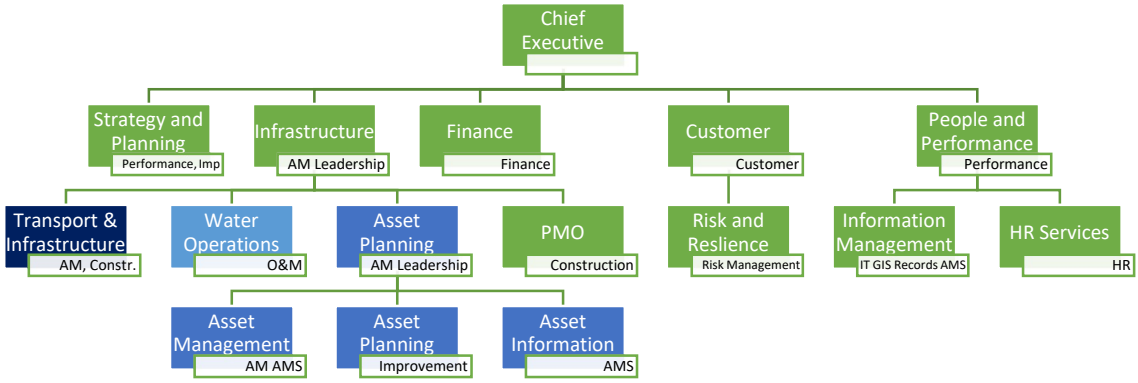

Figure 5: Organisation Chart with Asset Management Functions

4.2 Service Delivery

4.2.1 Overview of Service Delivery Model

While most Councils have outsourced their Stormwater service delivery, we have retained significant capability in-house, as summarised in Table 7 below. Essentially, either more complex activities (such as the design and construction of wetlands and other treatment units), or less frequent (such as the design and construction of trunk mains), are delivered through the procurement of external contractors.

External contractors are procured in line with our Management Team Policy for procurement and are managed predominantly by in-house Project Managers.

Note that external consultants are also engaged to carry out specialist investigations or provide technical advice on planning, consenting and policy matters, or temporarily fill vacancies as part of the asset management function.

Table 7: Service Delivery Model by Sub-Activity

Service Delivery Function	Internal Service Delivery Team	Internal Capabilities	External Service Delivery
Design	Water Operations Division > Projects and Maintenance Team	Limited	Most projects
Construct	Water Operations Division > Projects and Maintenance Team	Minor projects (Fitters)	Most projects

Service Delivery Function	Internal Service Delivery Team	Internal Capabilities	External Service Delivery
Operate	Water Operations Division > Water Treatment Team	All	None
Repair	Water Operations Division	Minor repairs (Fitters)	All other repairs

4.2.2 Section 17A Review of Service Delivery Model

The service delivery model was not reviewed in 2017 with other Activities as the service delivery model will be reviewed as part of the Water Reform, likely to occur late 2021 or early 2022 when a regional water entity design is likely to occur.

4.3 Asset Management Planning

The Asset Management Maturity Assessment (2019) found that the challenges facing the Stormwater Activity regarding Asset Management Planning were shared at an organisational level. Previous versions of the AMP have been shaped by limited engagement across the organisation. Thus, a key recommendation of the Maturity Assessment was to ensure that the AMP development is a collaborative process.

The development of this Asset Management Plan was led by the Asset Management Team and sponsored by the Transport and Infrastructure Division. Teams responsible for the asset management functions that support the Stormwater Activity (see Table 6 above) were engaged as key stakeholders to update the 2018 Stormwater AMP to this document.

4.4 Management Systems

4.4.1 Asset Management System

The Asset Management Maturity Assessment (2019) also found organisational issues with the Management System:

- **Scope:** This is now defined in the SAMP.
- **Asset portfolio:** This is now defined in the SAMP.
- **Asset Management Functions:** Refer to Table 6 above.
- **Processes:** Few processes have been documented.
- **Asset Management Maturity Levels:** These were set during the 2019 Asset Management Maturity Assessment.

4.4.2 Interface Between Systems

How the Asset Management System interacts with our other core systems is not well defined including these systems:

- Business Assurance (Quality);
- Risk;
- Environmental;
- Human Resources; and
- Financial.

4.4.3 Business Process Mapping

For the Stormwater Activity, there are few processes mapped and heavy reliance on key people. Standard Operating Procedures however are well established where there are risks to quality or health and safety. This is expected to improve once the Asset Management Policy is adopted.

4.4.4 Asset Management Maturity Levels

The Stormwater Activity has an overall asset management maturity target of 80% and in 2019 the Activity was assessed and scored 49%, or Core level, described as:

"Well defined and clearly linked processes and practices are in place."

Figure 6 below shows how each of the Asset Management elements scored for the Activity.

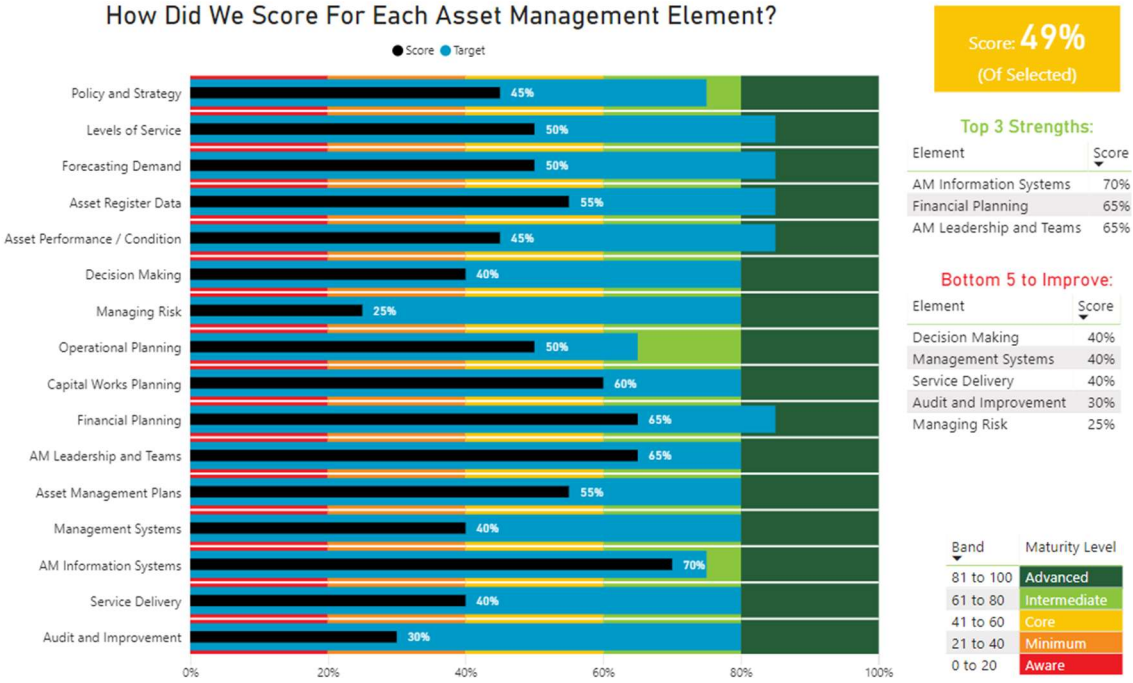

Figure 6: Asset Management Maturity Assessment Scores (2019)

4.5 Information Systems and Tools

Table 8 below contains a summary of the Asset Information System used by this Activity and commentary on recent improvements or issues. Further commentary on software specific to the Activity and data is provided below.

Table 8: Asset Information Systems

Component Type	Components	Improvements and Issues
Procedures and Standards	Staff have begun documenting procedures in ProMapp. Standard Operating Procedures are saved in OASIS (document management system).	Procedures for asset information collection need to be developed and staff trained. Standard Operating Procedures however are well established where there are risks to quality or health and safety.

Component Type	Components	Improvements and Issues
People	Dedicated role in Asset Information Team for asset data – Asset Information Analyst (3 Waters and Solid Waste).	The role of Asset Information Analyst regarding demand data is not defined. Asset information integration with financial and customer service systems is limited and largely manual. Asset Information Analyst is now required to provide much needed Business Intelligence. The roles of staff including Information Management staff are poorly defined.
Data	Asset hierarchy in place. Asset naming convention in place. The asset register is complete enough for valuation purposes. Data confidence has been assessed.	No data collection programme in place. Data needs not fully scoped (i.e. criticality and condition data are not missing). Master data sets not identified (i.e. property addresses). No structured interview processes with staff to document asset knowledge.
Software	IPS Hansen, RAMM, SPM (asset as-built attributes, condition, maintenance, criticality, valuation details) Salesforce Quality Supply and Demand (QSD) (demand and consent compliance, reporting and analytics) Ozone (financial, corporate valuation) Kbase (Customer Requests) RCMonitoring App (consent management) ArcGIS (geographical information system) TUFLOW and WaterRIDE (modelling)	There is little integration of software and data movement relies on manual processes. Limited reporting and analytics.

4.6 Quality of Data Supporting the Plan

4.6.1 Asset Data Requirements

The quality of our asset data is the foundation to staff making evidence-based decisions when managing this Activity. The business processes for the capture and recording of data are not well defined. This includes when to collect data, what data is collected, how the data is collected and who should collect the data.

While we have enough information to complete asset valuation (basis attributes, replacement cost and asset age/life) we have limited criticality information (completed for piped network) to support prioritisation of programmes.

4.6.2 Asset Hierarchy

An Asset Hierarchy for the activity has been established (refer to OASIS 2931127 and 2927045).

4.6.3 Data Management and Confidence Levels

Table 9 contains the data confidence levels for different asset attributes, which have been assessed using the confidence categories in Table 10. As data requirements are specified and data collection prioritised, it is expected that data confidence levels will increase.

Table 9: Summary of Asset Data Confidence Levels

Asset	As-Built Attributes	Condition	Repairs and Maintenance	Utilisation	Demand and Forecasts	Criticality	Risk	Resilience	Service Performance	Valuation	Financial Performance
Open Channels	2	3	3	3	3	3	2	0	3	3	3
Manholes	3	3	3	4	3	3	3	3	2	4	0
Pipes	5	2	2	4	3	4	3	3	3	3	0
Outlets	3	3	3	3	3	3	0	0	0	3	0
Floodgates	3	3	3	3	3	3	0	0	0	3	0
Pump Stations	4	1	2	0	0	0	0	0	0	4	0
Stop Banks	3	0	0	0	0	0	0	0	0	4	0
Detention Basins	2	1	2	0	0	0	0	0	0	4	0
Protection Works	2	0	0	0	0	0	0	0	0	3	0
Gross Litter Traps	4	0	1	0	0	0	0	0	0	4	0
Rain Gardens	0	0	0	0	0	0	0	0	0	0	0
Constructed Wetlands	4	0	0	0	0	0	0	0	0	4	0

Table 10: Asset Data Confidence Level Grading System

Confidence Grade	Description	Processes	Asset Data
5	Highly reliable/ Audited	A strictly formal process for collecting and analysing data. The process is documented and always followed by all staff. The process is recognised by industry as the best method of assessment.	Very high level of data confidence. Data is believed to be 95 to 100% complete and ±5% accurate. Regular data audits verify a high level of accuracy in data received.
4	Reliable/ Verified	Strong process to collect data. May not be fully documented but usually undertaken by most staff.	Good level of data confidence. Data is believed to be 80 to 95% complete and ±10 to 15% accurate. Some minor data extrapolation or assumptions has been applied. Occasional data audits verify a reasonable level of confidence.
3	Less Reliable	The process to collect data established. May not be fully documented but usually undertaken by most staff.	The average level of data confidence. Data is believed to be 50 to 80% complete and ±15 to 20% accurate. Some data extrapolation has been applied based on supported assumptions. Occasional data audits verify a reasonable level of confidence.
2	Uncertain	A semi-formal process usually followed. Poor documentation. The process to collect data followed about half the time.	Not sure of data confidence, or data confidence is good for some data, but most of the dataset is based on extrapolation of incomplete data set with unsupported assumptions.
1	Very uncertain	Ad hoc procedures to collect data. Minimal or no process documentation. Process followed occasionally.	Very low data confidence. Data based on very large unsupported assumptions, cursory inspection and analysis. Data may have been developed by extrapolation from small, unverified data sets.
0	No data	No process exists to collect data.	No data is available.

5 Description of Assets

5.1 Asset Summary

We own some $296 Million worth of assets to provide our stormwater services in the urban areas (note that rural roadside drainage is managed as part of the Transport Activity). As shown in Figure 7, most assets are associated with drainage compared to flood protection or treatment. The large investment in 1970 was due to the creation of storage basins at the Bennett Street and Fairs Road Drainage Reserves. The 1975 peak is due to a book-entry of assumed stormwater connections. This was the result of a review of properties and asset data that indicated some 15,000 connections were not registered. These equate to $15M or 5% of the total asset value, which is not insignificant, indicating that the assumptions should be revised.

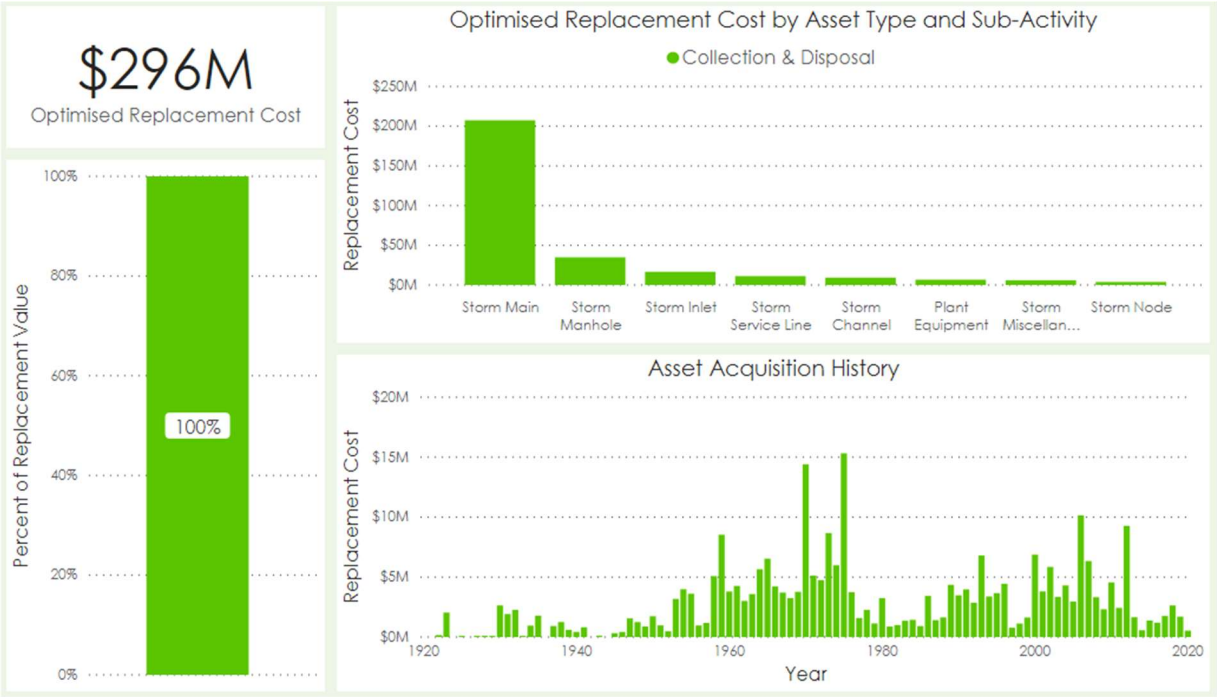

Figure 7: Optimised Replacement Cost (March 2020)

Table 11 contains some additional key statistics for each asset type. While constructed channels, stop banks, basins and other improvement works are valued, natural water courses and streams are not included in the stormwater asset valuation.

Table 11: Key Stormwater Asset Statistics

Asset Type	Optimised Replacement Cost	Quantity
Pipes – Circular	$ 162,038,054	282,897 m
Pipes – Rectangular	$ 44,811,490	8,365 m
Manholes	$ 34,467,060	5,511 no.
Mains Connections	$ 4,997,062	24,323 m
Sumps Connections	$ 16,468,233	55,344 m
Kerb Connections	$ 6,099,091	66,876 m
Floodgates	$ 583,710	87 no.
Inlet and Outlet Structures	$ 3,338,950	454 no.

Asset Type	Optimised Replacement Cost	Quantity
Storage Basins	$ 3,826,302	8 no.
Channels (artificial)	$ 9,314,446	19,911 m
Stop Banks	$ 2,679,227	14,106 m
Protection Works	$ 3,210,112	15 no.
Pump Stations	$ 2,946,943	15 no.
Drainage Reserve Land	$ 1,019,000	83,288 m^2
Total	**$295,799,680**	

While the assets are managed under a single sub-activity, "Collection and Disposal", these assets provide three core functions:

- Drainage (piped network and modified streams);
- Flood protection (flood gates and Kawau Stream stop banks); and
- Treatment (gross pollution traps, nets, rain gardens and constructed wetlands).

The different kinds of assets that deliver these three main functions are listed in Table 12 below.

Table 12: Asset Types by Function

Function	Asset Types
Collection	Pipelines, including culverts and pipe connections Manholes Inlet and outlet structures Channels, natural and artificial Protection works
Flood Control and Protection	Pump stations Stop banks Detention basins Floodgates
Pre-Treatment and Treatment	Constructed wetlands Rain gardens Gross pollution traps (including outlet nets) Sump traps Grass swales

Table 13 gives a brief description of the different stormwater asset types.

Table 13: Definition of Asset Types

Asset Type	Purpose
Pipelines and Culverts	These convey stormwater away from developed areas. Pipelines are normally circular pipework while culverts here refer to stormwater conduits that are of non-circular shapes such as rectangular, corrugated or multi-cell units. Rectangular pipes are associated mainly with the piping of the Kawau Stream
Manholes	These chambers provide access to pipelines at intervals of generally not greater than 100m. Manholes are located at confluences, changes in pipeline gradient or alignment.
Mains Connections	These pipes convey stormwater from properties directly to Council's stormwater mains.
Sump Connections	Sometimes referred to as sump leads. These pipes connect the street sumps to the stormwater mains.
Kerb Connections	Convey stormwater run-off from private property to the street kerb face.
Floodgates	Flood gated structures control the direction of the stormwater when the flow is high.
Inlet/Outlet Structures	Located at inlet and outlets when necessary, to retain the surrounding earth.
Detention Basins	Provide storage to reduce peak flows of stormwater downstream.
Channels-Artificial	In addition to natural watercourses and streams, these man-made or modified channels convey stormwater away from developed areas when the construction of a pipeline is uneconomic or not appropriate.
Stop-banks	These are earth embankments or concrete floodwalls along stream banks provided to prevent the overtopping of stream banks and discharge of flows onto surrounding properties.
Protection works	These protect the banks and beds of channels from erosion and include gabion baskets, channel lining etc.
Pump stations	Civil and mechanical structures which enable the pumping of stormwater from low areas in the system.
Treatment Devices	Assets that achieve treatment of stormwater via various means, including pre-treatment where they capture gross pollutants.
Flume	An inclined Open channel to discharge stormwater through steep embankments

5.2 Collection (Drainage) Assets

The collection network is made up of primary and secondary systems. The primary system is to drain stormwater resulting from frequent rain events. The secondary system, typically roadways and overland flow paths, exists to minimise the effects of flooding when the flows are more than the capacity of the primary system.

Historically the indicative design standard adopted by Council for the primary stormwater system has been to handle runoff from a storm with a 20% AEP (Annual Exceedance Probability, or the chance of being exceeded in any given year). For more significant and less frequent rainfall events the expectation is that the secondary stormwater system will provide the additional capacity required to

avoid flooding of habitable dwellings and commercial premises for up to a 1% AEP event. In practice, significant parts of the city have been provided historically with primary networks having a much lower design capacity, such that secondary flow networks operate more frequently than is currently desirable.

Stormwater collected by the existing pipe system is often discharged into streams and channels which may be located within our reserves or private properties.

The ultimate receiving watercourses are the Manawatū River, Mangaone Stream, Kawau Stream downstream of Botanical Road, and the Ashhurst Stream.

5.2.1 Pipelines, Culverts and Manholes

Figure 8 depicts the length of stormwater mains and culverts categorised by age. More than two thirds (77%) of stormwater pipelines have been constructed since 1960. Concrete stormwater pipes are expected to last well more than 100 years; thus, most pipelines are in the first half of their lifecycle. Most of the pipelines are made of concrete, but new pipes are typically constructed of plastic if they are smaller in diameter. Overall, most of the network comprises pipes smaller than 600mm in diameter. Note that the kerb and channel, and sump assets are managed separately under the Transport AMP.

Figure 8: Stormwater Pipe

5.2.2 Channels and Protection Works

Structures associated with streams and channels protect the integrity of the watercourse and allow it to interact with other infrastructure. This includes floodwalls, fences, concrete and timber retaining walls, as well as erosion protection works such as gabion baskets and channel lining.

5.3 Flood Protection Assets

Flood protection measures are largely regulatory, with planning and building controls placed on all buildings, such as minimum floor levels, as well as additional controls or possibly bans in particularly high-risk areas.

5.3.1 Pump Stations

Due to the flat topography of Palmerston North, some areas cannot drain to the natural streams or rivers by gravity alone, especially when receiving levels are high and gravity stormwater outlets are

submerged. Pump stations are required in these areas to dispose of stormwater during high flows and increase the capacity of the system. Locations of these pump stations are shown in Figure 9.

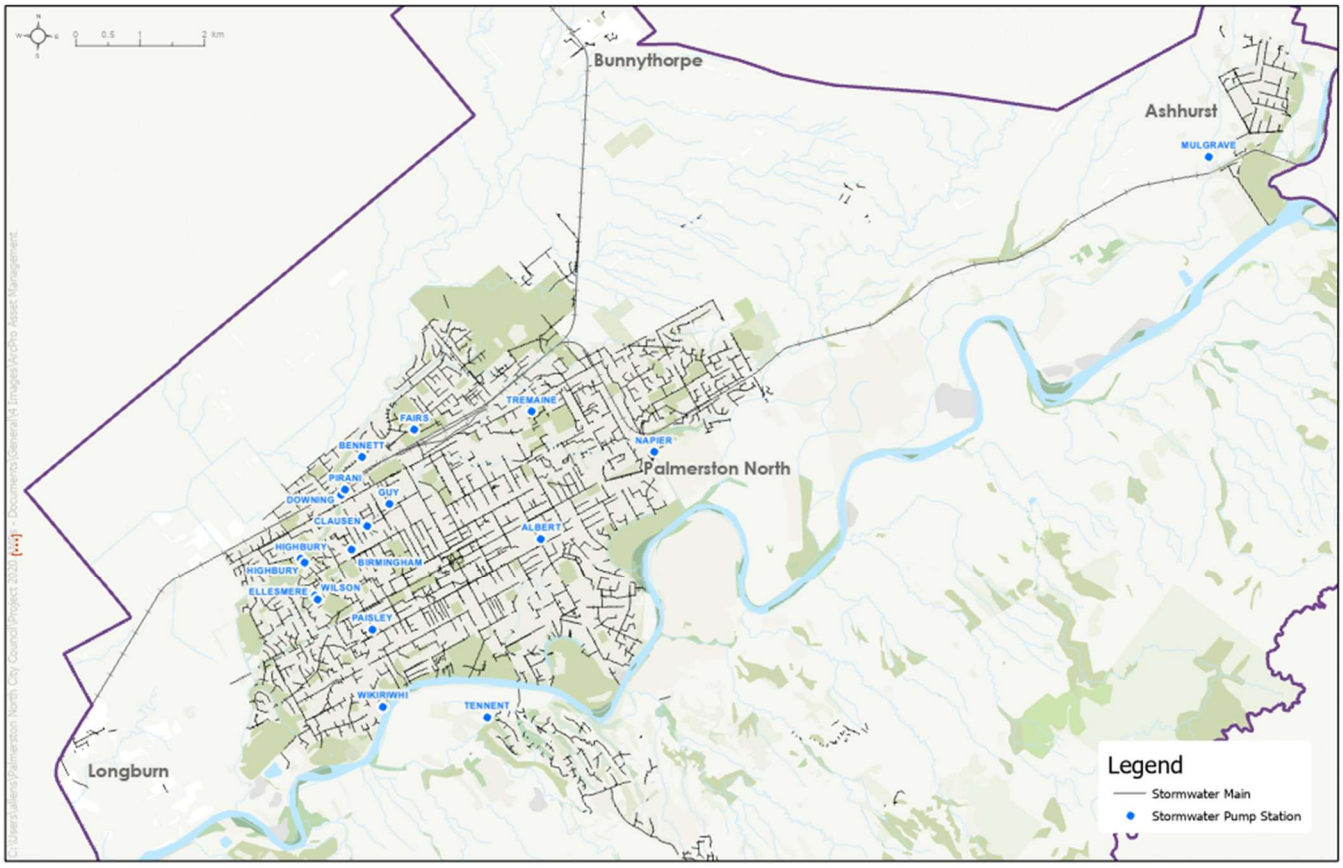

Figure 9: Location of Stormwater Mains and Pump Stations

5.3.2 Stop Banks

With regards to physical infrastructure, stop banks are provided and maintained on two streams (Kawau and Mangaone) running through the city, which also double as receiving environments. Pumps are placed in strategic locations to lift stormwater over these stop banks when the streams are running high.

