Long Term Plan 2021-31

Activity Plan

Flood Protection and Control Works

Adopted 21 & 23 June 2021

Christchurch City Council

Approvals

Role	Position	Name	For Draft LTP	
			Signature	Date of sign-off
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1. What does this activity deliver?

The flood protection and control works activity delivers floodplain and stormwater management plan objectives to reduce the harm from flooding to our community and to improve the quality of the surface water.

The activity includes construction of new flood protection infrastructure and management of existing infrastructure including:

- pump stations and water flow control devices and structures such as valve stations, stopbanks, tide gates and basins
- water quality treatment devices such as basins, wetlands, tree pits and raingardens
- hydrometric monitoring devices, measuring rainfall along with surface water, sea and groundwater levels.

Basins and wetlands serve a dual purpose of providing stormwater detention for reducing flood risk as well as providing water quality treatment.

Council is developing and implementing Stormwater Management Plans (SMPs) across Christchurch City and Banks Peninsula where the Council has stormwater infrastructure. The SMPs aim to maintain and improve the six values for waterways. The SMP technical documents support and define how Council will comply with rules in stormwater discharge consents it has with Environment Canterbury.

Service delivered by Flood Protection activity are:

- Reduce risk of flooding to property and dwellings during extreme rain events
- Major flood protection and control works are maintained, repaired and renewed to key standards
- Implement Land Drainage Recovery Programme works to reduce flooding
- Waterways are clean and pollution is minimised.

This activity is intrinsically linked to and interdependent with the Stormwater Drainage activity.

2. Community Outcomes – why do we deliver this activity?

	Community Outcomes	Describe how the activity effects the Community Outcome
Primary Outcome 1	Healthy water bodies	When flood waters flows overland, and then into waterways, sediment and other contaminants are washed into the waterway, reducing water quality. Appropriate management of stormwater and avoidance of flooding are therefore crucial parts of keeping waterways healthy. Healthy waterways are an important part of a healthy environment. Growth and land use intensification can negatively impact on the water quality and the ecological health of our natural waterways. For water quality in our waterways, wetlands and estuaries to improve over time good stormwater management such as timely renewals, appropriate maintenance regimes and public education on "where stormwater goes" is required by everyone in the community. To mitigate the effects of flooding, the activity aims to address the physical constraints that cause inundation and plan for the effects of changing natural hazards through climate change. Based on the financially constrained funding model, Council will be meeting its requirements for offsetting the effects on waterway degradation due to growth and the treatment of existing urban discharges within 2 priority catchments. Council will not be making any serious inroads into improving waterway health from existing and brownfield development.
Primary Outcome 2	Modern and robust city infrastructure and community facilities	A key objective of this activity is to limit the effects of flooding on homes and Council infrastructure and ensure lifeline routes are available during an emergency response. Through careful planning, consultation and prudent financial investment, Council aspires to ensure Christchurch is well prepared for the impacts and consequences of natural hazards and can respond and recover quickly. This will include the goal that Council infrastructure is able to function following expected natural hazard events. This will mean that the stormwater system will need to adapt as the climate changes, the sea rises and more frequent, more intense storms and rainfall affect the city. There is limited allowance within the 10 years of the Infrastructure Strategy to carry out backlog floodplain mitigation works, with 5 projects funded within the first 3 years of the LTP, and an additional 9 projects commencing within the 10 years of the LTP from a list of 16 projects identified to be carried out. This will leave several areas identified by Council staff not able to meet Councils nominated levels of service and vulnerable to flooding within the coming 10 year period.