5.3.3 Detention Basins

There are also a small number of storage basins and ponding areas that form part of the stormwater collection system. In managing stormwater drainage, informal storage basins and formal surface attenuation devices reduce peak flows by detaining stormwater until drainage networks and receiving watercourses can cope with the flows.

5.3.4 Floodgates

Floodgates and other mechanical installations support flood protection assets by controlling the direction of the stormwater when the flow is high. Floodgates include not only penstocks and sluice gates but also flap gates (non-return valve or backflow preventers).

5.4 Treatment Assets

Stormwater treatment methods are diverse and can be:

- placed at the point of collection, such as gross pollutant and sump traps to provide screening and pre-treatment;
- Along road shoulders such as rain gardens or similar bio-retention devices

- built into the conveyance system, such as with grassed swales; or
- situated just before discharge to a receiving system (piped system, open drain, or watercourse) such as with constructed wetlands.

Currently, we own relatively few of these assets, but the number is expected to increase as water-sensitive design is applied to improve water quality.

5.4.1 Constructed Wetlands

Wetlands are engineered treatment system consisting of large shallow pools of water body and planted with suitable species of vegetation to provide the required water quality outcomes. This approach is often adopted for new sub-divisions discharging to sensitive receiving environment, where Horizons Regional Council is likely to place stringent water quality requirements.

5.4.2 Rain Gardens and Grass Swales

Rain gardens and swales are generally the more preferred bioretention facilities to treat stormwater runoff from the road and other hard surfaces for all the new sub-divisions. They are typically located on road shoulders and uses engineered media to treat polluted stormwater. These facilities are planted with shrubs and grass which promotes filtration through different layers to achieve the required water quality outcomes.

5.4.3 Sump Traps, Gross Litter Traps and Outlet Nets

These devices are generally used as screening and to capture larger contaminants and solids from entering the network. This prevents the network from being blocked up and provides pre-treatment. Generally installed in sumps, at outlet structures, stream crossings and end section of the network. Some of the larger commercial and industrial areas have been fitted with these devices to capture plastics and intercept other particles such as oil, grease and grit.

5.5 Asset Challenges and Issues

The key issues facing **collection assets** are:

- Asset age affecting capacity and reliability;
- Pipes are generally sized to cope with a 20% AEP (1 in 5-year ARI), rainfall event. The actual capacity varies widely, with some parts of the network providing protection to only 50% AEP (1 in 2-year ARI), leading to a lower service level. The current Engineering Standard requires primary network sized for a 10%AEP (1in 10-year ARI);
- Tree root ingress;
- Displacement of pipes due to external disturbance or settlement;
- Sediment build-up in flatter gradient pipes, or due to long periods of low flows with insufficient self-cleansing velocities;
- The locations of flap-type floodgates on the 90+ flood gated outlets are often in positions where they are exposed to damage by the elements and water-borne debris, causing their condition to deteriorate more quickly than might otherwise be expected;
- In some of the lower reaches of some of the open channels, both previous heavy drain cleaning and high flow events have resulted in erosion of the bed, which in turn has contributed to some slumping of the banks in these areas;
- Several open drains are in a poorly maintained condition due to littering, illegal dumping and exotic vegetation growth;

- Several open channel sections run behind or across private properties and are difficult to access for maintenance purposes; and
- The discharge capacity of some smaller open channels can be exceeded in larger storm events resulting in stormwater overtopping and flooding adjacent properties. High water levels in receiving streams during these events can also prevent effective discharge from the stormwater primary system, causing surfacing flooding in low lying areas.

The key issues facing **flood protection assets** are:

- Asset age and unknown conditions affecting capacity and reliability;
- Four of the pump stations are not on telemetry, data collection is limited to alarms and total run hours, and few have any direct flow measurement. An upgrade programme is required to enable staff to be confident the pump stations are operating as and when required;
- Pump stations are generally installed in parallel to and alongside the gravity system to enable them to function only when the water level in the receiving watercourse rises to prevent or impede continuing gravity discharge. The operation of most of the pump stations can be monitored via the telemetry system, however, there are a number of the smaller pump stations which are not on the telemetry system. Alarm messages are sent to the mobile phones of 24-hour duty maintenance personnel to alert them of service failures and faults at the pump stations;
- There is evidence that the configuration and control of the pump stations are not optimised to match the range of flows being received, which impacts the cost of running and maintaining these assets;
- Access to those pump stations situated in the road corridor is difficult and expensive due to location; and
- Mechanical seizing due to under-use.

The key issues facing **treatment assets** are:

- Siltation of low impact design assets (wetlands, rain gardens, etc.) leading to loss of capacity or performance (depending on asset);
- Maintenance demarcation around vegetation assets;
- Build of debris on, and subsequent access to gross litter traps, as these are often on the inlets or outlets to the pipe systems;
- Diversity of maintenance requirements; and
- Asset age affecting capacity and reliability.

5.6 Asset Condition and Performance

5.6.1 Condition

Condition ratings shown in Figure 10 are largely assumed based on age and expected life.

Stormwater pipes are the only assets where actual condition assessments have been carried out and recorded. Since a CCTV inspection programme started a few years ago some 5km of pipes have been assessed. All pipes were found to be performing better than expected. Candidates for CCTV inspection should be prioritised based on their risk profile (which considers the consequence of failure, condition and performance, refer to Section 6).

All condition data for plant equipment in pump stations is assumed and indicates that nearly half of the assets are approaching the end of their useful life.

As pump stations provide flood protection it is a high priority to assess their actual condition.

A programme for improving asset condition data for the stormwater network is included in Section 11.4 Improvement Plan.

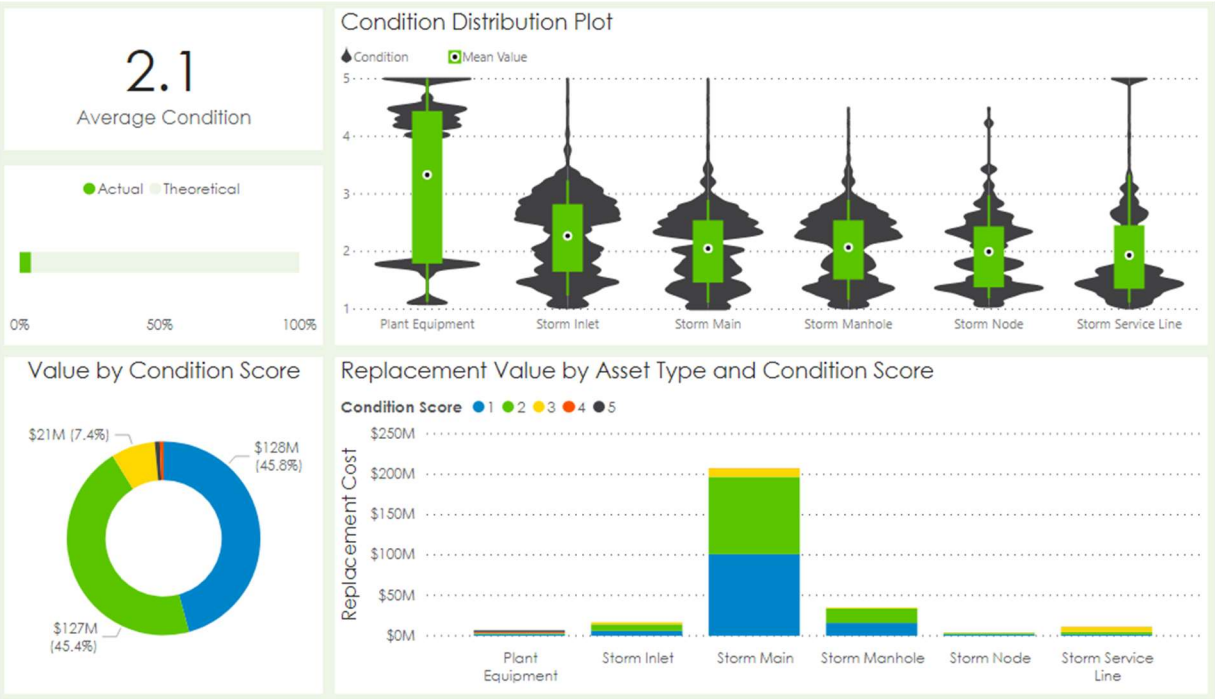

Figure 10: Stormwater Asset Condition

5.6.2 Performance

Performance of assets is largely indicated through customer complaints, especially properties that repeatedly experience issues. Areas of concern that have been addressed by increasing the capacity of the network recently include Vernon Avenue and Churchill Avenue. New GIS and modelling tools have been developed to understand the cause of issues as they are reported by customers.

6 Risk Management

6.1 Risk Context

This section focuses on risks to do with the management of the Stormwater Activity and its enabling infrastructure.

Risk management requires urgent attention as an organisation to better improve risk management at the Activity Level. The corporate risk register is currently being reviewed, after which, risks relevant to the management of this Activity will be updated.

6.2 Criticality of our Services

6.2.1 Essential Services

In 2009 the Stormwater Activity was identified as an essential service, in particular, flood protection (refer to OASIS: 1731539). The maintenance of critical assets, namely pump stations, was identified as an essential service. It is recommended that the scope of essential services be extended to include the maintenance of all critical assets including pipes.

6.2.2 Critical Customers

In 2019 the criteria for critical customers was reviewed (Jacobs, Importance Levels Guidance, December 2019). No customers were identified as being critical as a result of this review.

6.2.3 Critical Suppliers

Critical suppliers are those providing services required for the maintenance of critical stormwater assets. The following support services are critical:

- Radio communication;
- Fleet;
- Fuel; and
- Power.

Services that are deemed as not required are:

- Wastewater services;
- Water supply services;
- Access to our buildings; and
- Information Management.

6.3 Critical Assets

Critical assets are regarded as those assets which have the highest consequences should they fail. Criteria to assess the criticality of the following asset types has been developed:

- Pipes, culverts and channels;
- Pump stations;
- Stop banks; and
- Flood gates.

Of the above assets, only pipes, culverts and channels have been assessed in line with the current corporate risk framework. The criticality of the other assets listed above was last assessed in 2017 and needs to be reviewed against the current risk framework.

Stormwater grills have not been formally assessed but are maintained at least once a year as well as before heavy rain, indicating that they are critical to some degree and should be assessed too.

As shown in Figure 11 below, $86M (29%) of our assets have not been assessed for criticality. The likelihood of an asset failing is estimated from its age or condition if known. Using the corporate risk framework assets can be rated and their risk profiled. At the time of writing, there were no stormwater assets identified with an extreme risk rating (to be avoided).

However, some $8M worth of assets have been identified as high threat based on an assumed condition. These assets should be actively managed, that is, we should be assessing them and determining their actual condition using CCTV or similar technology.

Actual condition data can be used to decide what needs repairing versus replacing.

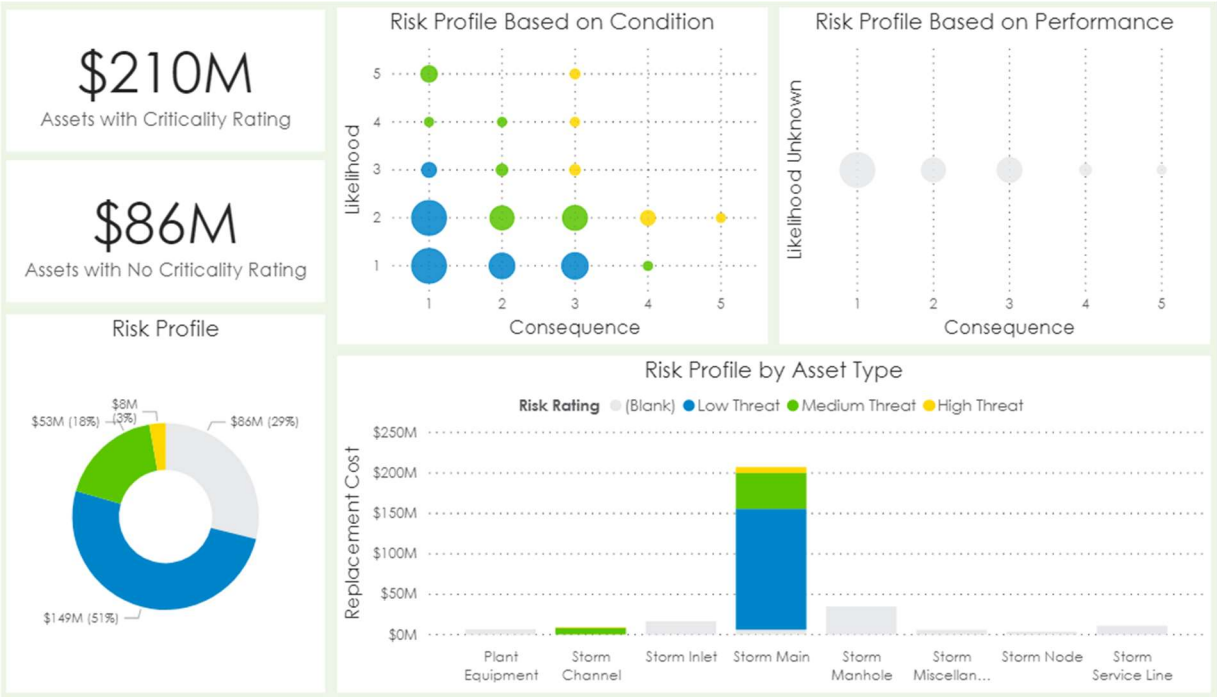

Figure 11: Stormwater Asset Risk Profile

6.3.1 Criticality of Pipes, Culverts and Channels

In 2019 the methodology to identify critical pipes was revised (Jacobs, Importance Levels Guidance, December 2019). Table 14 contains the expanded list of elements assessed using a GIS routine. Criteria for assessing the criticality rating can be found in Appendix.

Table 14: Criticality Elements Relevant to Risk Management Factors

Element	Corporate Image	Service Delivery	Financial PNCC	Financial Community	H+S Community	H+S Human Resource
Diameter	Y	Y				
Depth to invert		Y	Y			Y

Element	Corporate Image	Service Delivery	Financial PNCC	Financial Community	H+S Community	H+S Human Resource
Asbestos		Y	Y			Y
Asset under building		Y	Y			
Asset under/over a railway		Y		Y		Y
Asset in major traffic route	Y	Y	Y			
Asset under/over a waterway		Y	Y			Y
Asset near site of significance to Rangitāne, or cultural site	Y	Y				
Asset in District Plan Business Zone	Y			Y		
Asset in District Plan Industrial Zone				Y		
Asset within Land which is, or is likely to be, subject to Erosion or Slippage	Y	Y	Y	Y	Y	Y
Asset servicing critical customer	Y	Y				

6.3.2 Criticality of Pump Stations and Stop Banks

Table 15 contains a summary of how the criticality of pump stations and stop banks has been assessed previously and needs to be reviewed against the current risk framework.

Table 15: Critical Assets

Critical Asset	Criteria	Dependent Users & Services	Assessed Overall Criticality
Pump Stations: • Fairs Road • Ellesmere Crescent • Guy Avenue • Birmingham Avenue • Clausen Street	The number of people and properties adversely affected. Flow rate >750 L/s. Consequential cost of failure	Residents. Emergency services.	High
Pump Stations: • Bennett Street • Paisley Street	The number of people and properties adversely affected. Flow rate >750 L/s. Consequential cost of failure Critical user,	Residents. Significant business activities.	Medium
All flood gates Kawau stream upstream of botanical Road	Number of people and properties affected	Residents.	Medium

6.4 Activity Risks

Risk management at the Activity level is being reviewed. While effective at an operational level, risks are mostly managed as they arise, and localised/short term responses are developed to deal with issues.

Risk identification workshops were carried out with staff in September 2020 and need to be submitted to the organisational register once developed and managed per the organisational framework. The type of Activity risks should be identified in terms of whether they are planning, management, delivery or asset risks. The risks analysis needs to be completed including the assessments of the risks, their mitigation and treatment options, updating the Risk Action Plan, and putting in place monitoring and reviews.

Table 16 contains a summary of the key risks identified in 2017 for this activity with mitigation measures.

Table 16: Key operational risks

Key Risks	Mitigation Measures
Operational Risks	
Non-compliance with the legislative and legal requirements (SW08)	Compliance monitoring. Management of consents. Relevant and specific contract conditions (including OSH pre-qualification, HSE Act, etc.).
Power supply failure affecting pump operation (SW21)	Install standby power generator connections at all pump stations. Monitor pump hours run to correlate with storage. Install telemetry at all pump stations.
Discharge of contamination via the stormwater network (SW22)	Written procedures in respect of spill response to contamination and pollution discharge to the stormwater network. Community education and behaviour change initiatives. Private property surveillance, audit and compliance enforcement of requirements under the Stormwater Drainage Bylaw. Stormwater network quality monitoring to identify problem catchments and contaminant sources to implement at source treatment interventions.
Asset Failure Risks	
Stormwater pump station failure (SW20)	Complete detailed pump station condition assessments to develop a robust renewal and replacement schedule. Ensure a robust incident response plan is in place and all operational staff are familiar with the protocol. Test operation of all pump stations using a mobile generator. Ensure telemetry is installed at all pump stations and telemetry fault data is analysed to identify specific performance issues and trends.

Key Risks	Mitigation Measures
Asset Failure Risks	
Breaks and blockages in the pipe network (SW23)	Programme condition and performance assessment comprising CCTV inspection and scoring of both critical assets and a selection of the typical pipe materials across the network. Investigate blockage issues, capture information within IPS and analyse fault data to identify specific spatial or asset related trends or risks. Implement proactive inspections of critical large diameters services to ensure they are free of debris and they are capable of functioning as intended.
Erosion and scour (SW24)	Complete annual inspections of all channel and streams to develop a schedule of problem areas requiring maintenance and renewal. Update this condition schedule annually. Pipe sections of open drain where the lifecycle costs of reduced on-going maintenance and the benefits of improved safety justify the capital investment. Complete inspections of all watercourses with stop banks after floods. Inspect all SW outfalls annually before autumn to ensure they are functioning optimally, with priority given to immediate maintenance and renewals works.
Project and Planning Risks	
Lack of skilled staff (SW02)	Review and report situational risk profile at key intervals.
Failure to deliver on projects and programmes (SW04)	Development of corporate processes and systems. Reporting procedures for measuring performance. External reviews and audits. Formalise requirements and project reporting for internal consultants. Keep project scope up to date.
Inadequate asset management (SW07)	Continue to improve documentation around processes & practices. External review. Strategy to increase asset management maturity.
Inadequate communications and public relations management (SW16)	Improved presentation to the public. Communications plan developed for key projects. Contract conditions regarding community interaction. Timely communications/notification to affected customers. User-friendly website.

6.5 Disaster Resilience

6.5.1 National Disaster Resilience Strategy

Resilience is "the ability to anticipate and resist the effects of a disruptive event, minimise adverse impacts, respond effectively post-event, maintain or recover functionality, and adapt in a way that allows for learning and thriving" (National Disaster Resilience Strategy 2019).

In New Zealand, to prepare for disasters, we classify risks in five categories:

- Natural hazard risks;
- Biological hazard risks;
- Technological risks;
- Security risks; and
- Economic risks.

Our asset planning considers the resilience of the built environment only.

6.5.2 Natural Hazards

Seismic

About 90% of the piped stormwater network is made of brittle materials (reinforced concrete). During an earthquake, these brittle pipes are likely to suffer fractures and joint pull-outs and become blocked by liquefiable material and soil. Liquefaction would likely cause many manholes on the piped networks to be displaced resulting in them being sheared from their connecting pipework. This would reduce the effectiveness of the primary drainage system and lead to increased reliance on the secondary system (overland flow) with the effect of increased frequency and duration of stormwater ponding in urban locations under normal conditions.

Loss of power could be expected as a result of a major seismic event. None of the pump stations has permanently installed backup electrical power generation to operate the pumps. While a trailer-mounted generator is maintained by Water Operations (Infrastructure) which can be used for any of the stormwater or wastewater pump stations, priority will likely be given to providing backup power to critical wastewater pump stations.

Storms (Flooding, Lightning and other Severe Weather)

The purpose of the stormwater system is to protect property from inundation during frequent rainfall events which result in stormwater levels exceeding habitable building floor levels for the 2% AEP (1 in 50-year ARI) rainfall event.

The Horizons One Plan requires new structures, activities or critical infrastructure located in a floodway to be designed to be protected from a 0.5% AEP (1 in 200 years) flood event. Horizons has upgraded the river stop bank assets to protect the urban areas for river flood events up to a 0.2% AEP (1 in 500-year ARI) flood event. Should the river stop banks be breached or overtopped, extensive flooding of hundreds of properties to levels above current floor levels would occur in the eastern side of the city.

Even if the river is contained within the stop banks, many of the stop banks are higher than the surrounding residential floor levels. This means that some parts of the city are unable to drain under gravity. Flood gates are installed on outlets to prevent flood water from flowing from the rivers into the city and pump stations have been strategically positioned to pump stormwater out. During heavy rainfall and river flooding, it is expected that some surface ponding will occur in low-lying parts of the city.

Table 17 provides a summary of the assessed resilience of the stormwater assets to flood hazard. Where the current level of resilience is less than the desired level of resilience, further work is to be undertaken to determine options for future management and development of the asset. This will include reviewing the desired level of resilience.

The resilience of the remaining network to flooding hazards is medium, considering the extensive secondary flow path network and informal local detention areas.

A lightning strike of a pump station could damage pump controls and electrical circuitry.

Table 17: Resilience to Storms (Flooding, Lightning and Other Severe Weather)

Critical Asset	Criticality	Current Level of Resilience	Desired Level of Resilience
Piped drains & manholes	Medium-High	Medium - High	Medium - High
Culverts	Medium	Medium - High	Medium
Pump stations	Medium-High	Medium	High
Stop banks (PNCC owned)	Medium	Medium	High
Floodgates	Medium	Medium	High

Volcanic Hazard

Ash is the main hazard that could occur under a major volcanic eruption (volcanic alert level 5). The most recent eruption that resulted in ashfall occurred during the 1996 eruption of Mount Ruapehu.

The main risk associated with this hazard is the build-up of ash in the City's stormwater drains and channels, reducing the capacity of these assets. Ash carried through to pump stations could have a damaging effect on pumps, through corrosion and/or choking of the pump impellors. Additional reactive network maintenance in the form of pipe flushing, channel excavation, desilting of attenuation ponds, and pump station cleaning would be required.

Table 18 provides a summary of the assessed resilience of the critical stormwater assets to a volcanic hazard. Where the current level of resilience is less than the desired level, further work is to be undertaken to determine options for mitigation of the risk and further development of the asset to close the gap. This will include reviewing whether the desired level of resilience is appropriate.

The resilience of the stormwater network to volcanic hazards is medium, noting the role of secondary flow paths in providing adequate drainage for most parts of the city and the need to monitor the impact of the potential accumulation of ash deposits on open channel capacity.

Table 18: Resilience to Volcanic Hazard

Asset	Criticality	Current Level of Resilience	Desired Level of Resilience
Piped drains & manholes	Medium-High	Medium	Medium - High
Culverts	Medium	Medium - High	Medium - High
Pump stations	Medium-High	Low	High
Stop banks (PNCC owned)	Medium	High	Medium
Floodgates	Medium	Medium	Medium - High

6.5.3 Biological Hazards

Our response to Covid19 provides us with the opportunity to better assess the impact of biological hazards on our stormwater services. The main risk is the availability of staff to carry out preventative maintenance and inspections of critical assets (such as pump stations and grills) during a pandemic.

6.5.4 Technology Risks

Technology risks are largely managed by our Information Management team but there is an opportunity to better understand the impact on this Activity. The three waters Covid-19 stimulus package is being sued to upgrade parts of the telecommunications and control systems for the pump stations. Technology can also introduce complexity and that presents a risk.

6.5.5 Security Risks

Security risks are largely managed by our property team and this has prompted a recent review of our building access and security, including at our Water Operations staff facilities. We are aware that water utilities have been subject to cyber-attacks overseas including ransomware and unauthorised remote access resulting in the changing of process control points. Cyber-security is overseen by Information Management (People Unit)

6.5.6 Economic Risks

Changes in the global supply chain as a result of Covid-19 are having an impact on our Activity, particularly the cost of fleet and electronics. The impact of this is being monitored by Central Government.

6.5.7 Minimum Service Requirements During A Disaster

The stormwater activity is regarded as a Lifeline Utility under the Civil Defence and Emergency Management Act 2002. As a Lifeline Utility we have various duties under this Act, as laid out by Section 60:

> ***"60 Duties of lifeline utilities***
>
> *Every lifeline utility must—*
>
> *(a) ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency:*
>
> *(b) make available to the Director in writing, on request, its plan for functioning during and after an emergency:*
>
> *(c) participate in the development of the National Civil Defence Emergency Management Strategy and civil defence emergency management plans:*
>
> *(d) provide, free of charge, any technical advice to any civil defence emergency management group or the Director that may be reasonably required by that group or the Director:*
>
> *(e) ensure that any information that is disclosed to the lifeline utility is used by the lifeline utility, or disclosed to another person, only for the purposes of this Act."*

6.5.8 Desired Resilience Levels Versus Current Levels

Table 19 provides a summary of the assessed resilience of the critical stormwater assets to an MM9 earthquake, with a return period of 1,000 years. Where the current level of resilience is less than the desired level of resilience, further work is to be undertaken to determine options for increasing the resilience of the asset and managing service delivery following a seismic event. This will include a review

of the desired level of resilience. The average resilience of the stormwater network as a whole is medium, noting that the network is mostly a gravity system that follows natural gradients and flow paths.

Table 19: Resilience to Seismic Hazard

Critical Assets	Criticality	Current Level of Resilience	Desired Level of Resilience
Piped drains and manholes	Medium-High	Low	Medium - High
Culverts	Medium	Medium	Medium - High
Pump stations	Medium-High	Low - Medium	High
Stop banks (PNCC owned)	Medium	Medium	Medium - High
Floodgates	Medium	Low - Medium	Medium

6.6 Business Continuity Planning

A Business Continuity Action Plan has been prepared for the Stormwater Services to provide information and strategies, including coordination of people and resources that will enable continued availability of business process, services and recovery from events that interrupt those services.

The Stormwater Business Continuity Plan contains:

- The Stormwater Services call tree;
- Incident Stormwater Team;
- Stormwater services continuity and recovery strategies;
- Accessibility, Resources and Communication;
- Stormwater Disposal/Flood Protection;
- Contact Lists for both internal and external contacts; and
- Response Centre Details - Arena Manawatū.

7 Levels of Service

A key objective of this AMP is to ensure that assets support the delivery of the agreed levels of service in the most cost-effective manner. This requires a clear understanding of levels of service, now and in the future.

The SAMP defines levels of service (LoS) as statements that describe the services Council intends to deliver to its customers. Levels of service are used to:

- Inform customers of the level of service they can expect;
- Enable customers to assess suitability, affordability and equity of the services offered;
- As a focus for asset management strategies to deliver the required level of service;
- Enable the measurement of the effectiveness of this AMP;
- Identify costs and benefits of the services provided.

The process for the development and monitoring of levels of service is outlined in the SAMP. This section of the AMP documents each of these steps for stormwater and identifies any issues or service gaps and the plans to address them.

7.1 Establishing Levels of Service

There are three main inputs into the established levels of service for stormwater. These are outlined in Figure 12.

Figure 12: Process to Establish Levels of Service

7.1.1 Strategic Direction

The strategic direction for the Stormwater Activity is described in Section 2 of this AMP. The strategic goals of Council guide the community expectations that need to be delivered now and in the future. The supporting plans describe actions and targets for levels of service Council wishes to achieve.

7.1.2 Statutory Requirements / Standards

Statutory requirements/environmental standards (see Sections 2.4, 2.5 and 2.6) - Regulations, Acts, and Council Bylaws that impact the way assets are managed (i.e. resource consents, building regulations, health and safety legislation). These requirements set the minimum level of service that must be provided.

The Department of Internal Affairs (DIA) mandatory measures were introduced in 2013 to establish a set of baseline data to enable performance to be measured comparatively between all Local Authorities in the country.

7.1.3 Customer Expectations

Our Stormwater Activity provides a service for a wide range of users and stakeholders. Anyone who lives, works or plays in the city will benefit from our service. Table 20 provides the user and stakeholder groups of each of the elements of the stormwater activity which will be used to target the levels of service and assess whether the performance measures are being met.

Table 20: Stormwater Users, Partners and Stakeholders by Sub-Activity

Sub-Activity	Service Description	Customers	Partners	Other Stakeholders
Collection	Removal of rainwater from ponding in public spaces to enable their continued use during, or shortly following, regular rain events.	• Property Owners • Businesses • Residents • Visitors • Road users	• Rangitāne o Manawatū • He Waka Kotahi	• Nga Iwi o te Awa Manawatū • Horizons Regional Council • Developers • Manawatū District Council
Flood Protection	Protection of property from the negative effects of flooding in regular rain events.	• Owners of habitable property	• Rangitāne o Manawatū • Horizons Regional Council • Lifelines Group	• Nga Iwi o te Awa Manawatū • Developers • Property Owners • Businesses • Road Users
Treatment	Minimise the negative environmental impact of rainwater runoff with regards to natural receiving environments.	• Urban properties	• Rangitāne o Manawatū	• Nga Iwi o te Awa Manawatū • Horizons Regional Council • Developers

What's important to our users?

Stormwater is collected and disposed of, minimising flooding of buildings and public space.

The reticulation network, specifically the collection and/or discharge points of that network, has traditionally been the primary interface with users, usually in the form of downpipes, catchpits and pipe outfalls. Interaction also occurs at some detention facilities because of dual usage as parks, playgrounds and sports fields.

As treatment facilities become more commonplace, and urban design ideas take hold, community interaction with these facilities will also increase but not necessarily with a perception that these facilities are stormwater-related (for example, rain gardens may just be perceived as gardens rather than collection devices, wetlands as a natural amenity rather than a treatment device, etc.).

What is important to our stakeholders?

Stakeholders will often agree with Users on many aspects of level of service. For example, a developer wants to ensure flood protection for a new subdivision. There will however be key differences and tension between some stakeholder groups in some areas. That same developer will want to meet its regulatory requirements while keeping development costs down.

Rangitāne o Manawatū as a Partner have an active interest in all aspects of environmental impacts. They are expected to take a keen interest in Council's progress towards minimising the impact of stormwater discharge on the environment.

Wider groups not directly affecting the district, such as surrounding communities (including other Iwi groups), rural businesses, etc. are also affected by our actions. This is especially so for those downstream of our district. While they could be negatively affected by our actions, they have no direct way of influencing our decisions. These groups are relying on government and regional regulatory controls to ensure we are meeting our requirements for our stormwater discharge.

Limitations to Meeting Expectations

We recognise that the expectations of our users cannot always be met and that there are often conflicting desires and values within the broader activity user group. In addition to this, there are regulatory and technical considerations that often will override user expectations. The following limitations and/or exceptions to LoS are acknowledged:

- Council cannot provide a system that contains all flows. Whether this is in the piped system with no nuisance flooding, or the piped and overland system with no flood damage to property, at some point storm events will exceed the designed capacity of the system, and have an impact on the community;
- While all new buildings have a floor level set by Council, not all old buildings were built to a minimum floor level and so some older buildings may flood more frequently than is considered acceptable. Council considers it impractical and unaffordable to stop this from happening, and considers that the issue will gradually be addressed as the stormwater network is improved and buildings are redeveloped to new standards;
- The stormwater activity cannot directly influence the maintenance of stormwater catchpits as they are managed by the Transport activity;
- Although treatment of stormwater to high quality is desirable, Council considers that financial constraints mean a more targeted approach to treatment is more appropriate.
- While many of our actions serve to minimise negative environmental impacts, we cannot mitigate all downstream effects of our stormwater discharge or influence the discharge of others outside of our scheme.

7.1.4 Customer Feedback

On-going engagement methods include all those identified in section 12.3 of the SAMP and are supplementary to the 2005 review conducted into levels of service with the wider community.

There is no indication that user values and expectations have changed significantly for the Stormwater Activity since the 2018 AMP. The 2020 Annual Residents Survey showed that, for the Stormwater Activity, residents are generally happy with all aspects. The Village and Rural areas were the least satisfied as shown in Figure 13 below.

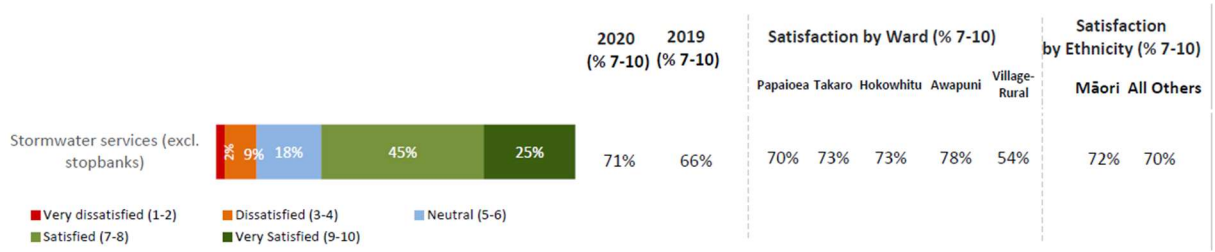

Figure 13: Customer Satisfaction Survey Results for Stormwater

Increased usage of the Manawatū River Park and urban walkways beside the Mangaone and Kawau Streams has led to an increase in customer expectations around water quality.

The primary area of feedback has generally been around localised flooding, though the perception of what constitutes flooding varies depending on the individual. This is reflected in the 2020 residents survey where "stormwater blockages and flooding" were identified as negative issues in the stormwater management space. The exact percentage is unknown as they were included along with street sweeping and road gutter clearing (both roading interface issues).

7.1.5 Review of Current Levels of Service

Staff Workshops

In November 2019, a workshop with staff involved in decision making relating to Three Waters infrastructure was held. The staff were asked to use their knowledge and experience to identify stormwater customers, what was important to them (values), and the services/assets they expected from Council.

The information was collated, and themes checked against the existing knowledge of customers and levels of service. The information was consistent with existing knowledge, though some new themes responding to environmental outcomes were not present in existing measures.

Elected Member Workshops

Workshops were held with Elected Members during 2019 and 2020 to inform the development of key documents used to inform the 10 Year Plan. This included the SAMP and this AMP.

In November 2019, Elected Members reviewed Council's Vision, Goals and Strategies developed as part of the 2018 10 Year Plan. In May 2020, Elected Members reviewed the strategic priorities and key actions for each of the plans. This workshop also provided staff with an opportunity to present any suggested additions or updates to LoS following the staff workshops.

Elected Members indicated overall satisfaction with the existing priorities for stormwater and as an extension of this, existing levels of service.

7.2 Customer Service Statements

Our 10 Year Plan consultation process confirms the service attributes and their performance measures that we will report on. Table 21 below contains a summary of the existing Service Attributes and Levels of Service Statements as agreed through the 10 Year Plan 2018-28. Other service attributes that are important to our stormwater services but are not publicly reported on are public health, cultural, environmental, resilience, and reputation.

Table 21: Existing Customer Levels of Service (2018/19 – 2020/21)

Services	Service Attribute	Levels of Service Statements
All	Provision Safety Reliability Compliance	We provide stormwater services to protect buildings from inundation from flooding in major (up to 2%AEP) events.
All	Provision	We provide stormwater infrastructure to support growth.
All	Financial / Affordable	We manage our Stormwater Activity in a financially sustainable way.

7.3 Performance Against Existing Levels of Service (2018/19 – 2019/20)

Performance against the levels of service statements in Table 21 above informs our investment, particularly where measures are not currently being met. Table 22 provides a summary of our performance against the levels of service for the previous two years.

Table 22: Performance Against Existing Levels of Service (2018/19 and 2019/20)

Levels of Service Statements	Customer Performance Measures	Target	Performance 2018/19 & 2019/20
We provide stormwater services to protect buildings from inundation from flooding in major events.	The number of flooding events per year that result in stormwater from Council's stormwater system entering a habitable floor in an urban area.	No more than 5 events	
	The number of habitable floors per 1,000 properties within urban stormwater service areas affected by a flood event.	0.1 habitable floors per 1000 properties	
	Median time to attend a flooding event	Less than 2 hours	Not measured
	The number of complaints received about the performance of the Council's urban stormwater system per 1,000 properties connected.	No more than 15	

Levels of Service Statements	Customer Performance Measures	Target	Performance 2018/19 & 2019/20
We provide stormwater services to protect buildings from inundation from flooding in major events.	Compliance with resource consent conditions for discharge from our stormwater system measured by the number of: • Abatement notices; • Infringement notices; • Enforcement orders; • Convictions.	100% compliance	
We manage our stormwater assets in a financially sustainable way.	A 30-year Asset Management is in place and major AMP projects approved in the 10 Year Plan are achieved	Renewals as a group	
	Major services and projects are provided within budget.	Services provided within budget	

7.4 Level of Service Gaps

7.4.1 Existing Levels of Service Gaps

In 2019/20 there were significantly fewer complaints about roadside ponding compared to the previous year. This may or may not be attributed to rainfall patterns and needs to be monitored further.

In 2019/20 stormwater planning and investigation services were provided to expectation but exceeded budget due to the additional costs of consultancy to prepare assessments for plan changes, structure plans and the drafting of asset management plans. Capital new and renewal projects were all completed within available budgets.

7.4.2 Forecast Levels of Service Gaps

The most likely customer performance measure that is not going to be met in the future is the provision of our services within budget. This is mainly due to existing budgets no longer being enough, as follows:

- There is a risk that maintenance and renewal budgets set under the 10 Year Plan 2018-28 become inadequate as our assets age.

8 Impact of Demands and Drivers

8.1 Demand Trends

Demand is increasing for stormwater services in the city. Overall, this is being driven by:

- Pressures to provide more housing for increasing population, which often results in an increase in the percentage of impermeable surfaces and therefore stormwater runoff volumes (reducing the spare capacity of the existing network);
- The impact of climate change on weather patterns. Specifically changes to rainfall intensity and duration;
- Community expectations of expected versus provided Levels of Service;
- Community expectations of the environmental quality of waterways, particularly in terms of ecological health and appearance;
- Mitigation of the frequency of flooding in prone areas and the level of annual average flood damage considered acceptable;
- The extent to which sustainable urban drainage solutions are incorporated into future developments;
- The type and nature of land use activity (for example, the number of contaminants generated from new and existing commercial areas);
- Regional and national legislative and regulatory changes setting performance standards for the quality of stormwater discharges; and
- A greater desire to gain an understanding of the system performance

8.2 Growth and Development

8.2.1 The impact from infill housing

Infill development occurring in the city is resulting in increases to the impervious surface area. This is leading to increased stormwater runoff volumes and rates of discharge to the stormwater collection network. This increase adds to existing issues with capacity in the network and will require upgrades over and above expected needs due to climate change.

Intensification of infill development, the additional incremental stormwater discharges have eroded the existing level of service and resulting in more frequent overland flow and ponding. For many areas of the city, the additional flows do not result in any material change to flood risk. However, for areas of the city with existing flood risk, there is a need to consider specific mitigation to limit any impact.

We use the stormwater model and scenario assessments to determine the effects of infill development and identify potential mitigation measures for additional runoff either at development or at catchment level. These measures or the need for them are included in consent conditions being applied to developments.

This type of development also impacts the potential for environmental degradation. Any development which results in land being transformed to building or hard surface will result in increased levels of contaminants associated with human activity, such as particulates from roof surfaces and vehicle movements. Older parts of the city generally don't have treatment devices and infill housing developments generally don't have space to provide their own.

For residential development the increase in contaminants are small, however, for commercial development involving large vehicle movements, and/or the handling of goods and materials,

significant levels of contaminants can be generated. Commercial activities involving high-risk process are required to provide first flush systems and bunded containment areas which provide for highly contaminated stormwater to be directed to specific stormwater treatment areas, or the wastewater system.

Improvements in stormwater quality associated with increasing regulatory and legislative standards are required in the future. We will need to ensure that treatment is provided at the source wherever possible by way of either engineered devices or natural treatment systems such as swales and wet or dry ponds. Only where this is not practicable or feasible will we consider treatment devices located in our network given the ongoing operation and maintenance costs they impose.

We are developing procedures and ensuring existing control is maintained and monitored to an adequate standard to:

- Manage silt runoff from development earthworks areas (silt pond requirements for developers);
- Manage discharge of contaminants associated with urban runoff in the CBD area (sump filters, rain gardens, and wetlands, and routine monitoring of receiving waters);
- Manage point source contamination from commercial and industrial areas (ongoing monitoring and updating of stormwater control devices in these areas); and
- Limit other contamination sources through active engagement with the community to change behaviour and value their neighbouring receiving environment.

8.2.2 The impact from the extension of the city

The expansion of the urban footprint into previously rural areas results in increases to the impervious surface area and therefore increases stormwater runoff volumes and rates of discharge to the stormwater collection network. Increased runoff and associated environmental concerns can be mitigated by requiring treatment and detention devices within development areas that only release the equivalent of pre-development flows to the existing network.

The approach has the added issue of increasing the amount of physical infrastructure as opposed to just capacity. This will increase the number of stormwater network assets that will add to the maintenance burden.

The existing city-wide flood model, at the time of writing, has included all anticipated urban growth areas. For this reason, we are well informed about the current state of the network from a capacity point of view.

8.2.3 Overland flows and general flood hazard

As the level of medium-density development increases in the city, the pressure on land will increase. This may result in the desire to push against established overland flow paths, or even build over them unknowingly where they run through private property. This in turn will increase the likelihood of dwellings being flooded.

Couple this pressure with an increase in the need for capacity due to climate change, and an increase in runoff due to infill and expansion, it is crucial that these secondary flow paths be protected as much as possible to prevent a future issue.

8.3 Regulatory and Policy

8.3.1 Three Waters Review

There is a lot of uncertainty about what the three waters review will look like for the stormwater activity – whether it will remain with us or not. However, it is likely that additional staff time may be required in

some way over the transition to the new entities. Whatever the outcome, the stormwater activity will continue to be operated prudently as a going concern by us in the meantime.

8.3.2 Changes in Legislative and Regulatory Requirements

The health of our freshwater is vital for the health of our people, environment, and economy. However, freshwater quality is declining. It is being impacted by urban development, agriculture, horticulture, forestry and other activities. Current regulation has not been able to halt the decline in many of our catchments.

To address these issues, the Ministry for the Environment, under their Essential Freshwater Plan, is working towards these three objectives, all of which will have an impact on the Stormwater Activity:

- **Stopping further degradation and loss** – taking a series of actions now to stop the state of our freshwater resources, waterways and ecosystems getting worse (i.e. to stop adding to their degradation and loss), and to start making immediate improvements so that water quality is materially improving within five years.
- **Reversing past damage** – promoting restoration activity to bring our freshwater resources, waterways and ecosystems to a healthy state within a generation, including through a new National Policy Statement for Freshwater Management and other legal instruments.
- **Addressing water allocation issues** – working to achieve efficient and fair allocation of freshwater and nutrient discharges, having regard to all interests including Māori, and existing and potential new users.

As part of this plan the New Zealand Government introduced a new National Policy Statement for Freshwater Management (NPSFM) in 2020 (see section 2.4). It is expected that Horizons Regional Council (Horizons) will amend the Regional Plan (The One Plan) in response to the NPSFM. Based on Horizons response to previous 2017 NPSFM is anticipated that this will at least include:

- A move towards Global Discharge Consenting for urban areas.
- The requirement will be introduced to have Catchment Management Plans for all existing urban areas within Palmerston North City boundary. These Catchment Management Plans will set out performance targets and actions to achieve stormwater quality improvements.

Horizons continues to seek to limit the extent of stormwater peak flow increase in order to limit flood flows in the Manawatū River. This will drive the requirement to limit peak flows to pre-development levels (i.e. attenuation) in all major new developments.

We will continue to work proactively with Horizons to identify the best means of achieving improvements in stormwater quality outcomes, that is both practical and cost effective. As a part of this we intend to implement the treatment requirement for all new developments to include stormwater treatment as complianceto their consent conditions and publish a framework to guide developers.

We participate in discussions with Rangitāne o Manawatū. This occurs at all levels of the organisation and allows us to prepare, influence and adapt to pending? changes before they are implemented.

We are also committed to implementing the monitoring of receiving environments to track how well treatment devices are operating, which will aid us in refining treatment options if some are found to have issues.

8.4 Technology

The adoption and implementation of technology can be driven by a range of different factors. The five - stage Better Business Case process is usually followed for any new technology proposals. This process ensures objective analysis and consistent information is provided to decision makers, enabling them to make informed decisions. While cost saving and good value for the community is important consideration

other non-financial benefits to levels of service, health and safety, environment, sustainability and resilience also significant factors in the adoption of technology.

As requirements for water quality increase new stormwater treatment technologies and products are also emerging. As we become aware of developments in this area they will be assessed as whether it might be incorporated into our future stormwater planning. This would include reviewing factors such as treatment effectiveness and operability.

There is also an intent to increase data gathering on the network using new technology to increase understanding of how the system operates. In time this data will be able to be utilised in trend analysis to identify constraints within the system. Currently identified advancements which council is looking into include:

- Using IoT (Internet of Things) networks to monitor rain gauges across the district, gaining live data regarding rain events in upper catchment areas to enable more timely responses to possible issues further downstream.
- Enabling use of data capture via electronic forms on digital devices for service teams and contractors whilst carrying out maintenance activities, able to be uploaded to the Asset Management System database much faster and therefore concerns addressed by the wider teams much quicker.
- Including continuous water quality sensing and state change alarming on monitoring systems for stormwater outfalls, and/or outfalls from individual treatment devices so activity managers are aware of issues in a timely fashion.

There is also an intent to increase data gathering on the network using new technology (refer next section), with installation of rain gauges, flow monitoring, and other such equipment to increase understanding of how the system operates. In time this data will be able to be utilised in trend analysis to identify constraints within the system.

8.5 Sustainability and Environment

8.5.1 Key Sustainability Issues

Key sustainability issues arising impacting on the stormwater activity are as follows:

- Increased hardstand areas reduce opportunities for soakage, increase total runoff and reduce potential for groundwater recharge.
- The transmission of pollutants from the source to the receiving environment via stormwater discharges. The quality of the stormwater discharges, particularly first flush of runoff from the built environment, will need addressing if an improvement to the biodiversity of streams and gullies and better riparian ecology is to be fostered.
- Continuing community pressure to reduce the incidence of flood damage and reduce extended ponding following rain events may necessitate strategic capacity upgrades to the stormwater network.
- An increased community focus on transforming stormwater reserves, corridors and waterways in terms of condition and appearance due to increased environmental awareness and interaction with these spaces.
- An increased community focus on transforming stormwater reserves, corridors and waterways to provide cycling and walking connectivity, amenity and recreational spaces.

It is important to note that regulatory and community expectations in this area are expected to increase, pushing Council to look for new ways of delivering services.

8.5.2 Approach Taken in This Plan

Sustainability considerations are incorporated into the AMP through the following mechanisms:

- Implementing consent conditions for all new developments to include stormwater treatment as a requirement f
- Engineering Design Standards which require whole of lifecycle cost assessment and set out acceptable solutions for stormwater attenuation and detention devices and treatment systems.
- Stormwater Drainage Bylaw 2015 which provides for at-source improvement of stormwater discharges.
- A programme of city-wide stream cultural and scientific monitoring to track the quality of the receiving environments to ensure the measures are working.

8.5.3 What are we planning for?

Currently there is a reasonably unbroken route for most pollutants (except for gross litter), and we intend to put measures in place to remedy this issue, including:

- The development of a Stormwater Framework providing guidance on the use of Water Sensitive Design (WSD) and Sustainable Urban Drainage (SUD) approaches.
- Implementing at source water treatment devices in public spaces where possible (such as rain gardens in existing roadside garden areas).
- Identifying areas of the network where larger scale treatment devices, such as ponds and wetlands, could be implemented.

We are also planning to take the following measures to address other environmental issues:

- Continue to rectify the backlog of the maintenance of watercourses and work with the community to replant it.
- Designate overflow paths in the District Plan to prevent encroachment by developments and help give weight to access requirements where they already exist.
- Purchase setback corridors to ensure adequate maintenance access.
- Ensuring all streams in future subdivisions are placed under reserves to enable access and ease of maintenance.

8.6 Climate Change

The projected impacts of climate change are likely to become more noticeable within the next decade and have greatest relevance to the three waters assets, especially *stormwater*.

Current research suggests that the main impacts of climate change on the stormwater activity will be an increase in the frequency and intensity of rainfall events. This in turn is likely to result in more rain events per annum with the secondary stormwater system operating, i.e. stormwater flowing down roads, swales and via informal overland flow paths. The impact is characterised by a change in the return period of an event, e.g. a current event which is predicted to have a 1% chance of occurring in a year may now have a 2% chance of occurring.

The impact of the greater frequency of any rain event is an increased risk of flooding in susceptible areas of the network. More frequent ponding is likely to occur in low lying areas. This will require more robust assessment and mitigation of stormwater flooding risk at the building and subdivision consent stage if greater stormwater damage losses are to be avoided with new developments. However, it is only in areas where more frequent flooding of habitable residential and commercial buildings is likely that Council would propose to investigate mitigation options.

Problems could also arise with sedimentation in pipes due to low to no flows during extended dry periods. This could lead to an increase in maintenance being required to ensure pipe capacities are maintained for higher flow periods.

Design of all new stormwater infrastructure will consider climate change. Modelling will be utilised, using the most up to date rainfall predictions from NIWA and, as data is collected, with comparison against data collected by Council rain gauges, to assess the feasibility and efficacy of capital projects to manage additional runoff. Areas likely to be targeted will be those already experiencing flood damage effects, with other areas being looked at in turn.

This modelling analysis will also be used to target upgrades to the existing network, as well as new infrastructure, for the largest benefit.

8.7 Resilience and Reliability

The Local Government Act requires us to plan and provide infrastructure assets that are resilient to the effects of natural hazards. For the Stormwater Activity this will mean focussing on mitigating flood damage risk. In addition, the nature of the Stormwater Activity is that failure is only apparent when demand is highest – which is in periods of intense rainfall. Therefore, resilience in the context of stormwater network is predominately centred around emergency preparedness.

A programme has been allowed for in this AMP to study what resilience means to us and how it should be actively incorporated into the service. This study hopes to identify the particular risks that the network faces in different emergency scenarios, what could be planned for, what is a post-event appropriate LoS for stormwater, how the activity can respond to this and ultimately what this means in terms of impacts on stormwater infrastructure and asset management practices. It is anticipated, however, that it will include readiness in case there are breakdowns within the pump stations, such as mobile generators and deployable standby portable pumps for temporary flood relief action.

In addition, while the BCP is periodically updated, there is a desire to improve what is included in the BCP to cover a wider area of business continuity and emergency response planning.

The Local Government Act An increased emphasis on planning and providing for resilience of infrastructure assets to natural hazards, as a result of the Local Government Act 2002 Amendment Act 2014, will support a focus on mitigating flood damage risk.

8.8 Demand Management

8.8.1 Sensitivity to Demand Changes

The city wide 2-D stormwater modelling work is well advanced and has identified the current pattern of stormwater drainage and identified areas at risk of significant loss due to flooding. This modelling work will be further developed to assess the impacts of significant changes in land use, especially that of infill development and increasing percentages of impervious surfaces, on the flood damage risk.

Based on this work a range of potential mitigation measures have been identified and these will be assessed to determine their technical feasibility and efficacy at mitigating the flood risk. The most cost effective of these will be advanced as part of the new capital programme of work. The works are largely focussed on development in the existing urban area.

With respect to future growth areas, specific stormwater volume and quality mitigation measures have been mandated to ensure developments have as little impact as possible on the receiving environment. Typically, the growth areas discharge to Horizon's controlled water courses or rural drainage networks.

8.8.2 Stormwater Framework

The extent to which Council can implement sustainable urban drainage requirements will determine the extent of growth impacts on the demand for stormwater services. Consent conditions are being applied to new developments requiring attenuation (limiting peak flows to pre-development levels) and treatment facilities funded by the developers either directly or through development contributions.

As mentioned in sections 8.2 8.3 and 8.5 we are in the process of preparing a stormwater framework to guide developers on implementation of these measures. The Framework details at a high level what is generally required in terms of stormwater attenuation and treatment across each catchment within the greater area of Palmerston North City.

Over time additional policy and planning instruments will be utilised to look to apply the principles of the Framework. This will include its reference in the District Plan. Thus, the Framework will become the guiding document for Water Sensitive Design (WSD) and Sustainable Urban Drainage (SUD) approaches.

8.8.3 Building Floor Level Control

A key factor in effectively mitigating flood damage is to accurately identify flood risk areas and then restrict and control building activity by way of setting minimum floor levels for new dwellings or buildings. This is particularly important within infill development where older style timber piled housing is often replaced with concrete slab foundation dwellings. Without the setting of specific minimum floor levels supported by flood modelling work, new buildings could be constructed with a lower floor level than the original building resulting in an increased risk of flood damage.

The predicted 50yr ARI flood levels in the model are used to set floor levels through the building consent process. These are then enforced via the Building Act.

8.8.4 Education & Environmental Enhancement

Although this has only been implemented to a degree this would include promotion of the impact of human activities and contaminants on the stormwater receiving environment to create greater public awareness. Watercourse enhancement activities would also be promoted to raise cognisance of biodiversity and improve community ownership and engagement with the urban stormwater network. Community engagement via stream cleaning, vegetation clearing and planting the banks is envisaged to promote the same effect.

9 Lifecycle Management

9.1 Lifecycle Overview

As mentioned in Section 5.1, the assets that support the stormwater activity can be divided into three functional areas – being collection, flood protection and treatment. However, for the management of lifecycle (operation, maintenance, renewal, improvement, disposal) the assets are divided into different groups. This is because the functional areas contain a mix of assets, with different lifecycle requirements. Table 23 contains a summary of asset lifecycle grouping for each asset type and functional area.

Table 23: Asset Lifecycle Grouping

Functional Area	Asset list	Lifecycle Group
Collection	Pipelines, including pipe connections	Pipe Network
	Manholes	Pipe Network
	Inlets / Outlet Structures (associated with reticulation network)	Pipe Network
	Culverts	Channel Structures
	Inlets / Outlet Structures (associated with culverts)	Channel Structures
	Protection works	Channel Structures
	Channels, natural and artificial	Streams, Channels and Earth Structures
Flood Protection	Floodgates	Channel Structures
	Stop Banks	Streams, Channels and Earth Structures
	Detention Basins	Streams, Channels and Earth Structures
	Pump Stations	Pump Stations
Treatment	Constructed wetlands Rain gardens Gross litter traps (including outlet nets) Sump traps Grass swales	Treatment Devices

The sub-sections of this section are built up based on the following:

- What are the strategic drivers and levels of service expected from this asset?
- What are our customer and strategic issues for this asset?
- What operating, maintenance, renewal and asset improvement investment do we need to respond to these things to deliver on the outcomes sought?

In addition, an overall Lifecycle management alternatives section examines what investment alternatives are available.

- **Service Overview:** The Overview sub-section provides a description of the asset group being considered.
- **Customer and Strategic Issues:** This section provides a link between levels of service, strategic direction, activity challenges and risks through to specific assets. It seeks to translate this direction into short term goals, long term goals and life cycle impacts sought from investment.
- **Operations and Maintenance:** How we operate and maintain our assets day-to-day is important in the performance of the stormwater activity. Operational activities ensure the successful continuation of the service, while maintenance activities serve to extend the life of the asset, delaying the need for asset renewal.
- **Renewals Plan:** The aim of the renewal plan for each asset type is to identify the optimum level of renewal investment to minimise whole of life costs while delivering the appropriate level of service to customers.
- **Asset Improvement and New Assets:** In order to deliver the outcomes sought for the stormwater activity asset improvement and capital new investment may also be required. Asset improvement will typically be required where there is a gap between a level of service and what is currently being delivered.
- **Asset Disposal:** When an asset is no longer required its appropriate decommissioning and disposal needs to be considered. Ideally this would have been considered in the planning for the asset.

9.2 Stormwater Pipe Network

9.2.1 Asset and Service Overview

The lifecycle management of the following assets is covered in this section:

- Pipelines as part of the stormwater reticulation network
- Manholes
- Mains Connections
- Sump Connections
- Kerb Connections
- Inlet/Outlet Structures associated with the reticulation network

These assets are pipes, or those associated with pipes, that allow the safe and reliable collection and reticulation of stormwater from overland drainage to an approved and appropriate outlet. This includes structures at the start and/or end of the pipes that may be managed as part of the pipe, such as inlet or outlet structures.

9.2.2 Life Cycle Intent and Impacts

Table 24 summarises the links between service levels and the management of the lifecycle of the pipe network assets.

Table 24: Stormwater Pipe Network Life Cycle Intent and Impacts

Life Cycle Intent Statement	Indicator	Short Term Goal	Long Term Goal	Life Cycle Impacts
Drainage is provided by ensuring an adequate quality network.	Average condition grading of the network.	All critical pipeline <10 years remaining life have reliable condition scores by Year 2.	Renewal strategy is informed by reliable condition data and criticality.	Optimal balance between renewal and maintenance costs. Critical pipes are renewed before they are at risk of failure.
Prolonged flooding is minimised.	Complaints regarding ponding.	O&M trends are analysed within next three years to enable renewals trade-offs.	Renewals are based on a robust, well documented strategy.	Optimal balance between renewal and maintenance costs.
Stormwater services are affordable and efficient	The operating cost of stormwater services per property.		All network O&M procedures are documented.	O&M effort is targeted and optimised.

9.2.3 Operations and Maintenance

Operational and maintenance practices for the stormwater piped system were historically documented in the Citywide Stormwater Reticulation Maintenance Service Level Agreement (SLA). This was the service provision agreement between the Water Operations Division and the previous iteration of the Council Infrastructure Unit developed to provide the documented stormwater collection levels of service.

Changes to the approach to stormwater pipe network operations and maintenance meant that the programmes detailed in the SLA were reduced in practice. This resulted in the SLA essentially becoming redundant.

The current actions that are carried out as part of the pipe network operation and maintenance (detailed below) are not documented in a structured way, including in IPS. This maintenance regime is predominantly determined by staff experience.

There is no shared understanding between activity management and operations staff about what the programme should comprise. Even though it is no longer adhered, the SLA is still a good basis for the documentation of such a programme.

Operations – General

Operationally the piped stormwater network is generally a passive system which provides a controlled drainage route for stormwater. No routine day to day operational intervention by staff is undertaken on the piped network.

Operations – Post flooding event inspections

Following a flooding event, a general inspection will be carried out on the network in the vicinity of the flood. The objective is to identify any damage to the network caused by the flood, and any possible failures in the network which may have contributed to the flood event.

Maintenance

In order to ensure stormwater pipe systems are operating at their full capacity when rain events occur, a series of maintenance activities are conducted on a routine basis as summarised in Table 25.

Table 25: Stormwater Network Inspection Frequency

Asset	Inspection Frequency
Inlets and outlets	Prior to a predicted significant rain event (at least once annually), clearing if required
Pipelines	Siltation clearing as required, selected yearly CCTV (as well as reactive)
Manholes	Checks conducted alongside pipelines

Reactive maintenance tasks are typically initiated through a KBase customer request, with the response and resolution times are all recorded in KBase. The reactive maintenance works are recorded in IPS.

Currently the budgets allocated to stormwater network operations are not enough to carry out all the tasks to provide the agreed levels of service. Additional funding to address this 'gap' will be required.

Providing greater detail about individual operational and maintenance tasks and procedures in the SLA are the Water Operations Standard Operating Procedures (SOPs). These cover most administrative tasks, and critical or irregular field work, but not all tasks are covered by an SOP. Water Operations staff develop new SOPs when they identify a need.

Tasks without an SOP are guided by experienced staff and judgement, and the technical requirements for these tasks are passed on as institutional knowledge. Site observations and issues are discussed weekly by the Water Operations leadership, with options for alternative operations and maintenance methods. This process needs to be reviewed, in conjunction with the whole SOP development process, to determine a way of documenting all procedures to reduce reliance on institutional knowledge.

Critical to effective management of the stormwater network is completion of regular condition inspections by CCTV and other inspections. There are currently insufficient inspections being carried out over time to assess the overall condition of the network and rate of deterioration of assets. Ideally all the critical network components would be inspected once every 10 years.

The following improvement project opportunities have been identified for operation and maintenance planning:

- Collate all the existing information on stormwater network operation and maintenance into agreed practice documents
- Undertake gap analysis of SOPs and plan for documentation of all procedures
- Develop feedback and improvement processes for operation and maintenance practices and procedures
- Undertake formal reviews and/or optimisation studies of maintenance and operations activities based on data and risk
- Allocate additional funding to stormwater network operation and maintenance

- Increase amount of condition inspections sufficient to assess the overall condition of the network and rate of deterioration of assets

Programmes that address operational and maintenance issues in relation to stormwater pipes and associated assets are shown in Table 26 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 26: Proposed Stormwater Pipes and Associated Assets Operations and Maintenance Programmes

Prog Type	Prog. No. & Name	Budget as per the first 10 years of LTP				
Operational	1495-Third party stormwater flood problem resolution (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$30,000	$30,000	$30,000	$30,000	$30,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$30,000	$30,000	$30,000	$30,000	$30,000
Operational	1709-City-wide - Stormwater Condition Assessments (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$110,000	$110,000	$110,000	$110,000	$110,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$110,000	$110,000	$50,000	$50,000	$50,000
Operational	1710-City-wide - Stormwater Modelling, Consenting and Planning (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$260,000	$180,000	$180,000	$180,000	$180,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$180,000	$180,000	$180,000	$180,000	$180,000
Operational	1976-City-wide – Stormwater - Operation and maintenance of vested assets (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$0	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$11,000
Operational (LoS gap)	2002-Stormwater Reticulation Network Maintenance (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$97,411	$97,411	$97,411	$97,411	$97,411
		2026/27	2027/28	2028/29	2029/30	2030/31
		$97,411	$97,411	$97,411	$97,411	$97,411

9.2.4 Renewal Plan

The decision making around whether to renew pipe network assets or continue to carry out maintenance or repairs has historically been based on staff judgement and experience. Candidates for renewals are generated from a decision process embedded in IPS. This decision tree was developed historically and considers repair history and condition.

To improve decision making criteria for prioritising specific stormwater pipe network assets for renewal is being developed and will continue to be refined. These criteria include flooding issues, other works in the area, condition, remaining theoretical useful life, location (e.g. under stop banks), large size, and criticality.

Stormwater renewals are generally be done on a 'like for like' basis, unless the one of the following applies to the pipe to be renewed:

- Is smaller than the minimum of 225mm size,
- Identified as being under capacity for required LoS targets,
- Part of an approved upgrade to cater for growth,
- An upgrade is required to adapt to climate change and/or provide greater service resilience,
- A different standard is required to meet any relevant legislative requirements, or
- Upgrade will result in a lower overall whole of life cost.

If any of these applies, then the pipe is considered for upgrade as well as renewal. If an upgrade is required, it can be funded from the renewals budget for the like for like replacement and from a capital new budget for the upgrade portion.

There is an opportunity to better improve the cross-service interaction and efficiency gained in renewing assets at the same time. This is particularly important for footpath and pavement renewals. Currently renewals are input into GIS one year ahead across each service area to help identify projects for renewing at the same time. There is a desire to expand this out to 30 years so that better programming of renewals can be undertaken across different services.

Renewal programmes for stormwater pipes and associated assets are shown in Table 27 below.

Table 27: Proposed Stormwater Pipes and Associated Assets Renewal Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Renewal	1062-City-wide - Stormwater Network Renewal Works (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$650,000	$620,000	$600,000	$600,000	$600,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$600,000	$600,000	$600,000	$600,000	$600,000

9.2.5 Asset Improvement and New Assets

Planning for new stormwater network assets and improvement to existing stormwater network assets considers factors detailed in previous sections. This includes:

- Reducing risk and increasing resilience in the network;
- Responding to changes in level of service agreed with the community;
- Meeting the needs of residential, commercial and industrial growth where the assets cannot be provided by the developer; and
- Responding to other demands and drivers.

The storm event of 24 July 1988, and the subsequent 1991 Comprehensive Stormwater Management Plan (CSMP), guided the stormwater capital development strategy over three decades. Approximately three years ago the focus moved on to:

- Mitigation of flood damage risks across the city by implementing targeted capacity, detention and stormwater diversion improvements.
- Improvement of stormwater discharge quality by targeting interventions in areas of high potential contaminant discharge, initially in green field developments.

A city wide 2-D stormwater model was developed along with this change in focus.

The Stormwater Framework will precipitate overall management plans for individual catchments. These will take in account not only the model output but will also consider the drivers listed above, catchment investigations and the requirements of the framework itself. The management plan will be used to provide the basis of the infrastructure required in the catchment, whether it be green field or brown field. This will in turn give potential developers an idea as to what the requirements are for new areas.

New pipe network assets to meet the needs of growth are acquired in a variety of ways, as follows:

- Assets within a new subdivision which are vested to us;
- We construct new network assets where the development has been confirmed, which will support residential growth areas or where stormwater services are needed.

The risk, costs and benefits of accepting vested assets will be reviewed and a decision regarding approval for acquisition will be made on a case-by-case basis by staff. When satisfactorily completed in accordance with our standards and any approvals given, we will accept such assets into public ownership.

For capital-renewal planning, there is an opportunity to better plan out capital-new projects to coincide where possible with renewals and/or new projects across services. This will increase efficiency of the projects (particularly for horizontal infrastructure) and reduce any potential rework and disruption of the network.

Programmes that address requirements for new capital and/or improvements in relation to stormwater pipes and associated assets are shown in Table 28 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 28: Proposed Stormwater Pipes and Associated Assets New Capital Programmes

Prog Type	Prog No. & Name	Proposed 10 Year Plan Budget				
Capital New	51-Urban Growth - Development Contributions – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$200,000	$200,000	$200,000	$200,000	$200,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$200,000	$200,000	$200,000	$200,000	$200,000
Capital New	197-Urban Growth - NEIZ – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$296,250	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$20,000	$0	$0
Capital New	1001-Urban Growth - Whakarongo – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$631,181	$970,000	$600,000	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1060-City-wide - Stormwater Network Improvement Works (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$1,430,000	$880,000	$880,000	$880,000	$730,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$500,000	$450,000	$450,000	$450,000	$400,000

Prog Type	Prog No. & Name	Proposed 10 Year Plan Budget				
Capital New	1065-Urban Growth - Kakatangiata – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$350,000	$0	$400,000	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1704-Urban Growth - Aokautere – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$300,000	$300,000	$350,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1706-City-wide - Stormwater Network Resilience (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$130,000	$215,000	$165,000	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1708-City-wide - Stormwater Flood Mitigation (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$143,000	$545,000	$976,000	$1,006,000	$200,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$72,000	$4,305,000	$0	$0	$0
Capital New	2034-Urban Growth - Ashhurst – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$527,000	$110,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	2035-Urban Growth - Napier Rd Extention – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$0	$200,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0

9.2.6 Asset Disposal

Asset disposal is often included as part of renewals consideration as most stormwater pipes and associated assets are replaced on the same alignment. Therefore, the old asset is both physically disposed of, and disposed of in the information system when the replacement asset is entered.

When a pipe asset is renewed on an alternative alignment or new location, the original assets is left in situ. Buried assets should be decommissioned by being filled to prevent voids forming around the pipe. Pipes may be replaced on an alternative alignment for several reasons including better accessibility.

There are no specific programmes associated with disposal of stormwater pipes and associated assets.

9.3 Stormwater Streams, Channels and Earth Structures

9.3.1 Asset and Service Overview

The lifecycle management of the following assets is covered in this section:

- Streams (natural water courses, with or without some modification)
- Artificially constructed earth channels
- Stop banks (earth)
- Detention basins

The open watercourses form part of the overall stormwater network and provide an appropriate outlet for the piped system. Man-made or modified channels are also used to convey stormwater where the construction of a piped stormwater drain is not economical or appropriate.

Detention basins and stop banks both provide important flood protection functions, both in diverting high flows and detaining stormwater to release it in a more controlled fashion.

9.3.2 Life Cycle Intent and Impacts

Table 29 summarises the links between service levels and the management of the lifecycle of the streams, channels and earth structures assets.

Table 29: Streams, Channels and Earth Structures Life Cycle Intent and Impacts

Life Cycle Intent Statement	Indicator	Short Term Goal	Long Term Goal	Life Cycle Impacts
Drainage is provided by ensuring an adequate quality network.	Average condition grading of the network.	O&M trends are analysed within next three years.	O&M programmes are based on a robust, well documented strategy.	Optimal maintenance costs.

9.3.3 Operations and Maintenance

As with the piped network, operational and maintenance practices for the stormwater streams, channels and earth structures were historically documented in the Citywide Stormwater Reticulation Maintenance Service Level Agreement (SLA). Again, changes to the approach to operations and maintenance meant that the programmes detailed in the SLA were reduced in practice, resulting in the SLA essentially becoming redundant.

The current actions that are carried out (detailed below) are generally not documented in a structured way. This maintenance regime is predominantly determined by staff experience. The only partial exception to this is the annual channel inspections, which are recorded in IPS.

There is no shared understanding between activity management and operations staff about what the programme should comprise. Even though it is no longer adhered, the SLA is still a good basis for the documentation of such a programme.

Operations – General

Operationally the stormwater system is a passive system which provides a controlled drainage route for stormwater. No routine day to day operational intervention by staff is undertaken on the network of streams and open channels. Nor is any day to day activity carried out on earth stopbanks or detention basins.

Operations – Post flooding event inspections

Following a flooding event a general inspection will be carried out on these assets in the vicinity of the flood. The objective is to identify any damage caused by the flood, and any possible failures that may have contributed to the flood event.

Maintenance

In order to ensure these assets are operating at their full capacity and/or offering optimal protection when rain events occur, a series of maintenance activities are conducted on a routine basis as shown in Table 30.

However, not all of this has not been completed historically and there is a backlog of this maintenance that is being rectified. There is an ongoing programme for this work. Given the increasing public engagement with open water courses the clearing of the backlog needs to continue. Complete clean ups for entire water courses over the long term may be required in response to the increasing engagement.

Some stormwater asset groups, such as dentition basins have no scheduled maintenance programme at all. In addition to the lack of shared understanding of the programme, how the assets are recorded in IPS compounds this issue.

Table 30: Stormwater Stream and Channel Inspection Frequency

Asset	Inspection frequency
Channels	Annual inspections, followed by mechanical cleaning and/or spraying
Streams	Annual condition inspection
Stop banks	Annual condition inspection
Detention basins	No specific programme, but ideally quarterly, including all inlets and outlets are free from blockage, monitoring siltation in forebays and ponds, weed spraying and monitoring of flora / fauna in receiving environment

Issues identified during maintenance inspections are sometimes scheduled to be rectified. This may take various forms, for example extra maintenance, construction of a structure or protection works or earthworks.

As with the piped network reactive maintenance tasks are typically initiated through a KBase customer request, with the response and resolution times are all recorded in KBase. Reactive maintenance works are also recorded in IPS.

Providing greater detail about individual operational and maintenance tasks and procedures in the SLA are the Water Operations Standard Operating Procedures (SOPs). These cover most administrative tasks, and critical or irregular field work, but not all tasks are covered by an SOP. Water Operations staff develop new SOPs when they identify a need.

Tasks without an SOP are guided by experienced staff and judgement, and the technical requirements for these tasks are passed on as institutional knowledge. Site observations and issues are discussed weekly by the Water Operations leadership, with options for alternative operations and maintenance methods. This process needs to be reviewed, in conjunction with the whole SOP development process, to determine a way of documenting all procedures to reduce reliance on institutional knowledge.

Although these assets are subject to inspection, the inspection purpose is predominately to identify issues as opposed to recording condition over time. This is critical to effective management of the stormwater streams and channels and earth structures to assess the overall condition and rate of deterioration of assets. Condition data therefore needs to be collected as part of these inspections.

The following improvement project opportunities have been identified for operation and maintenance planning:

- Collate all the existing information on stormwater network operation and maintenance into agreed practice documents
- Undertake gap analysis of SOPs and plan for documentation of all procedures
- Improve recording of stormwater asset data in IPS
- Develop feedback and improvement processes for operation and maintenance practices and procedures
- Undertake formal reviews and/or optimisation studies of maintenance and operations activities based on data and risk
- Completely rectify the backlog of stream and channel maintenance
- Collect condition information as part of regular inspections to assess the overall condition and rate of deterioration of assets

Programmes that address operational and maintenance issues in relation to stormwater streams, channels and earth structures are shown in Table 31 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 31: Proposed Streams, Channels and Earth Structures Operations and Maintenance Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Operational	1369-City-wide Data Collection and WQ Monitoring	2021/22	2022/23	2023/24	2024/25	2025/26
		$225,000	$200,000	$225,000	$225,000	$225,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$225,000	$225,000	$225,000	$225,000	$225,000
Operational	1495-Third party stormwater flood problem resolution (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$30,000	$30,000	$30,000	$30,000	$30,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$30,000	$30,000	$30,000	$30,000	$30,000
Operational	1614-Stormwater - Open channels and drains – maintenance (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$500,000	$530,000	$530,000	$440,000	$440,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$230,000	$150,000	$100,000	$100,000	$100,000
Operational	1709-City-wide - Stormwater Condition Assessments (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$110,000	$110,000	$110,000	$110,000	$110,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$110,000	$110,000	$50,000	$50,000	$50,000

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Operational	1710-City-wide - Stormwater Modelling, Consenting and Planning (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$260,000	$180,000	$180,000	$180,000	$180,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$180,000	$180,000	$180,000	$180,000	$180,000
Operational	1976-City-wide – Stormwater - Operation and maintenance of vested assets (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$0	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$11,000
Operational (LoS gap)	2002-Stormwater Reticulation Network Maintenance (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$97,411	$97,411	$97,411	$97,411	$97,411
		2026/27	2027/28	2028/29	2029/30	2030/31
		$97,411	$97,411	$97,411	$97,411	$97,411

9.3.4 Renewal Plan

There is generally no renewal plan for streams, open channels and earth structures. Streams are natural watercourses and are maintained to ensure their integrity as opposed to being renewed. Likewise, open channels. Any work other than the routine maintenance would be a change in system type, (to pipe for example) which would be considered an asset improvement and/or a new asset.

Earth structures, such as stop banks, are managed in a very similar way. Once they are constructed, they are maintained as opposed to renewed.

9.3.5 Asset Improvement and New Assets

The requirement for new or improvements to open channels, stop banks or detention basins may be triggered in response to the stormwater capital development strategy outlined in section 9.2.5. Particularly the guiding principle of mitigation of flood damage risks. Again, the 2D model would be used to assess options for the infrastructure need. Options would then be developed and the most appropriate one selected.

New stream assets will generally be only acquired as vested assets from a new development. The requirement for new or improvements to open channels, stop banks or detention basins can also be identified as part of planning processes. Normally this is as part of the requirements for zoning changes or resource consents. Changes within the urban areas will often require improvements to existing assets, whereas changes outside the urban boundary will trigger the requirement for new assets to be constructed.

Eventually, as with the piped network, new or improvements to open channels, stop banks or detention basins will be identified in our management plans for individual catchments. The management plan will be used to provide the basis of the infrastructure required in the catchment, whether it be green field or brown field. This will in turn give potential developers an idea as to what the requirements are for new areas.

The risk, costs and benefits of accepting vested assets will be reviewed and a decision regarding approval for acquisition will be made on a case-by-case basis by staff. When satisfactorily completed in

accordance with our standards and any approvals given, we will accept such assets into public ownership.

Programmes that address requirements for new capital and/or improvements in relation to stormwater pipes and associated assets are shown in Table 32 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 32: Proposed Stormwater Streams, channels and Earth Structures New Capital Programmes

Prog. Type	Prog. No. & Name	Budget as per the first 10 years of LTP				
Capital New	1060-City-wide - Stormwater Network Improvement Works (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$1,430,000	$880,000	$880,000	$880,000	$730,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$500,000	$450,000	$450,000	$450,000	$400,000
Capital New	1706-City-wide - Stormwater Network Resilience (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$130,000	$215,000	$165,000	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1707-City-wide - Land purchase associated with streams and channels	2021/22	2022/23	2023/24	2024/25	2025/26
		$250,000	$250,000	$250,000	$250,000	$250,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$250,000	$250,000	$250,000	$250,000	$250,000
Capital New	1708-City-wide - Stormwater Flood Mitigation (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$143,000	$545,000	$976,000	$1,006,000	$200,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$72,000	$4,305,000	$0	$0	$0

9.3.6 Asset Disposal

Due to their function stream and open channels are generally not disposed of but may be replaced with a pipe in certain circumstances. The circumstances would often involve mitigation of flooding or need for land and would be more common for open channels than for streams. Given the increasing public engagement with open water courses (see section) and the probable need for a resource consent such a change would be rare. Likewise, disposal of stop banks or detention basins would be rare. There are no specific programmes associated with disposal of streams, channels and earth structures.

9.4 Stormwater Channel Structures and Floodgates

9.4.1 Asset and Service Overview

The lifecycle management of the following assets is covered in this section:

- Culverts associated with stormwater channels
- Protection works
- Inlet/Outlet Structures associated with culverts
- Floodgates including penstocks, sluice gates and flap gates (non-return valve or back flow preventors)

The structures associated with streams and channels protect the integrity of the watercourse and allow it to interact with other infrastructure. The floodgates support flood protection assets in by controlling the direction of the stormwater when the flow is high.

9.4.2 Life Cycle Intent and Impacts

Table 33 summarises the links between service levels and the management of the lifecycle of the channel structure and floodgate assets.

Table 33: Stormwater Channel Structures Life Cycle Intent and Impacts

Life Cycle Intent Statement	Indicator	Short term goal	Long term goal	Life Cycle impacts
Drainage is provided by ensuring an adequate quality network.	Average condition grading of the structures and floodgates	All critical structures and floodgates <10 years remaining life have reliable condition scores by Year 2.	Renewal strategy is informed by reliable condition data and criticality.	Optimal balance between renewal and maintenance costs. Critical structures and floodgates are renewed before they are at risk of failure.

9.4.3 Operations and Maintenance

In a similar manner to other lifecycle groups, operational and maintenance practices for the stormwater structures and floodgates were historically documented in the Citywide Stormwater Reticulation Maintenance Service Level Agreement (SLA). Again, changes to the approach to operations and maintenance meant that the programmes detailed in the SLA were reduced in practice, resulting in the SLA essentially becoming redundant.

The current actions that are carried out (detailed below) are generally not documented in a structured way. This maintenance regime is predominantly determined by staff experience. The only exceptions to this are the channel (which include the channel structures) and floodgate inspections, which are recorded in IPS.

There is no shared understanding between activity management and operations staff about what the programme should comprise. Even though it is no longer adhered, the SLA is still a good basis for the documentation of such a programme.

Operations – General

Operationally the stormwater system is a passive system which provides a controlled drainage route for stormwater. No routine day to day operational intervention by staff is undertaken on the stormwater channel structures and floodgates.

Operations – Post flooding event inspections

Following a flooding event a general inspection will be carried out on the open network in the vicinity of the flood. The objective is to identify any damage to the network caused by the flood, and any possible failures in the network which may have contributed to the flood event.

Maintenance

In order to ensure streams and open channel systems are operating at their full capacity when rain events occur, a series of maintenance activities are conducted on a routine basis as shown in Table 34.

Table 34: Stormwater Channel Structures Inspection Frequency

Asset	Inspection frequency
Culverts, inlets and outlets	Prior to a predicted significant rain event (at least once annually), clearing if required
Protection works	Annual inspection with associated channel
Floodgates	Six-monthly inspections and routine maintenance Prior to a predicted significant rain event (at least once annually) to check operation, clearing if required

Issues identified during these inspections are scheduled to be repaired or renewed.

As with the other lifecycle groups reactive maintenance tasks are typically initiated through a KBase customer request, with the response and resolution times are all recorded in KBase. The reactive maintenance works are recorded in IPS.

Providing greater detail about individual operational and maintenance tasks and procedures in the SLA are the Water Operations Standard Operating Procedures (SOPs). These cover most administrative tasks, and critical or irregular field work, but not all tasks are covered by an SOP. Water Operations staff develop new SOPs when they identify a need.

Tasks without an SOP are guided by experienced staff and judgement, and the technical requirements for these tasks are passed on as institutional knowledge. Site observations and issues are discussed weekly by the Water Operations leadership, with options for alternative operations and maintenance methods. This process needs to be reviewed, in conjunction with the whole SOP development process, to determine a way of documenting all procedures to reduce reliance on institutional knowledge.

Although these assets are subject to inspection, the inspection purpose is predominately to identify issues to rectify as opposed to recording condition over time. This is critical to effective management of the stormwater channel structures and floodgates to assess the overall condition and rate of deterioration of assets. Condition data therefore needs to be collected as part of these inspections.

The following improvement project opportunities have been identified for operation and maintenance planning:

- Collate all the existing information on stormwater network operation and maintenance into agreed practice documents
- Undertake gap analysis of SOPs and plan for documentation of all procedures

- Develop feedback and improvement processes for operation and maintenance practices and procedures
- Undertake formal reviews and/or optimisation studies of maintenance and operations activities based on data and risk
- Completely rectify the backlog of stream and channel maintenance
- Collect condition information as part of regular inspections to assess the overall condition and rate of deterioration of assets

Programmes that address operational and maintenance issues in relation to stormwater channel structures and floodgates are shown Table 35 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 35: Proposed Channel Structures and Floodgates Operations and Maintenance Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Operational	1614-Stormwater - Open channels and drains – maintenance (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$500,000	$530,000	$530,000	$440,000	$440,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$230,000	$150,000	$100,000	$100,000	$100,000
Operational	1709-City-wide - Stormwater Condition Assessments (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$110,000	$110,000	$110,000	$110,000	$110,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$110,000	$110,000	$50,000	$50,000	$50,000
Operational (LoS gap)	2002-Stormwater Reticulation Network Maintenance (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$97,411	$97,411	$97,411	$97,411	$97,411
		2026/27	2027/28	2028/29	2029/30	2030/31
		$97,411	$97,411	$97,411	$97,411	$97,411

9.4.4 Renewal Plan

The decision making around whether to renew channel structures and floodgates or continue to carry out maintenance or repairs has historically been based on staff judgement and experience.

There is no specific documented renewal strategy for channel structures and floodgates. In practice they are generally only renewed upon failure. For floodgates particularly the focus is on maintaining to a standard to avoid any failure, and therefore defer their renewal for as long as possible.

Technologies for protection of watercourses are developing over time, with many newer solutions designed to meet the current trends for more natural looking solutions. Thus, if a channel structure is renewed with a modern equivalent then the renewal may be different from what it is replacing.

Floodgates may also be renewed at the same time as the pipe that they serve. However, this is likely to be rare compared to replacement due to failure. This is because mechanical devices, even when maintained well, will normally have a much shorter life span than pipe materials.

Renewal programmes for stormwater channel structures and floodgates are shown in Table 36 below.

Table 36: Proposed Channel Structures and Floodgates Renewal Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Renewal	1062-City-wide - Stormwater Network Renewal Works (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$650,000	$620,000	$600,000	$600,000	$600,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$600,000	$600,000	$600,000	$600,000	$600,000

9.4.5 Asset Improvement and New Assets

The requirements for new and improvements to channel structures and floodgates are identified in several different ways. The means relates to the function of the structure.

Culverts, and their associated inlet/outlet structures would be acquired if a track or road was constructed that crossed an open channel or stream of some kind. However, acquiring these as stormwater assets would be a rare occurrence as most culverts constructed for such a purpose would be included as part of the asset base for the party owning the track or road (transport, parks and reserves, etc).

Protection works are normally constructed in response to an issue in an open channel or a stream, often in response to maintenance inspections. This might be scouring or a bank collapse. Often the selected option to remedy this will be a structure of some kind such as a retaining wall or channel lining.

The requirement for new or improvements to floodgates may be triggered in response to the stormwater capital development strategy outlined in section 9.2.5. Particularly the guiding principle of mitigation of flood damage risks. Again, the 2D model would be used to assess options for the infrastructure need. Options would then be developed and the most appropriate one selected – this may be a mechanical device.

The requirement for new or improvements to channel structures or floodgates can also be identified as part of planning processes. Normally this is as part of the requirements for zoning changes or resource consents. Changes within the urban areas will often require improvements to existing assets, whereas changes outside the urban boundary will trigger the requirement for new assets to be constructed.

Eventually, as with other asset types, new or improvements to channel structures and floodgates will be identified in our management plans for individual catchments. The management plan will be used to provide the basis of the infrastructure required in the catchment, whether it be green field or brown field. This will in turn give potential developers an idea as to what the requirements are for new areas.

The risk, costs and benefits of accepting vested assets will be reviewed and a decision regarding approval for acquisition will be made on a case-by-case basis by staff. When satisfactorily completed in accordance with our standards and any approvals given, we will accept such assets into public ownership.

Programmes that address requirements for new capital and/or improvements in relation to stormwater pipes and associated assets are shown in Table 37 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 37: Stormwater Channel Structures and Floodgates New Capital Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Capital New	1060-City-wide - Stormwater Network Improvement Works (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$1,430,000	$880,000	$880,000	$880,000	$730,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$500,000	$450,000	$450,000	$450,000	$400,000
Capital New	1706-City-wide - Stormwater Network Resilience (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$130,000	$215,000	$165,000	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1708-City-wide - Stormwater Flood Mitigation (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$143,000	$545,000	$976,000	$1,006,000	$200,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$72,000	$4,305,000	$0	$0	$0

9.4.6 Asset Disposal

Asset disposal is often included as part of renewals consideration as most stormwater channel structures and floodgates are replaced in the same location. Therefore, the old asset is both physically disposed of, and disposed of in the information system when the replacement asset is entered.

In some rare situations, assets may cease to be required. For channel structures this might be because the replacement is constructed in an alternative location or planting takes hold over time. The existing component may be removed. In other situations, it might remain even though it is redundant, and it then ceases to function over time due to natural processes.

In general, the old asset is disposed of in the information system when the replacement asset is entered. This process is currently informal and does not necessarily consider where a redundant component remains.

There are no specific programmes associated with disposal of stormwater channel structures and floodgates.

9.5 Stormwater Pump Stations

9.5.1 Service Overview

Pump station assets support flood protection assets in preventing habitable floor level property flooding and alleviating street ponding in their local catchment areas.

9.5.2 Life Cycle Intent and Impacts

Table 38 summarises the links between service levels and the management of the lifecycle of the pump station assets.

Table 38: Stormwater Pump Station Life Cycle Intent and Impacts

Life Cycle Intent Statement	Indicator	Short term goal	Long term goal	Life Cycle impacts
Drainage is provided by ensuring an adequate quality network.	Average condition grading of pump stations.	All pump stations have reliable condition scores.	Renewal strategy is informed by reliable condition data and criticality.	Optimal balance between renewal and maintenance costs with reduced risk of critical failures
Flood protection is provided by ensuring network has capacity.	Number of pump stations that meet Council pump station standards.		Upgrades are based on a robust, well documented strategy.	
Prolonged flooding is minimised.	Complaints regarding ponding.	O&M trends are analysed to enable renewals trade-offs.	Renewals are based on a robust, well documented strategy.	Optimal balance between renewal and maintenance costs.

9.5.3 Operations and Maintenance

Operational and maintenance practices for the stormwater pump stations were historically documented in the Citywide Stormwater Pump Stations Operations & Maintenance Service Level Agreement (SLA). Yet again, changes to the approach to operations and maintenance meant that the programmes detailed in the SLA were reduced in practice, resulting in the SLA essentially becoming redundant.

The current actions that are carried out as part of pump station operation and maintenance (detailed below) are not documented in a structured way, including in IPS. This maintenance regime is predominantly determined by staff experience.

There is no shared understanding between activity management and operations staff about what the programme should comprise. Neither is there a process for adding additional pump stations to the list to be operated and maintained. Even though it is no longer adhered, the SLA is still a good basis for the documentation of such a programme.

Operations – General

No routine day to day operational intervention by staff is undertaken.

Operations – Post flooding event inspections

Following a flooding event a general inspection will be carried out on any pump stations in the vicinity of the flood. The objective is to identify any damage caused by the flood, and any possible failures which may have contributed to the flood event.

Maintenance

In order to ensure the stormwater pump stations are operating at their full capacity when rain events occur, a series of maintenance activities are conducted on a routine basis as shown in Table 39.

Table 39: Pump Station Inspection Frequency

Asset	Inspection Frequency
Pump stations	Annual pump run-checks and general pump station condition inspection

Reactive maintenance works are referred to in the SLA, but very little detail is specified. These are typically initiated by operators after alarm responses or as a result of regular inspections. The reactive maintenance works are supposed to be recorded in IPS, but this process is currently quite variable.

Currently the budgets allocated to stormwater pump station operation and maintenance are not enough to carry out all the tasks to provide the agreed levels of service. Additional funding to address this 'gap' will be required.

Providing greater detail about individual operational and maintenance tasks and procedures in the SLA are the Water Operations Standard Operating Procedures (SOPs). These cover most administrative tasks, and critical or irregular field work, but not all tasks are covered by an SOP. Water Operations staff develop new SOPs when they identify a need.

Tasks without an SOP are guided by experienced staff and judgement, and the technical requirements for these tasks are passed on as institutional knowledge. Site observations and issues are discussed weekly by the Water Operations leadership, with options for alternative operations and maintenance methods. This process needs to be reviewed, in conjunction with the whole SOP development process, to determine a way of documenting all procedures to reduce reliance on institutional knowledge.

Although these assets are subject to inspection, the inspection purpose is predominately to identify issues to rectify as opposed to recording condition over time. It is critical to effective management of the stormwater pump stations to assess the overall condition and rate of deterioration of assets. Condition data therefore needs to be collected as part of these inspections.

The following improvement project opportunities have been identified for operation and maintenance planning:

- Collate all the existing information on pump station operation and maintenance into agreed practice documents
- Undertake gap analysis of SOPs and plan for documentation of all procedures
- Improve recording of pump station operational and maintenance data in IPS
- Develop feedback and improvement processes for operation and maintenance practices and procedures, including introducing new pump stations into the processes
- Undertake formal reviews and/or optimisation studies of maintenance and operations activities based on data and risk
- Allocate additional funding to stormwater pump station operation and maintenance
- Collect condition information as part of regular inspections to assess the overall condition and rate of deterioration of assets

Programmes that address operational and maintenance issues in relation to stormwater streams, channels and earth structures are shown in Table 40 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 40: Proposed Pump Stations Operations and Maintenance Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Operational	1709-City-wide - Stormwater Condition Assessments (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$110,000	$110,000	$110,000	$110,000	$110,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$110,000	$110,000	$50,000	$50,000	$50,000
Operational (LoS gap)	2003-Stormwater Pump Station Operation & Maintenance	2021/22	2022/23	2023/24	2024/25	2025/26
		$24,000	$24,000	$24,000	$24,000	$24,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$24,000	$24,000	$24,000	$24,000	$24,000

9.5.4 Renewal Plan

The decision making around whether to renew pump station assets or continue to carry out maintenance or repairs is generally based on staff judgement and experience.

The selection for renewal of specific pump station mechanical and electrical equipment has historically been finalised at the start of every budget year. This is being replaced by a more robust 6-year renewals programme. Considered in this process are informal assessments of repair history, criticality and current condition.

Wherever possible upgrades to assets to address growth or change in demand patterns should occur simultaneously with the planned renewal of those assets.

The breakdown and arrangement of pump station assets in IPS was informally reviewed as part of the planning process. This cast some doubt about the overall usefulness of the current breakdown. From this an overall review needs to be carried out to see if these concerns are valid.

Renewal planning for pump station buildings is to be determined, but they will be managed in the same way as other buildings. Further information on this and the building assets can be found in the Property AMP.

Renewal programmes for stormwater pump stations are shown in Table 41 below.

Table 41: Proposed Pump Station Renewal Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Renewal	20-City-wide - Stormwater Pump Station Renewals	2021/22	2022/23	2023/24	2024/25	2025/26
		$225,000	$170,000	$470,000	$280,000	$190,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$100,000	$100,000	$100,000	$100,000	$100,000

9.5.5 Asset Improvement and New Assets

Planning for new stormwater pump station and improvement to existing stormwater pump station assets considers factors detailed in previous sections. This includes:

- Reducing risk and increasing resilience in the network;
- Responding to changes in level of service agreed with the community;
- Meeting the needs of residential, commercial and industrial growth where the assets cannot be provided by the developer; and
- Responding to other demands and drivers.

The requirement for new or improvements to pump station may also be triggered in response to the stormwater capital development strategy outlined in section 9.2.5. Particularly the guiding principle of mitigation of flood damage risks. Options would be assessed for the infrastructure need, and the most appropriate one selected.

Eventually, as with other asset types, new or improvements to stormwater pump stations will be identified in our management plans for individual catchments. The management plan will be used to provide the basis of the infrastructure required in the catchment, whether it be green field or brown field. This will in turn give potential developers an idea as to what the requirements are for new areas.

New pump station assets to meet the needs of growth are acquired in a variety of ways, as follows:

- Assets within a new subdivision which are vested to us;
- We construct new network assets where the development has been confirmed, which will support residential growth areas or where stormwater services are needed.

The risk, costs and benefits of accepting vested assets will be reviewed and a decision regarding approval for acquisition will be made on a case-by-case basis by staff. When satisfactorily completed in accordance with our standards and any approvals given, we will accept such assets into public ownership. As mentioned in section 9.5.3 the process of including newly vested pump stations into the operational and maintenance programme needs to be clarified.

Programmes that address requirements for new capital and/or improvements in relation to stormwater pump stations are shown below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 42: Proposed Pump Stations New Capital Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Capital New	1372-City-wide Stormwater Pump Stations Improvement	2021/22	2022/23	2023/24	2024/25	2025/26
		$930,000	$470,000	$560,000	$310,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$100,000	$0	$0	$100,000	$0
Capital New	1706-City-wide - Stormwater Network Resilience (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$130,000	$215,000	$165,000	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0

9.5.6 Asset Disposal

Asset disposal is primarily included as part of renewals consideration as most stormwater pump station components are physically removed and disposed of to allow for the replacement component. In some cases, the replacement component is installed alongside the existing component and the existing component (wholly or partly) eventually remains, even though it is redundant. This may be to save costs or because the existing component is too difficult to completely remove.

Wherever possible, above ground assets are sold for scrap value with revenue used to further enhance the stormwater system. Effort is made to reuse assets in this manner that are no longer required.

In general, the old asset is disposed of in the information system when the replacement asset is entered. This process is currently informal and does not necessarily consider where a redundant component remains. There are no specific programmes associated with stormwater pump station asset disposal.

9.6 Stormwater Treatment Devices

9.6.1 Assets and Service Overview

The lifecycle management of stormwater treatment devices is covered in this section. These assets enable the treatment of stormwater to the required standard and consent requirements. There are a wide variety of treatment assets in service. These include:

- Constructed wetlands
- Rain gardens
- Gross pollution traps (including outlet nets)
- Sump traps
- Grass swales

9.6.2 Life Cycle Intent and Impacts

Table 43 summarises the links between service levels and the management of the lifecycle of stormwater treatment devices.

Table 43: Stormwater Treatment Devices Life Cycle Intent and Impacts

Life Cycle Intent Statement	Indicator	Short term goal	Long term goal	Life Cycle impacts
Negative environmental impacts of rainwater runoff are minimised by sufficient quality stormwater treatment infrastructure	Average condition grading of treatment components.	All treatment components have reliable condition scores by Year 2.	Renewal strategy is informed by reliable condition data.	Optimal balance between renewal and maintenance costs with reduced risk of critical failures
The quality of natural waterways is not degraded due to ability to treat stormwater to discharge requirements.	Compliance with resource and discharge consents.	O&M trends are analysed within next three years to enable renewals trade-offs.	Renewals are based on a robust, well documented strategy.	Optimal balance between renewal and maintenance costs.

Life Cycle Intent Statement	Indicator	Short term goal	Long term goal	Life Cycle impacts
Stormwater services are affordable and efficient	The operating cost of the stormwater services per property.		All network O&M procedures are documented.	O&M effort is targeted and optimised.

9.6.3 Operations and Maintenance

Some operational and maintenance practices for stormwater treatment devices were historically documented in the Citywide Stormwater Reticulation Maintenance Service Level Agreement (SLA). However, this documentation was limited, and additional different treatment devices have been introduced. This has resulted in anything the SLA about treatment devices essentially becoming redundant.

The current diversity of stormwater treatment devices in services brings challenges for operational and maintenance practices. As stated in section 5.4 the number and diversity are expected to increase as water-sensitive design is applied to improve water quality.

The current actions that are carried out (detailed below) are generally not documented in a structured way. This maintenance regime is predominantly determined by staff experience. The only partial exception to this a small number of inspections, which are recorded in IPS.

Maintenance requirements need to be recorded at time of vestment to us. The process for this needs to be improved and the requirements brought together to create a shared understanding between activity management and operations staff about what the programme should comprise.

Operations – General

Operationally the stormwater treatment devices are passive systems which provide a controlled inlet or outlet point for stormwater needing to be treated. No routine day to day operational intervention by staff is undertaken.

Operations – Post flooding event inspections

Following a flooding event a general inspection will be carried out on the treatment devices in the vicinity of the flood. The objective is to identify any damage caused by the flood, and any possible failures which may have contributed to the flood event.

Maintenance

In order to ensure stormwater treatment devices are operating optimally when rain events occur, a series of maintenance activities are conducted on a routine basis as summarised in Table 44.

Table 44: Stormwater Treatment Devices Inspection Frequency

Asset	Inspection Frequency
Gross litter traps	Quarterly inspection and general cleaning
Outlet net	Monthly inspection and general cleaning
Swales	No specific programme, but ideally quarterly, including all inlets and outlets are free from blockage, monitoring siltation in forebays and ponds, weed spraying and monitoring of flora / fauna in receiving environment

Asset	Inspection Frequency
Wetlands	No specific programme, but ideally quarterly, including all inlets and outlets are free from blockage, monitoring siltation in forebays, weed spraying and monitoring of flora / fauna in receiving environment. Plant replacement may be required perdiocically.
Rain gardens	No specific programme, but ideally quarterly checks of outlets to network. Media replacement is expected to be required every 20-25 years.

As with the other lifecycle groups reactive maintenance tasks are typically initiated through a KBase customer request, with the response and resolution times are all recorded in KBase. Although this is the anticipated programme. The reactive maintenance works are recorded in IPS.

As many of these devices are new, they do not have any Water Operations Standard Operating Procedures (SOPs). Individual operational and maintenance tasks and procedures are instead guided by experienced staff and judgement, and the technical requirements for these tasks are passed on as institutional knowledge. Site observations and issues are discussed weekly by the Water Operations leadership, with options for alternative operations and maintenance methods. This process needs to be reviewed, in conjunction with the whole SOP development process, to determine a way of documenting all procedures to reduce reliance on institutional knowledge.

Although some of these assets are subject to inspection, the inspection purpose is predominately to identify issues to rectify as opposed to recording condition over time. This is critical to effective management of the stormwater channel structures to assess the overall condition and rate of deterioration of assets. Condition data therefore needs to be collected as part of these inspections.

The following improvement project opportunities have been identified for operation and maintenance planning:

- Collate all the existing information on stormwater treatment devices into agreed practice documents
- Undertake gap analysis of SOPs and plan for documentation of all procedures
- Develop feedback and improvement processes for operation and maintenance practices and procedures
- Undertake formal reviews and/or optimisation studies of maintenance and operations activities based on data and risk
- Collect condition information as part of regular inspections to assess the overall condition and rate of deterioration of assets

Programmes that address operational and maintenance issues in relation to stormwater treatment devices are shown below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 45: Proposed Stormwater Treatment Devices Operations and Maintenance Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Operational	1709-City-wide - Stormwater Condition Assessments (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$110,000	$110,000	$110,000	$110,000	$110,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$110,000	$110,000	$50,000	$50,000	$50,000

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Operational	1930-City-wide - Maintenance of Stormwater Treatment Devices	2021/22	2022/23	2023/24	2024/25	2025/26
		$10,000	$10,000	$20,000	$20,000	$75,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$75,000	$75,000	$75,000	$75,000	$75,000

9.6.4 Renewal Plan

The decision making around whether to renew treatment or continue to carry out maintenance or repairs is likely to be based on staff judgement and experience. However, because many of these devices are so new to staff these decisions are limited.

There is no specific documented renewal strategy for treatment devices. These would very dependent on the type of device. These will continue to be developed as more devices are installed, and Council develops an understanding of which devices are preferred.

Part of these development of these strategies will be defining what constitutes renewal and what is maintenance in the context of the different treatment devices. For instance, is the replacement of plants or media maintenance or renewal? In contrast, decision for the 'harder' treatment devices, such as various types of Gross Litter Trap, may be easier as they can be treated in the same manner as pipes .

Renewal programmes for stormwater treatment devices are shown in Table 46 below.

Table 46: Proposed Stormwater Treatment Devices Renewal Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Renewal	1062-City-wide - Stormwater Network Renewal Works (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$650,000	$620,000	$600,000	$600,000	$600,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$600,000	$600,000	$600,000	$600,000	$600,000

9.6.5 Asset Improvement and New Assets

The requirement for new or improvements to stormwater treatment devices may be triggered in response to the stormwater capital development strategy outlined in section 9.2.5. Particularly the guiding principle of improvement of stormwater discharge quality. This coupled with requirements from Horizons will mean a gradual implementation of new treatment devices in existing areas of the city.

The requirement for new or improvements to treatment devices can also be identified as part of planning processes. Normally this is as part of the requirements for zoning changes or resource consents. Changes within the urban areas will often require improvements to existing assets, whereas changes outside the urban boundary will trigger the requirement for new assets to be constructed.

Eventually, as with other asset types, new or improvements to stormwater treatment devices will be identified in our management plans for individual catchments. The management plan will be used to provide the basis of the infrastructure required in the catchment, whether it be green field or brown field. This will in turn give potential developers an idea as to what the requirements are for new areas.

The risk, costs and benefits of accepting vested assets will be reviewed and a decision regarding approval for acquisition will be made on a case-by-case basis by staff. When satisfactorily completed in

accordance with our standards and any approvals given, we will accept such assets into public ownership.

Programmes that address requirements for new capital and/or improvements in relation to stormwater treatment devices are shown in Table 47 below. Many of them also link to the issues raised in the previous sections in terms of risk management, levels of service, and demands and drivers.

Table 47: Proposed Stormwater Treatment Capital New Programmes

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Capital New	51-Urban Growth - Development Contributions – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$200,000	$200,000	$200,000	$200,000	$100,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$10,000	$10,000	$100,000	$100,000	$100,000
Capital New	197-Urban Growth - NEIZ – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$296,250	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$20,000	$0
Capital New	1001-Urban Growth - Whakarongo – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$631,181	$970,000	$600,000	$0	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1065-Urban Growth - Kakatangiata – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$0	$350,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$400,000	$0	$0	$0	$0
Capital New	1704-Urban Growth - Aokautere – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$300,000	$300,000	$350,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0
Capital New	1708-City-wide - Stormwater Flood Mitigation (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$143,000	$545,000	$976,000	$1,006,000	$200,000
		2026/27	2027/28	2028/29	2029/30	2030/31
		$72,000	$4,305,000	$0	$0	$0
Capital New	2034-Urban Growth - Ashhurst – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$527,000	$110,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0

Prog. Type	Prog. No. & Name	Proposed 10 Year Plan Budget				
Capital New	2035-Urban Growth - Napier Rd Extension – Stormwater (shared across many asset types)	2021/22	2022/23	2023/24	2024/25	2025/26
		$0	$0	$0	$200,000	$0
		2026/27	2027/28	2028/29	2029/30	2030/31
		$0	$0	$0	$0	$0

9.6.6 Asset Disposal

There is no specific documented disposal strategy for treatment devices. These need to be developed. Like renewals strategies these would very dependent on the type of device.

There are no specific programmes associated with disposal of stormwater treatment devices.

9.7 Lifecycle Management Alternatives

As stated in the SAMP lifecycle decision making is an area of improvement for us. This includes consideration of lifecycle alternatives for stormwater. Thus, for all types of stormwater assets lifecycle management alternatives have not been well considered. This will be addressed in the proposed lifecycle decision making improvements for us, which include risk-based analysis of alternatives and embedding of the business case development process.

9.8 Lifecycle Improvement Items

Items identified that would improve lifecycle management are:

- Turn the existing SLAs and various dispersed planning documents into operation and maintenance practice documents for the stormwater network, structures pump stations, and treatment;
- Undertake gap analysis of SOPs and plan for documentation of all procedures;
- Process map all operational and maintenance practices and procedures;
- Develop feedback and improvement processes for operation and maintenance practices and procedures;
- Review the recording of all asset types in IPS, including breakdown of the plant and equipment;
- Improve recording of stormwater network, structures pump stations, and treatment operational and maintenance data in IPS;
- Undertake formal reviews and/or optimisation studies of maintenance and operations activities based on data and risk;
- Increase the amount of condition inspections to a level that is enough to assess the overall condition of and rate of deterioration of the network, pump stations, and treatment and disposal assets (including incorporating into scheduled maintenance routines);
- Review, revise and process map the renewal strategy and section criteria for all asset types;
- Prepare management plans for all stormwater catchments;
- Expand out GIS mapping of forward works to avoid clashes to 30 years; and
- Review, revise and process map the process for disposal all asset types.

10 Financial Summary

10.1 Overview

This section outlines the long-term financial requirements for the operations, maintenance, capital renewal and capital new to meet the agreed levels of service for Stormwater Activity. These requirements have been identified and assessed individually throughout this plan and are summarised in this section. This section also includes discussion on the strategies used to develop the financial budgets, as well as the assumptions and risks inherent in the budget forecasts.

10.2 Financial Forecast Reliability and Risk

10.2.1 Potential Effects of Uncertainty

Expenditure forecasts are based on the best available information. The longer-term budgets will be refined both in scope and costing as these programmes get closer to implementation. Periodic revision and adjustment to the schedule of works every three years enables the adverse effect of uncertainty in the financial forecasts to be mitigated.

Should the required level of funding not be available, then there is a potential risk of deferred maintenance and renewal or development. This may not be noticeable immediately but would result in agreed levels of service not being met.

The ideal cost accuracy for any programme (operational, renewal and new) is based on when the programme first appears in the LTP. These ideal accuracies are as follows:

- **Years 1 to 3 (2021/22 -2023/24):** The scope and pricing of work should be reliable, based on good market information for unit rates, etc.
- **Years 4 to 6 (2024/25 - 2026/27):** Estimates should be reliable, with detailed design work has not been carried out.
- **Years 7 to 10 (2027/28 - 2030/31):** Estimates generally based on a high-level idea of what the programme will involve.
- **Years 11 to 30 (2031/32 onwards):** Rough order costing based on the estimated quantum of work; forecasts could change significantly with further investigation.

10.2.2 Operational and Maintenance Forecast Reliability

Forecasts of operational and maintenance expenditure are reasonably reliable based on a known quanta and scope of work. However, as the operational and maintenance procedures are collected and documented, there will be more certainty and reliability in forecasting the operations and maintenance budgets.

Obtaining condition data will also have an impact on operations and maintenance budgets as some specific assets may require immediate maintenance in response to the condition inspections. The impact of this will not be known until the condition inspections are begun.

10.2.3 Capital Renewal Forecast Reliability

Renewals expenditure forecast is mostly based on the asset information out of IPS. Renewal budget for different asset types were created using the asset install date, estimated useful life, and the replacement cost from the recent asset revaluation. There is uncertainty when using the estimated useful life of any asset for forecasting renewals budget.

The reliability of the renewals forecast will improve once asset condition, and performance data is obtained. However, the budgets are expected to be of the right quantum over 30 years, with the condition data changing the date of renewal of specific assets as opposed to the overall budgets.

Another factor that may affect the certainty of the long-term renewals forecast is the rate of increase in the unit rates. If unit rates increase at the same rate as inflation, then the forecast renewals budget with an inflation adjustment will be adequate. If unit rates increase at a rate greater than inflation, as has occurred in the last three years, then the forecast renewals budgets will be insufficient and will need to be increased.

10.2.4 Capital New Forecasts Reliability

The budget forecast for each capital new programme is based on the assumptions and information available for that programme, and thus the reliability varies between programmes. The data associated with each programme indicates the reliability of the budget for that programme.

The timing of the growth programmes assumes that the demand for these programmes will occur in a predicted year. However, when this demand will trigger the need for the growth programmes occur is uncertain. While the budget for each growth programme has a stated level of reliability, the timing of the programme has a relatively low level of reliability. The development scenario for residential growth is based on meeting the needs of a growing population and includes the additional margins required by the National Policy Statement for Urban Development Capacity.

10.3 Financial Forecast

10.3.1 Proposed Operations and Maintenance Expenditure

Existing operations and maintenance budgets were reviewed against historic expenditure and levels of service requirements. This was used to forecast future budget needs for existing assets, and to estimate the budget required for new assets programmed to be created.

Figure 14 below shows the breakdown of the proposed operations and maintenance budgets for the next ten years (excluding inflation). The different colours in the columns show budget for different expenditure categories:

- Maintain Service Level or MSL (pink): budget for the operation and maintenance of the existing assets;
- Operational Programmes (blue): budgets for discrete operational programmes, for example the collection of base asset condition data, resource consent renewal, or business case preparation; and
- Capital New (green): budget allowance for operation and maintenance due to the creation of new assets each year.

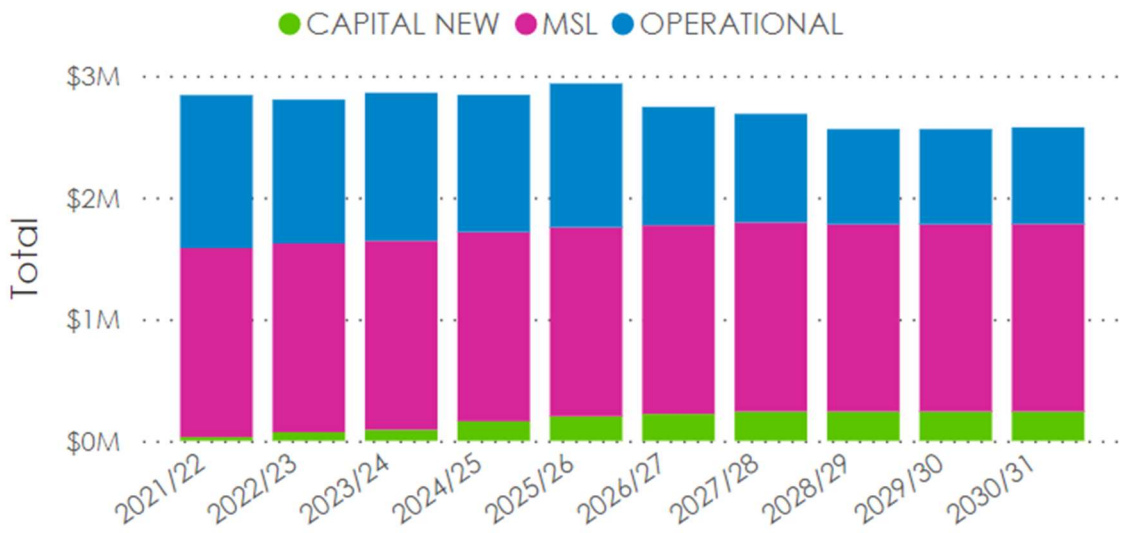

Figure 14: Stormwater Proposed Operational and Maintenance Budget Breakdown

As referred to in Section 7 current operations and maintenance (MSL) budgets are not enough to provide the agreed levels of service. Additional funding to address this 'gap' is required. This has been achieved by the creation of operational programmes, as opposed to adjustments to the operations and maintenance (MSL) budgets.

It can be seen from the graph that the forecast trend over the next ten years is that operations and maintenance budgets will increase steadily. This is predominately due to the budget required to operate and maintain the predicted increase in assets. In contrast the forecast operational programme budget varies from year to year.

The trend over the 30 years is expected to follow a similar pattern. With the expected growth of the City the forecast trend in stormwater operations and maintenance budgets is a steady increase.

Figure 16 shows further detail on the breakdown of the MSL budgets (excluding revenue and inflation). Labour accounts for nearly $1M each year, or about two thirds of the budget. About a tenth of the budget is for consultants, who are typically used for specialist investigations and design work. Maintenance costs are associated with consumables, plant and physical works and contribute to another tenth of the budget. Administration costs cover insurance, software, rates (Regional Council) amongst other items.

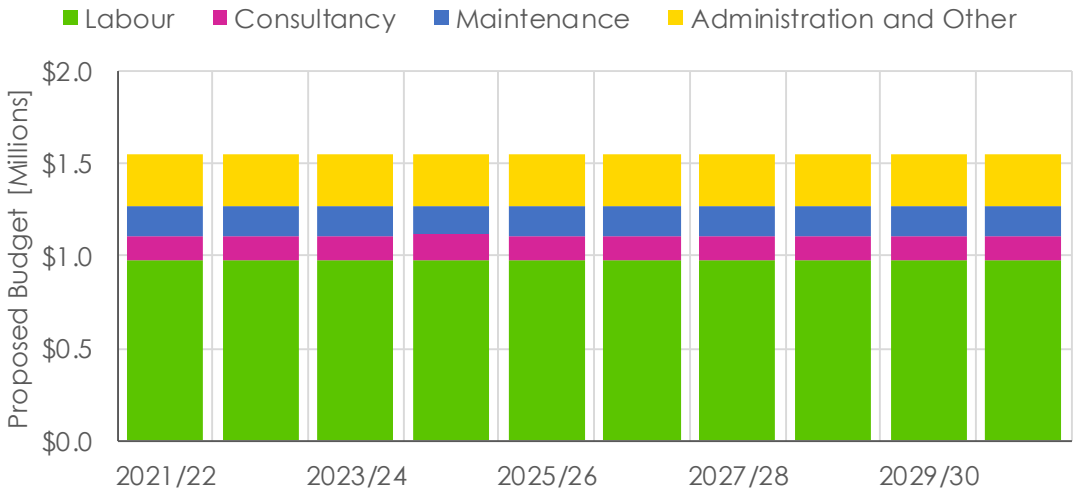

Figure 15: Stormwater Proposed MSL Budget Breakdown

10.3.2 Proposed Renewals Expenditure

The renewal programme budgets are developed primarily by the value and expected useful life of the assets as contained in the asset register (IPS). This is used to generate a projected cumulative replacement value for an asset group over the next 100 years. The existing cumulative renewals budget is compared with the projected replacement value to see if there is a shortfall or not in the required renewals budget. From this the required renewals budget is adjusted to match over time the projected replacement value.

A summary of the valuation that the budgets are based on is contained in Appendix. This includes unit rates and expected useful lives.

Figure 16 below shows this analysis for the stormwater pipes, open channels and structures renewals. It shows that a high proportion of these assets are expected to be due for renewal between 70 and 100 years in the future (orange bars). It can also be seen that current cumulative renewals budget (green line) is greater than the cumulative replacement value (red line). However, considering the prioritisation criteria and a desire to smooth the amount of assets due for renewal in the future a new cumulative renewals budget (yellow dotted line) has therefore been proposed. The overall proposed budget effectively smooths the high replacement value in year 90 at what is proposed to be a steady, affordable rate.

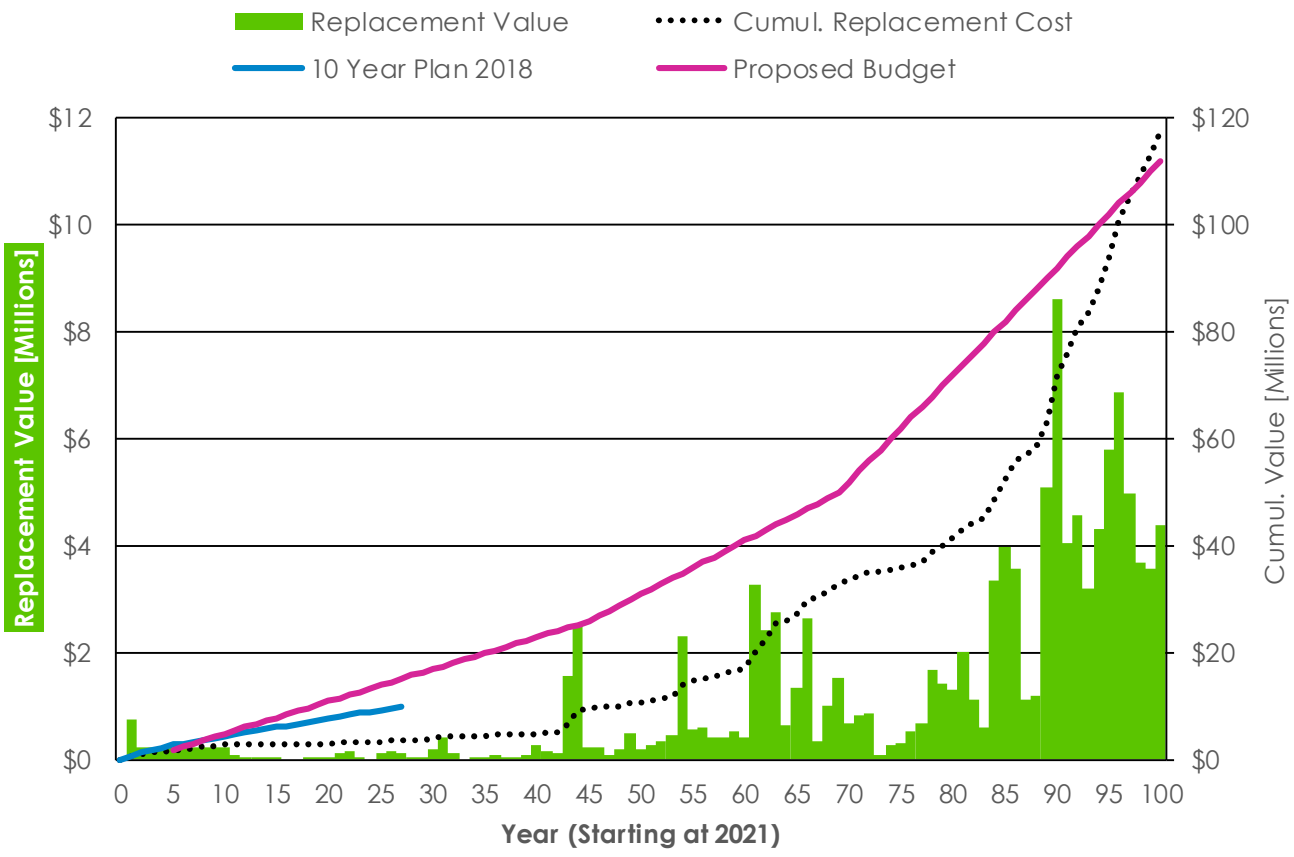

Figure 16: Stormwater Pipes, Open Channels and Structures Renewals Value and Budget Profile

The budget information shown in Figure 17 below is with specific reference to the stormwater pump stations which has been done in a similar way to the stormwater pipes, open channels and structures renewals.

Note that the cumulative renewals (red line) and the new cumulative renewals budget (yellow dotted line), trend closely to one another in shape, indicating the expected replacement costs year on year are reasonably steady, with none of the forecast sudden increase in later years expected with the

collection system. Note that the cumulative renewals (red line) and the new cumulative renewals budget (yellow dotted line), trend closely to one another in shape. Which shows that the expected replacement costs year on year are reasonably steady, with none of the forecast sudden increase in later years expected with the collection system. The cumulative renewals (red line) has some inherent risks which the new cumulative renewals budget (yellow dotted line) could help to iron out, such as the risk of early failure of an asset.

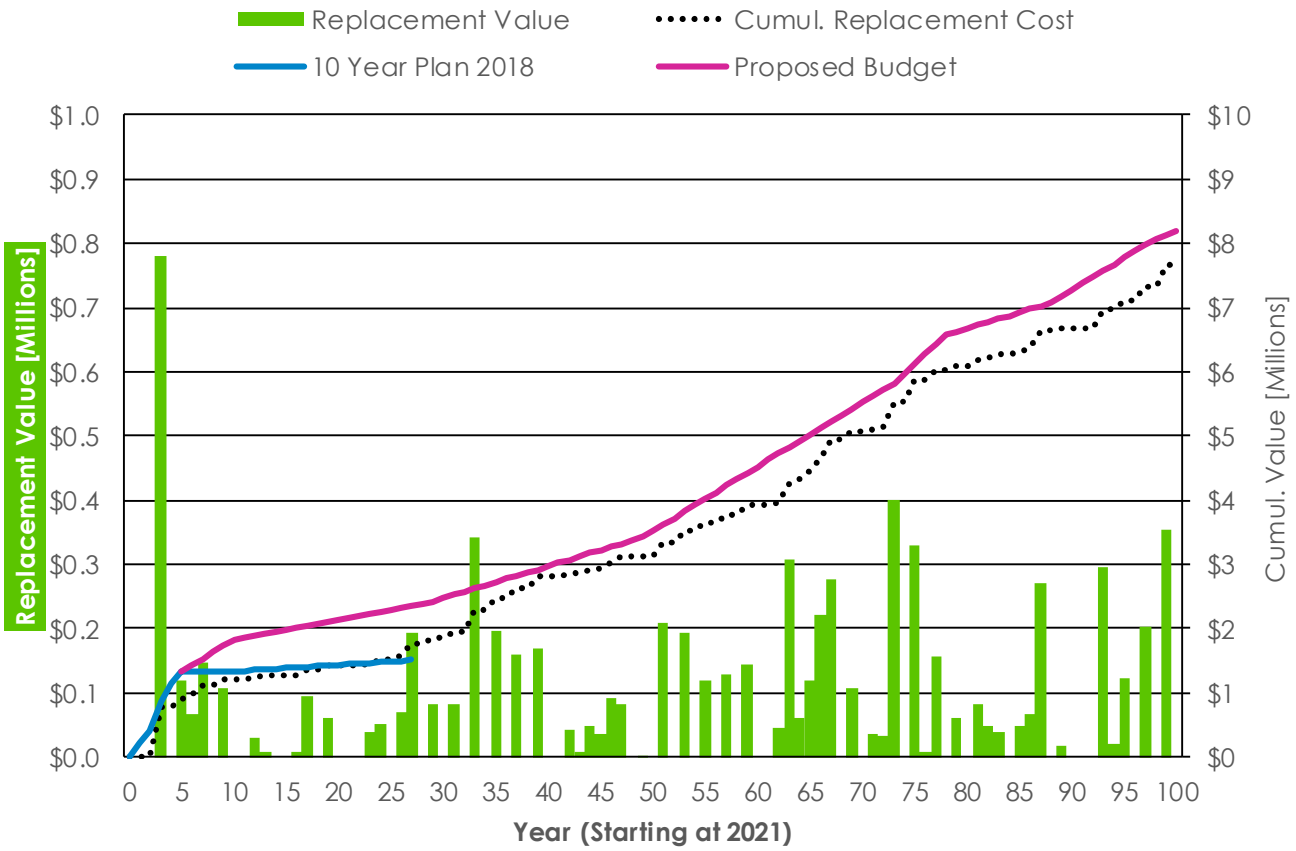

Figure 17: Stormwater Pump Stations Renewals Value and Budget Profile

Figure 18 below shows the proposed renewals expenditure for the next ten years. The renewals in the first five years is slightly higher than the following five years. This is due to the backlog of pipeline and pump station renewals.

Figure 18: Stormwater Proposed Renewal Budget

Over the next 30 years and longer the expected trend in the renewals budgets is that they will eventually reach a state of slow and steady rise. The starting value of this is anticipated to be higher than the latter part of the first ten years, as the repeat renewal of the assets renewed in the first five years becomes required. The steady rise from that value will be due to the increasing asset base.

10.3.3 Proposed New Capital Expenditure

As stated previously proposed budgets for capital new programmes are based on the information available for that programme. This could be a design, or a feasibility study with various costed options, or simply a programme concept.

Figure 19 below shows the proposed new capital budget for the next ten years. The budgets are comparatively higher in the first four years due to issues that need addressing within that timeframe. As mentioned throughout the AMP that flood mitigation is a priority. To address this issue, programmes have been put together for the stormwater network improvements and the stormwater pump station upgrade. Programme 1708 which has a substantial budget in year seven has been proposed for the upgrade of the Botanical and Ferguson street stormwater network.

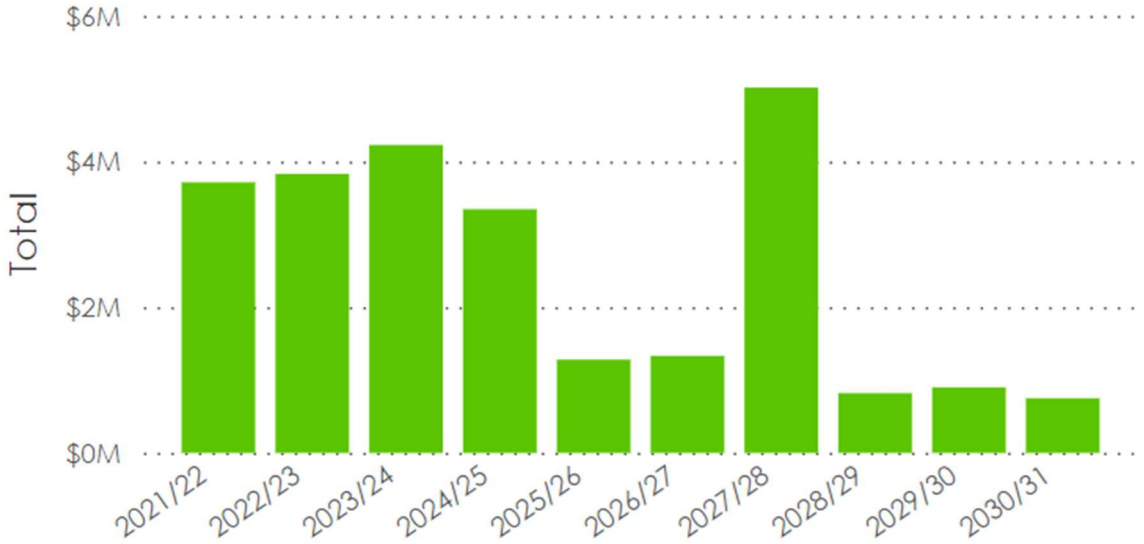

Figure 19: Stormwater Proposed New Capital Budget

Over the next 30 years the expected trend in the capital new budgets is uncertain. At present the budget forecast makes an allowance for new infrastructure after the ten years.

10.4 How We Will Pay For It

The different types of expenditure are funded in different ways. These are as follows:

- Operation and Maintenance is funded from the general rate.
- Capital renewal is funded from rates revenue to cover programmed renewal costs and if necessary, from borrowing.
- Capital development works that are for an increased level of service are funded from borrowing. Works that are required as a result of growth are funded, where possible, from user charges such as development contributions. Through the application of its Development Contribution policy we seek to obtain contributions to fund the infrastructure that is required due to City growth. Programmes that are attributable to growth are shown in this AMP. Development contributions for stormwater are area specific.

11 Plan Monitoring and Improvements

Improvements to storm water asset management practice have been identified in a number of ways:

- Relevant improvement items from the 2018 AMP that have yet to be completed;
- Activity specific recommended improvements from the 2019 Asset Management Maturity Assessment;
- Improvement actions from the review of the valuation; and
- Improvements identified as part of the preparation of this AMP.

These sources have identified numerous actions, not all of which will be able to be completed before the next revision of the AMP. To address this a pan-activity improvement register will be complied in accordance with the general improvement items in the Asset Management Maturity Assessment. This will then be prioritised, and the storm water improvement plan detailed in this section will focus on the improvements that can be made before the next revision of the AMP.

We will then prioritise the overall improvement register outside of this document and plan the improvements that can be made before the next revision of the AMP. The storm water improvement plan detailed at the end of this section will be the results of this process.

11.1 2018 AMP Improvement Plan Progress

The previous 2018 AMP listed general improvement items and then a more detailed list of improvement tasks. These are shown as they related to each other along with progress on each item in the table below.

Some of the improvement items previously listed are part of business as usual (BAU) or core business, so are therefore not improvement items in the sense that they are not a one-off action that improves practice. Unless there is a related one-off improvement item these previous items will not be carried through to the 2021 improvement plan.

The AMMA was carried out independently of the previous AMP improvement items. For some of the previous AMP improvement items that were not complete the AMMA identified the same or a similar improvement item. These AMMA items are detailed in the SAMP or Table 48 below. Where the same or similar measure has been identified in the AMMA the AMMA measure will be used from now on in favour of the 2018 improvement item.

Table 48: 2018 AMP improvement plan progress

2018 AMP Improvement Item	2018 AMP Improvement Tasks	Progress Made	Completed?	Considered BAU?	Superseded by AMMA Action?	Carried to 2021?
Capital renewal and development project planning – further development of processes to take into account a sustainable development approach.	Relates to several tasks.	A draft Stormwater Network Renewals Criteria has been prepared. This is still to be refined and revised.	N	N	Y	N
Review demand projections on an on-going basis consistent with Council's Residential Growth Strategy.	1.2 Review impact of Council's strategies and policies on demand projections. 1.4 Review project priorities based on risk/cost/benefit analysis	With the preparation of the SAMP and 10YP demand projections have been reviewed. Council's Growth Strategies have been reviewed and updated by Strategy and Planning.	Y Y	Y Y	Y Y	N N
Continue to develop predictive modelling and risk based approaches to help prioritise renewal programmes and better manage risks and costs in achieving the desired outcomes.	3.1 Undertake annual assessment of asset condition, age, and environmental factors to determine residual asset lives (predictive modelling). 3.2 Compile a renewal programme (accounting for condition and renewal profile depreciation) including consequences/risks of budget constraints. 3.3 Develop and action processes to identify and prioritise risk mitigation options (ODM). Prepare renewal programme.	The move to predictive modelling has been explored but not yet implemented or regularly updated (updating the model is BAU, but its development is improvement). A renewal programme has been developed and risks of budget constraints illustrated. A process for developing options for programmes and assessing option risks has been begun but needs to be completed.	N Y N	N Y Y	Y Y Y	N N N

2018 AMP Improvement Item	2018 AMP Improvement Tasks	Progress Made	Completed?	Considered BAU?	Superseded by AMMA Action?	Carried to 2021?
Update City-wide asset development plans as growth and actual development necessitates.	1.1 Complete model development and scenario assessments to determine flood damage risks considering all trends (development extents, impervious area coverage, climate change impacts etc). Map flooding risks.	A Stormwater Catchment Plan has yet to be prepared.	N	N	Y	N
Periodically review risk assessments.	1.3 Identify and model potential mitigation options to address flooding risks.	The process for prioritising programmes has been revised as part of the 10YP and includes risk. This needs to be needs to be further refined.	N	N	Y	N
	5.4 Develop a process for regular review of risk.	A process of regularly reviewing AM risk is still to be developed.	N	N	Y	N
Further develop appropriate mitigation strategies for Council's critical assets in the event of a major natural hazards and programmes to improve resilience of critical assets from natural hazards.	1.5 Review mitigation strategies for major natural hazard events impacting on stormwater facilities.	Overall, this is an area that requires further improvement.	N	N	N	Y
	2.6 Review/Identify critical assets in the register.	Critical assets have been identified.	Part	N	Y	N
	5.5 Develop and enhance measures for resilience of critical assets to natural hazards.	Multiple resilience programmes have been included in this AMP to both carry out physical works to improve resilience and to undertake studies of Council's resilience strategies.	N	N	N	Y

2018 AMP Improvement Item	2018 AMP Improvement Tasks	Progress Made	Completed?	Considered BAU?	Superseded by AMMA Action?	Carried to 2021?
Operations and maintenance – on-going review of contracting and internal service agreement strategies to achieve the best balance of risk transfer, cost and performance.	4.1 Document O&M strategy and O&M processes for optimising programmes (benefit/ cost approach).	Documentation of O&M process and strategies requires further improvement.	N	N	Y	N
	4.4 Scope up external contract for specialist mechanical and electrical maintenance services to achieve improved service, transparency and value.	Review of resourcing of O&M would need to occur post any documentation of processes.	N	N	Y	N
Asset information – on-going development of systems to meet all asset management needs, and the integration of asset information activities within Council.	2.1 Review AM system data quality processes and improve as required. Develop Data Improvement Plan. Link with Task 3(a)	Progress is only just starting to be made on data systems and documenting processes.	N (All)	N (All)	Y	N
	2.2 Review and document condition assessment quality process/ programme (to support risk & predictive modelling)	A programme has been included in the LTP for collection of condition data to support these actions.			Y	N
	2.3 Implement mobile data capture solution to enable real time capture of data and improvement of asset data quality by field staff				Y	N
	2.4 Review performance data needs (reporting & decision-making) and document data capture quality process.				Y	N
	2.5 Analyse asset lives (using condition/ capacity/ performance data), and review / address data quality issues. Enter into AM system				Y	N

2018 AMP Improvement Item	2018 AMP Improvement Tasks	Progress Made	Completed?	Considered BAU?	Superseded by AMMA Action?	Carried to 2021?
	2.7 Review financial data needed to support ODM and valuation- implement process				Y	N
	2.8 Assess advanced AM system needs and implement suitable application for predictive modelling.				Y	N
	2.9 Undertake regular drain and watercourse inspections to determine condition and develop renewal priorities. Capture information in IPS.				Y	N
	2.10 Complete 2 yearly condition survey of pump stations.				Y	N
	2.11 Assess future options for development of AM system				Y	N

2018 AMP Improvement Item	2018 AMP Improvement Tasks	Progress Made	Completed?	Considered BAU?	Superseded by AMMA Action?	Carried to 2021?
Internal process improvements for Collaborative Working Practices, Service Procurement processes and Market Comparability assessments.	4.2 Review processes to ensure that competitive prices are obtained for services delivered, and that there is the correct balance between risk transfer, performance orientation and costs. (SLA comparability, core market data, schedules of prices.) 4.3 Continue development of measure and value SLAs with further development of KPIs and deliverables. Detailed review of resource inputs to operation and maintenance activities to identify opportunities to do more for less. 9.2 Improve internal processes of CWP. SLA system and Market Comparability as required	Due to internal restructuring the need to review internal service agreements and collaborative working practices no longer exists.	N/A	N/A	N/A	N/A
Level of service – undertake stakeholder consultation on new, major issues to update understanding of community expectations and preferences. Review levels of service with Council every three years	7.1 Review LoS strategy and programme. 7.3 Undertake LoS Review with Council. 7.2 Undertake consultation on major issues, case by case.	LoS have been reviewed as part of the AMP process. New performance measures and LoS statements have been prepared. Consultation is normally undertaken on major issues as part of the LTP process and/or the programme.	Y Y N	N N Y	Y Y N	N N N

2018 AMP Improvement Item	2018 AMP Improvement Tasks	Progress Made	Completed?	Considered BAU?	Superseded by AMMA Action?	Carried to 2021?
AM resource planning to ensure the recruitment, retention and development of sufficient and suitably qualified staff	6.1 Adopt succession planning process to minimise risks relating to loss of key staff knowledge. 6.2 Skill gaps in AM are assessed and training programmes implemented to close any identified gaps.	This has been partially addressed by the formation of the Asset Planning Division. Further improvement is still required.	N N	N N	Y Y	N N
Review asset management strategy to take account of changes in Council direction and Government policy	No specific tasks	Council has undertaken a significant review of AM strategies internally. One of the results of this was the formation of the Asset Planning Division.	Y	N	Y	N
(New item) Develop and improve internal AM practice	1.6 Document changes to AMP programmes that arise through 10 Year Plan & AP processes 2.12 Review and update Programme Planning and Implementation (PPI) information in conjunction with AP & 10 Year Plan process 2.13 Develop user friendly database for the PPI information 5.1 Establish annual management review meetings to consider AM performance 5.2 Establish an Asset Management Coordinating Group to drive improvement plan & next 'AMP over the next 3yrs	This has been partially addressed by the formation of the Asset Planning Division, but some improvement is still required. Actions that are currently in train to address some of these tasks: • Preparation and approval of AM Policy • Establishment of an AM steering group to oversee AM practice and improvements • Development of AM KPIs in the SAMP • Investigation of programme and	N N N N N	Y Y N N N	N N N Y Y	N N Y N N

2018 AMP Improvement Item	2018 AMP Improvement Tasks	Progress Made	Completed?	Considered BAU?	Superseded by AMMA Action?	Carried to 2021?
	5.3 Develop overall AM strategy leading up to next AM review and get adopted by MT	project data structure and tool	N	N	Y	N
	5.6 Develop & implement process to ensure that there is better integration between all AMPs		N	N	Y	N
	5.7 Develop KPIs to monitor progress with the Improvement Plan		N	N	Y	N
	6.3 Promote organisational understanding of AM practices and outcomes		N	N	Y	N
	9.1 Review collaboration and procurement of services for managing and delivery of water services as part of Section 17A review		N	N	Y	N
(New item) Revise AMP for 2021-31 LTP	8.1 AMP Maturity Assessment and identification of key focus areas for 2021 Plans.	The AMPs have been completely revised for the 2021-31 LTP.	Y	Y	N	N
	8.2 Prepare AMP using outputs of this improvement programme and incorporate further recommendations from the 2017 Peer Review & Audit NZ into the Plan.		Y	Y	N	N
	8.3 Update AMP programme and financials.		Y	Y	N	N

11.2 Maturity Assessment

An external review of Council's asset management practice was undertaken in July 2019 by Infrastructure Associates Ltd using the New Zealand Treasury framework. The broader discussion on the results of this are outlined in the SAMP. One of the outputs of the review was a list of activity specific improvement items. Many of the more generic improvement items have and are continuing to be addressed by the formation of the new Asset and Planning Division, alongside the development of the Asset Management Policy and Strategic Asset Management Plan.

The maturity assessment improvement items are listed in Table 49 below. For each item there is comment on the status and progress that has been made, as well as where it is addressed; either in the SAMP or this AMP.

Table 49: Stormwater Specific Improvement Items from AMMA

AM Function	Recommended Improvements	AMMA Priority
Policy and Strategy	Ensure that the Asset Management Policy provides specific guidance for the management of three waters assets.	Medium
Policy and Strategy	Develop separate wastewater and stormwater development plans and explore the impact of different development scenarios and management strategies.	High
Levels of Service and Performance Management	Review three waters levels of service performance measures.	Medium
Forecasting Demand	Assess risk of stormwater flooding due to climate changes and the impact of demand resulting from infill development on existing infrastructure	Medium
Asset Register Data	Review the critical assets methodology and classify the criticality of the three waters assets within the asset database.	High
Asset Register Data	Recommend Council accelerates its collection and update of stormwater asset data, including location, materials, geotechnical conditions, and criticality.	High
Asset Performance and Condition	Need to schedule CCTV data collection into a programme targeting critical stormwater and wastewater assets and plant more regularly.	High
Managing Risk	Assess resilience of network, using results from criticality and condition surveys.	High
Capital Works Planning	Develop IPS capability to produce renewal plans for wastewater and stormwater.	High
Financial Planning	Develop case for underfunded renewals showing options and consequences.	High
AM Information Systems	Ensure that there is at least one other database administrator who can manage IPS.	Medium

AM Function	Recommended Improvements	AMMA Priority
Audit and Improvement Planning	Along with other activities, develop combined Council improvement plan.	High

11.3 Items from Asset Management Plan Update Process

The following improvement items in Table 50 have been identified as part of the review and update of this AMP.

Table 50: Stormwater Specific Improvement Items from 2020 AMP Development

AMP Section	AM Function	Recommended Improvement	For Improvement Register (Not Identified Already)
Major Activity Challenges	Management Systems	Develop handover processes for when staff retire or leave.	N
Information Systems and Tools	Asset Register Data	Develop procedures for data needs, asset information collection, and develop staff training.	N
Information Systems and Tools	AM Leadership and Teams	Clearly define the roles of staff, including Information Management staff.	Y
Information Systems and Tools	AM Information Systems	Integrate IPS and customer service software.	Y
Information Systems and Tools (and Lifecycle Renewals)	Asset Performance / Condition	Carry out condition assessments of critical assets and a representative sample of the entire stormwater asset base to improve reliability of the information that is derived from asset condition.	N
Risk Management	Operational Planning	Improve what is included in the BCP to cover a wider area of business continuity and emergency response planning.	N
Information Systems and Tools	AM Information Systems	Develop processes to ensure all relevant operation and maintenance is being recorded in IPS across all stormwater asset types.	N
Lifecycle Operations and Maintenance (also Sustainability Demand/Drivers)	Operational Planning	Develop plans for each individual stormwater catchment to enable goals of mitigation of flood damage risks and improvement of stormwater discharge quality	Y

AMP Section	AM Function	Recommended Improvement	For Improvement Register (Not Identified Already)
Lifecycle Operations and Maintenance	Operational Planning	Collect and analyse maintenance data to optimise operations and preventative maintenance schedules, and to focus associated budgets.	Y
Lifecycle Operations and Maintenance (also Sustainability Demand/Drivers)	Operational Planning	Review and update operational planning for the stormwater network, pump stations, structures and treatment to replace the SLA (include sustainability considerations).	Y
Lifecycle Operations and Maintenance	Asset register Data	Review the recording of all assets in IPS to ensure it is appropriate for valuation, maintenance and renewal.	Y
Lifecycle Renewals	Operational Planning	Review, revise and process map the renewal strategy and section criteria for all asset types.	N
Lifecycle Renewals, and Improvements and New Assets	Capital Works Planning	Expand out GIS mapping of forward works to avoid clashes to 30 years.	Y
Lifecycle Disposal	Operational Planning	Review process for the disposal of storm water plant and equipment.	Y

11.4 Improvement Plan

The purpose of the Improvement Plan is to:

- Identify and develop implementation of AM planning processes.
- Identify, programme and resource measures required to complete studies or measures to confirm planning assumptions or to gather information required to improve the reliability / confidence of information used to develop the AMP.
- Identify and prioritise ways to cost-effectively improve the quality of the AMP.
- Identify indicative timelines, priorities, and human and financial resources required to achieve AM planning objectives.

Table 51 contains the Rubbish and Recycling Improvement Plan with an indicative timeframe for implementation. Improvement items are listed in priority based on targeting the biggest gaps identified in the Asset Management Maturity Assessment.

Table 51: Stormwater Improvement Plan

Year	Programme Number	Improvement Items	Description of Improvement Item
2021/22	PROG-034	IMP-0126	Review the critical assets methodology and classify the criticality of the three waters assets within the asset database.
	PROG-008	IMP-0133	Along with other activities, develop combined Council improvement plan.
	PROG-056	IMP-0045	Map AM processes in ProMapp.
	PROG-010	IMP-0207	Clearly define the roles of staff, including Information Management staff.
	PROG-017	IMP-0005	Review the levels of service for each activity through customer engagement.
		IMP-0006	Develop the non-infrastructure (community/customer) LoS and then review the infrastructure (technical) LoS.
		IMP-0124	Review three waters levels of service performance measures.
	PROG-036	IMP-0016	Review the policy governing asset condition and performance assessment in terms of content and frequency.
	PROG-067	IMP-0196	Expand out GIS mapping of forward works to avoid clashes to 30 years.
	PROG-073	IMP-0037	Show the renewal requirement for different options and the funding available in the Strategic AMP. The consequences of funding constraints should be articulated clearly.
		IMP-0131	Develop case for underfunded renewals showing options and consequences.
	PROG-039	IMP-0013	Review the asset data hierarchies against industry standards.
	PROG-040	IMP-0014	Review asset information needs, conducting a gap analysis, and implementing a data improvement project. Recognise the approach may be difference for each of the activities/portfolios.
		IMP-0338	Ensure data systems enable analysis and creation of understanding about assets

Year	Programme Number	Improvement Items	Description of Improvement Item
2021/22	PROG-041	IMP-0127	Recommend Council accelerates its collection and update of stormwater asset data, including location, materials, geotechnical conditions, and criticality.
		IMP-0221	Provide width and depth attribute data for stormwater channels.
		IMP-0222	Provide asset additional attribute data for stopbanks and gabions.
	PROG-054	IMP-0030	Ensure that clear renewal and maintenance plans are developed and communicated with key staff and broader stakeholders.
		IMP-0197	Review and update operational planning for the 3 waters networks to replace the SLAs (include sustainability considerations).
		IMP-0206	Collect and analyse maintenance data to optimise operations and preventative maintenance schedules, and to focus budgets.
	PROG-064	IMP-0123	Develop separate wastewater and stormwater development plans and explore the impact of different development scenarios and management strategies.
		IMP-0209	Develop plans for each individual stormwater catchment to enable goals of mitigation of flood damage risks and improvement of stormwater discharge quality
	PROG-063	IMP-0198	Review process for disposal of plant and equipment.
	PROG-042	IMP-0018	Develop processes for contractors and inhouse staff to collect condition information, using mobile data applications.
	PROG-048	IMP-0047	Review the functionality capabilities of each system and develop processes to use them effectively through training and process development.
	PROG-047	IMP-0132	Ensure that there is at least one other database administrator who can manage IPS.
	PROG-043	IMP-0199	Integrate IPS with customer service and financial software
	PROG-044	IMP-0208	Undertake data reporting and analytics. Analyse/integrate data from all the asset management data systems to create meaningful reports in order to make informed decisions on the requirements of the various infrastructure assets.

Year	Programme Number	Improvement Items	Description of Improvement Item
2022/23	PROG-023	IMP-0027	Assess the resilience of the network across all the activities.
		IMP-0099	Develop and enhance measures for resilience of critical assets to natural hazards.
		IMP-0129	Assess resilience of network, using results from criticality and condition surveys.
	PROG-024	IMP-0297	Update Business Continuity Planning
	PROG-030	IMP-0050	Develop pre-approved procurement panels and formalise contracts with more clearly defined KPIs and monitoring.
		IMP-0092	Scope up external contract for specialist mechanical and electrical maintenance services to achieve improved service, transparency and value
	PROG-062	IMP-0334	Develop renewal strategies and get them approved by ILT
	PROG-038	IMP-0017	Complete condition surveys on all critical assets, and schedule regular inspections with the frequency based on criticality.
		IMP-0128	Need to schedule CCTV data collection into a programme targeting critical stormwater and wastewater assets and plant more regularly.
	PROG-061	IMP-0001	Incorporate Jacobs criticality assessment in IPS renewals decision tree and review whole decision tree.
		IMP-0130	Develop IPS capability to produce renewal plans for wastewater and stormwater.
	PROG-050	IMP-0219	Investigate and implement a method of capturing current contact costs to validate valuation unit rates.
	PROG-049	IMP-0304	Review asset cost reporting needs and carry out gap analysis in IPS. Implement financial structure in IPS in order to track asset costs by Activity and Sub-Activity (or equivalent in new ERP).
2024/25	PROG-059	IMP-0066	Analyse asset lives (using condition/ capacity/ performance data), and review / address data quality issues. Enter into AM system
		IMP-0220	Develop a process to ensure condition data is used to estimate expected lives of individual assets and overall asset groups.
	PROG-002	IMP-0122	Ensure that the Asset Management Policy provides specific guidance for the management of three waters assets.

Appendices

A. Key Assumptions

The following assumptions have been adopted for this AMP.

Inflation

Financial projections are based on July 2020 estimated costs. No inflation factors have been applied.

BERL inflation factors will be applied to the programmes and budgets in the 10 Year Plan. Budgets for successive years of the Annual Budget are based on the corresponding year of the 10 Year Plan.

Depreciation

Average asset lives at a project level for new works have been used to calculate depreciation.

New works are a small percentage of total depreciation. Differences from actual due to averaging of lives are relatively minor.

Vested Assets

On average the same level of assets are gifted to the Council as a result of subdivision as has occurred over the last 5 years.

Note that the rate of change of development will be taken account of in future revisions of the AMP and subsequent O&M and depreciation taken into account.

Service Potential

Service potential of the asset is maintained by the renewal and maintenance programme.

There is low risk that the service potential of the asset will not be maintained by implementation of the renewal programme since this is based on reliable asset and condition information from the asset management system.

Asset lives

Asset lives are accurately stated.

The risk that lives are inaccurate is low. Lives are based on generally accepted industry values modified by local knowledge. The asset database gives a good knowledge of asset condition and an extensive field assessment has recently been undertaken.

Natural Disasters

That there are no major natural disasters during the planning period requiring additional funds.

There is medium risk of a natural disaster occurring during this period requiring additional funds to repair or reinstate assets. Some further provision for increasing the resilience of the assets has been built into this plan but there is still further work to be undertaken to determine the desired level of resilience and the further asset improvements to achieve this.

Council Policy

No significant change to Council policy that impacts on assets and services.

Any significant change will require a full review of the AMP and implications identified at the time.

Interest Rate

An interest rate of 5.7% p.a. is used for debt on new work.

B. 30 Year Financial Forecasts

Table B1: Proposed Thirty Year Operations and Maintenance Budgets ['000s]

Year	Stormwater Collection and Disposal	Operating Programmes [3]	Total
2021/22	**$3,664**	$665	**$4,330**
2022/23	**$3,875**	$720	**$4,595**
2023/24	**$4,064**	$957	**$5,020**
2024/25	**$6,019**	$983	**$7,002**
2025/26	**$4,443**	$1,011	**$5,454**
2026/27	**$4,505**	$1,107	**$5,612**
2027/28	**$4,600**	$1,127	**$5,727**
2028/29	**$4,685**	$1,063	**$5,748**
2029/30	**$4,683**	$841	**$5,524**
2030/31	**$4,687**	$881	**$5,568**
2031/32	**$4,677**	$836	**$5,513**
2032/33	**$4,665**	$857	**$5,522**
2033/34	**$4,650**	$878	**$5,528**
2034/35	**$4,625**	$900	**$5,526**
2035/36	**$4,601**	$966	**$5,567**
2036/37	**$4,580**	$990	**$5,570**
2037/38	**$4,557**	$1,015	**$5,572**
2038/39	**$4,540**	$1,040	**$5,580**
2039/40	**$4,526**	$1,066	**$5,592**
2040/41	**$4,505**	$1,141	**$5,647**
2041/42	**$4,486**	$1,170	**$5,656**
2042/43	**$4,484**	$1,199	**$5,683**
2043/44	**$4,464**	$1,229	**$5,694**
2044/45	**$4,446**	$1,260	**$5,706**
2045/46	**$4,430**	$1,337	**$5,767**
2046/47	**$4,407**	$1,370	**$5,778**
2047/48	**$4,377**	$1,405	**$5,782**
2048/49	**$4,346**	$1,440	**$5,786**
2049/50	**$4,313**	$1,476	**$5,789**
2050/51	**$4,313**	$1,562	**$5,875**

[3] See Table B2 below for details of Operating Programmes

Table B2: Proposed Thirty Year Operating Programmes

Programme	Budget	Timing
1369-City-wide Data Collection and WQ Monitoring	$225,000 per annum	2021/22 to 2050/51 ($200,000 in 2022/23)
1495-Third party stormwater flood problem resolution	$30,000 per annum	2021/22 to 2050/51
1614-Stormwater - Open channels and drains - maintenance	$500,000 (year 1) decreasing to $100,000 (from year 7)	2021/22 to 2050/51 ($100,000 from 2028/29)
1709-City-wide - Stormwater Condition Assessments	$100,000 (years 1-7) to $50,000 (years 8-10)	2021/22 to 2027/28 2028/29 to 2030/31
1710-City-wide - Stormwater Modelling, Consenting and Planning	$260,000 (year 1) $180,000 (years 2-10)	2021/22 2027/28 to 2030/31
1930-City-wide - Maintenance of Stormwater Treatment Devices	$10,000 (year 1) increasing to $75,000 (from year 5)	2021/22 to 2050/51
1976-City-wide – Stormwater - Operation and maintenance of vested assets	$10,000 (year 11) increasing to $93,000 (from year 25)	2030/31 to 2050/51
2002-Stormwater Reticulation Network Maintenance	$97,000 per annum	2021/22 to 2050/51
2003-Stormwater Pump Station Operation & Maintenance	$24,000 per annum	2021/22 to 2050/51

Table B3: Proposed Capital Budgets ['000s]

Year	Capital Renewal Programmes [4]	Depreciation	Capital New Programmes [5]
2021/22	**$875**	$1,818	**$3,714**
2022/23	**$790**	$1,818	**$3,830**
2023/24	**$1,070**	$1,818	**$4,227**
2024/25	**$880**	$1,818	**$3,346**
2025/26	**$790**	$1,818	**$1,280**
2026/27	**$700**	$1,818	**$1,332**
2027/28	**$700**	$1,818	**$5,015**
2028/29	**$700**	$1,818	**$820**
2029/30	**$700**	$1,818	**$900**
2030/31	**$700**	$1,818	**$750**
2031/32	**$630**	$1,818	**$700**
2032/33	**$630**	$1,818	**$550**
2033/34	**$630**	$1,818	**$370**
2034/35	**$630**	$1,818	**$350**
2035/36	**$630**	$1,818	**$450**
2036/37	**$630**	$1,818	**$350**
2037/38	**$630**	$1,818	**$350**
2038/39	**$630**	$1,818	**$450**
2039/40	**$630**	$1,818	**$350**
2040/41	**$630**	$1,818	**$350**
2041/42	**$630**	$1,818	**$450**
2042/43	**$630**	$1,818	**$350**
2043/44	**$630**	$1,818	**$350**
2044/45	**$630**	$1,818	**$450**
2045/46	**$630**	$1,818	**$350**
2046/47	**$630**	$1,818	**$250**
2047/48	**$630**	$1,818	**$350**
2048/49	**$630**	$1,818	**$250**
2049/50	**$650**	$1,818	**$250**
2050/51	**$650**	$1,818	**$3,714**

[4] See Table B4 below for details of Capital Renewal Programmes
[5] See Table B5 below for details of Capital New Programmes

Table B4: Proposed Thirty Year Capital Renewal Programmes [000]

Programme	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28 Onwards
20-City-wide - Stormwater Pump Station Renewals	$225	$170	$470	$280	$190	$100	$30 to $100 per annum
1062-City-wide - Stormwater Network Renewal Works	$650	$620	$600	$600	$600	$600	$600 per annum

Table B5: Proposed Thirty Year Capital New Programmes [000]

Programme	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28 Onwards
Growth							
51-Urban Growth - Development Contributions - Stormwater	$200	$200	$200	$200	$100	$10	$10 to $100 per annum
197-Urban Growth - NEIZ - Stormwater			$296				$20 (x2) in 2028/29, and 2033/34
1001-Urban Growth - Whakarongo - Stormwater	$631	$970	$600				-
1065-Urban Growth - Kakatangiata - Stormwater				$350		$400	-
1704-Urban Growth - Aokautere - Stormwater		$300	$300	$350			-
Capacity							
1060-City-wide - Stormwater Network Improvement Works	$1,430	$880	$880	$880	$730	$500	$200 to $450 per annum
1372-City-wide Stormwater Pump Stations Improvement	$930	$470	$560	$310		$100	$100 every 3 years from 2029/30
Reslience							
1706-City-wide - Stormwater Network Resilience	$130	$215	$165				-

Programme	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28 Onwards
Environmental							
1707-City-wide - Land purchase associated with streams and channels	$250	$250	$250	$250	$250	$250	$250 per annum until 2031/32
Flood Protection							
1708-City-wide - Stormwater Flood Mitigation	$143	$545	$976	$1,006	$200	$72	$4,305 in 2027/28

C. Resource Consents

Table C1: Summary of Resource Consents

Consent No.	Term [Yr]	Expiry Date	Type	Consent Subtype	Location	Description
APP-2015200167.00	35	1-Jul-2050	Water Permit	Dam & Divert	Norton Park	To undertake earthworks in Norton Park to construct a series of shallow ponds to create a wetland area, diversion of the Little Kawau Stream through the wetland area and installation of structures in the bed of the river subject to the attached condition schedule.
101464	35	22-Nov-2035	Land Use Consent	Land Disturbance	Cashmere Drive Subdivision	To excavate and disturb the surface of land and to place fill a culvert and structures for erosion protection.
6321	35	13-Dec-2030	Water Permit	Divert	Roberts Line	To divert water into a piped stormwater system on properties located on roberts line.
APP-2016200765.00	5	1-Jul-2022	Land Use Consent	Construct	James Line	Installation/lengthening of a culvert.
APP-2016200765.00	5	1-Jul-2022	Land Use Consent	Land Disturbance	James Line	Land disturbance and vegetation clearance associated with the widening and upgrading of James Line within 5 m of a rare and threatened habitat.
APP-2016200765.00	5	1-Jul-2022	Discharge Permit	Discharge to Water	James Line	Discharge stormwater to a rare and threatened habitat.

Addendum – Stormwater Asset Management Plan

The proposed budgets contained within the body of the Stormwater Asset Management Plan were set at 27 September 2020.

Several changes have been made to these proposed budgets through the 10-Year Plan process.

The 10-Year Plan was adopted by the Council on 7 July 2021 in accordance with the Local Government Act 2002.

The following provides a high-level summary of these changes including commentary on the implications, risks or opportunities of these changes.

Operations and Maintenance

Figure A shows the proposed and adopted Operations and Maintenance budgets for the Activity.

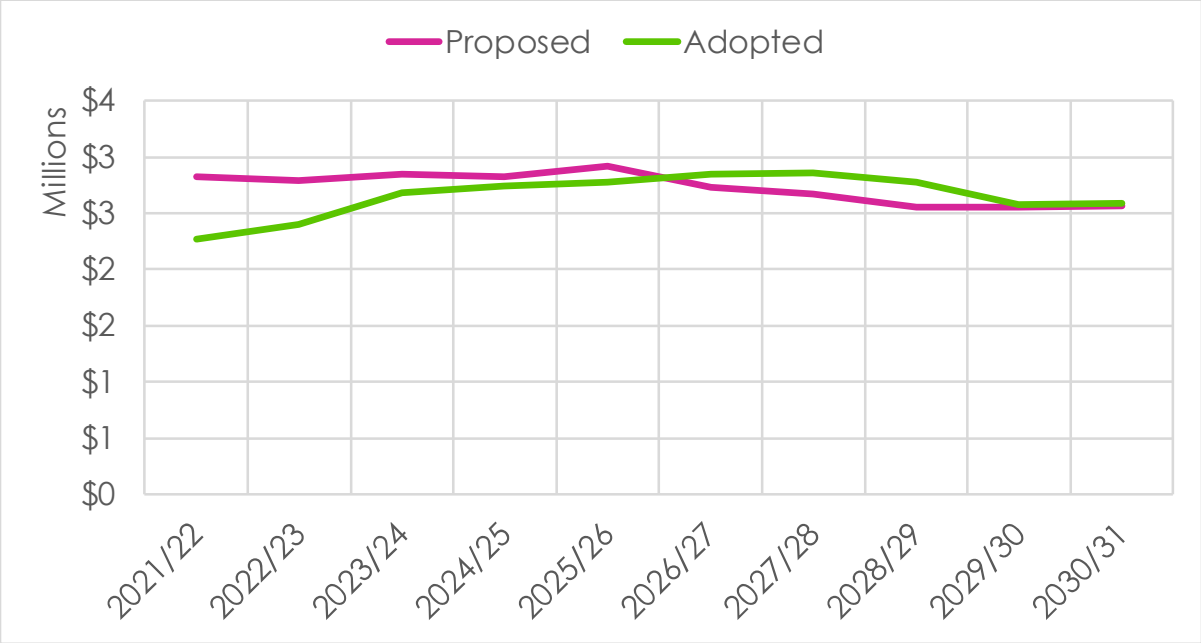

Figure A: Comparison of Operations and Maintenance Budgets

Table A contains a high-level summary of the changes to Operational programmes, alongside the implications, risks and opportunities due to the change in budgets.

Table A: Summary of Changes to Operational Programmes and Impact

Programme Name	Change	Implication/Risk/Opportunity
1369-City-wide Data Collection and WQ Monitoring	Reduced	Monitoring programme will need to meet future resource consent conditions and may need to be revised up.
1495-Third party stormwater flood problem resolution	Not Adopted	Continue to manage out of maintain service level operational budgets.

Programme Name	Change	Implication/Risk/Opportunity
1614-Stormwater - Open channels and drains - maintenance	Increased	Opportunity to meet desired level of service as budgets were previously inadequate.
1710-City-wide - Stormwater Modelling, Consenting and Planning	Reduced	Consenting requirements will need to meet Horizons One Plan and District Plan policy and rules. May need to be revised up.
1930-City-wide - Maintenance of Stormwater Treatment Devices	Reduced	Low risk of exceeding maintenance budgets in order to maintain service level.
2002-Stormwater Reticulation Network Maintenance	Reduced	Low risk of exceeding maintenance budgets in order to maintain service level.

Renewal

Figure B shows the proposed and adopted Capital Renewal budgets for the Activity. No changes occurred to the Capital Renewal programmes.

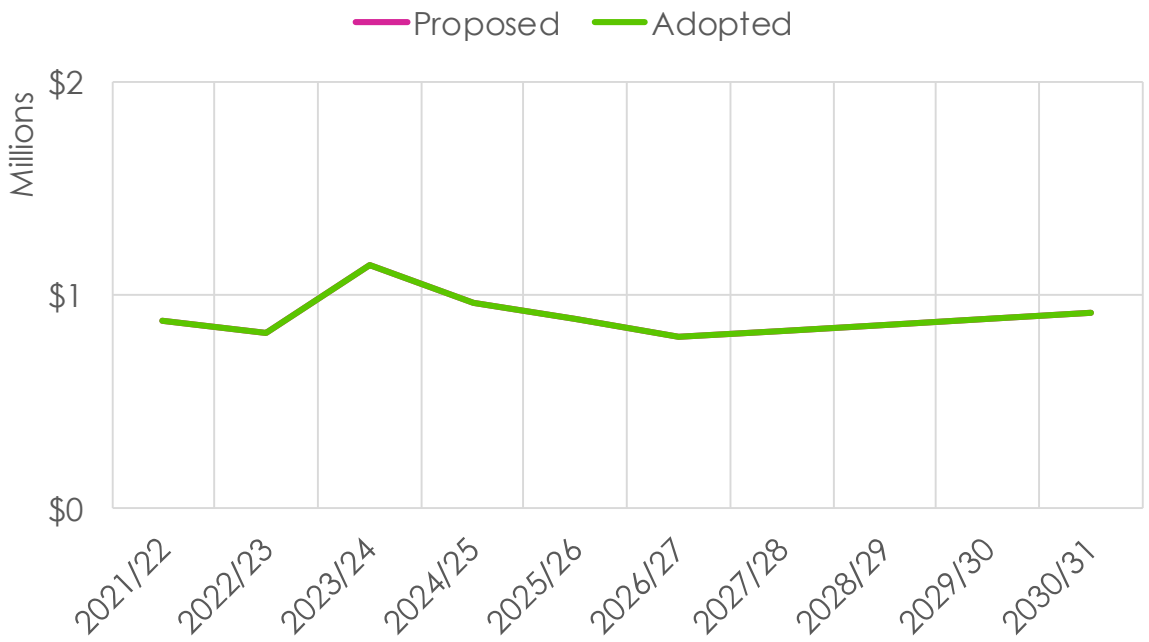

Figure B: Comparison of Capital Renewal Budgets

Capital New Expenditure

Figure C shows the proposed and adopted Capital New budgets for the Activity.

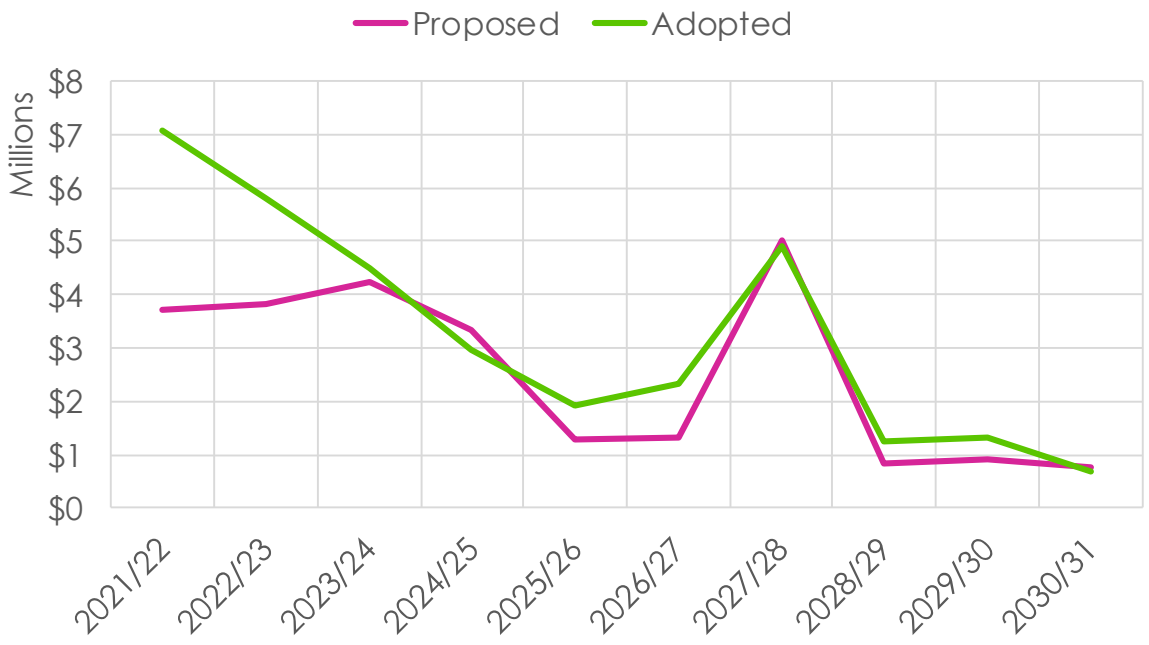

Figure C: Comparison of Capital New Budgets

Table C contains a high-level summary of the changes to Capital New programmes, alongside the implications, risks and opportunities due to the change in budgets.

Table C: Summary of Changes to Capital Renewal Programmes and Impact

Programme Name	Change	Implication/Risk/Opportunity
1001-Urban Growth - Whakarongo - Stormwater	Increased	Increased alignment with growth assumptions.
1060-City-wide - Stormwater Network Improvement Works	Increased	Improved workload and easier to plan resources. Neglible risk to level of service failure but need to monitor and re-prioritise work programme each year based on the latest performance trends
1065-Urban Growth - Kākātangiata - Stormwater	Increased	Increased alignment with growth assumptions.
1372-City-wide Stormwater Pump Stations Improvement	Reduced	Programme of works is more realistic
1704-Urban Growth - Aokautere - Stormwater	Increased	Increased alignment with growth assumptions.
1707-City-wide - Land purchase associated with streams and channels	Reduced	Increased alignment with growth assumptions.
197-Urban Growth - NEIZ - Stormwater	Increased	Increased alignment with growth assumptions.

Programme Name	Change	Implication/Risk/Opportunity
2034-Urban Growth - Ashhurst - Stormwater	Introduced	Increased alignment with growth assumptions.
2035-Urban Growth - Napier Rd Extention - Stormwater	Introduced	Increased alignment with growth assumptions.

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