	Community Outcomes	Describe how the activity effects the Community Outcome
Secondary Outcome 1	Safe and healthy communities	Around 30% of Christchurch residents live in areas at risk of flooding or coastal inundation. If this activity were not conducted then flooding could be expected to dramatically worsen across the city from ongoing wear and tear on existing networks, earthquake damage effects and climate change. Significant social harm and degradation could occur without flood protection and control works. There are thousands of homes and properties at risk of current and future flooding and coastal inundation across our low lying city. The ongoing health and wellbeing of our residents is supported by this activity. This activity is typically delivered concurrently with the Stormwater Drainage activity by using informed and proactive approaches to natural hazard risks. The city wide model used for predicting flooding in the city only consider the current level of development i.e. the backlog infrastructure upgrades required to mitigate flooding due to current levels of the city's development. There has been no consideration for creating any flood plain mitigation projects to mitigate the effects of future levels of development e.g. inner city intensification or for the effects of rising ground water or sea levels on property flooding. Therefore, as discussed in the "Modern and robust city infrastructure and community facilities " section above, with the limited amount of funding within the 10 year infrastructure funding period identified to mitigate the backlog flooding areas, Council may find itself in the position that there is a "bow wave" of expenditure required to offset the effects of climate change induced flooding. With not funding the known sites within the 10 year strategy, Council may be creating intergenerational debt for resolving flooding in our communities. The Financially Constrained Option for the 10 years of the LTP of $1,381M will deliver approximately 47% of the $2,609M budget that was requested as the Recommended Option, translating into a reduced number of projects to address the effects of flooding on our communities.
Secondary Outcome 2	Unique landscapes and indigenous biodiversity are valued and stewardship exercised	For an ecosystem to be healthy, there needs to be natural diversity in landscapes, waterways, flora and fauna species. Urbanisation and development has destroyed much of the natural landscape variability whether by heavily modifying and draining the swamps and estuarine areas, removing the native tree from the city areas or the Port Hills, and minimising the salt marsh areas. This combined with the pollution from urban run-off and industrial discharges into the rivers has drastically affected flora and fauna species. To regain a connection with a healthy environment and public well-being, it is essential that Council recognises that there are many unique landscapes needing to be protected, maintain and extended along with its indigenous biodiversity. Greening of our infrastructure can bring ecosystems right to the residents of our city, making it a much more pleasant place to live. As communities see and enjoy living with the natural environment across their city, the unique landscapes and indigenous biodiversity will become truly valued. This community outcome cannot be met just by this activity, it will require a cross-activity relationship with the Parks, Transport, Strategy and the Biodiversity team.

	Community Outcomes	Describe how the activity effects the Community Outcome
		By conserving and improving our landscapes and biodiversity which are taonga, mahinga kai will be enhanced. This can be achieved over time by ensuring that good stormwater management practice is carried out by everyone in the community. The importance of biodiversity is recognised as an important part of improving the quality of our water bodies. A number of new improvement projects, and increases to funding on existing improvement work programmes have been proposed under the Recommended Funding Option. The nominated projects are now not proposed to occur until year 4 of the LTP, and the work programme will not be funded within the 10 year Infrastructure Strategy. This will result in Council not being able to provide the improvements to biodiversity to waterways as originally planned. There will still be benefits attained though some of the existing CAPEX projects for new treatment and flood mitigation works.

3. Strategic Priorities – how does this activity support progress on our priorities?

Strategic Priorities	Activity Responses
Enabling active and connected communities to own their future	As a member of the Community Waterways Partnership Charter, Council work with other members to improve waterways, through delivery of education and awareness programmes to get the wider community working together to protect and improve waterways. As part of the activities that Council is responsible for, consultation is undertaken at various levels (depending on the importance of the decision needed) for all of the strategic and financial directions in the stormwater activity. The community has the opportunity to submit on all critical decisions to ensure they have a say with the planning of their own futures. Engaging with the community for joint activities such as planting days and community education is essential. The more public willing to interact with the water ways running within their properties and communities, the more likely waterway encroachment trends will start to reverse, and the habit of protection and enhancement will become normal.
Meeting the challenge of climate change through every means available	This activity is critical to managing the effects of climate change for the district, which are projected to worsen over time. While the Land Drainage teams have appreciation for the effects of some aspects of climate change, additional work is required to better understand the changing risks and what that means to the asset base in the future.

Strategic Priorities	Activity Responses
	Increased OPEX investment is required to gain a better understanding of risks and to better inform CAPEX decisions for the short, medium and long term. How the asset base itself will be affected by ground water elevation, sea level rise, sand accretion and changes to rainfall patterns, frequencies and intensities needs to be understood, as do the changing conditions the system will need to manage. Even if assets are perfectly maintained, LOS will be at risk in future due to insufficient capacity as a result of more intense rainfall, greater infiltration and decreased hydraulic gradient across the city to the sea. Designs to maximise the use of natural systems and minimise pumping are crucial, in order to carry out the activity with minimum emissions and increased resilience. The challenge is designing all facilities and assets to benefit the six-values approach for waterways while at the same time maximising their ability to mitigate the extremes of climate change. Such understanding is essential in developing and implementing strategies which relate CAPEX investments in assets to the threats of climate change impacts such as the effects of rising sea level on coastal infrastructure. This will enable prudent levels of infrastructure investment in areas under threat, assist in adaptation planning and resilience building, and avoid wasted investment in assets which will become redundant through climate change effects well before the end of their economic life. Council is actively progressing the Coastal Hazard Adaptation Planning works which will provide a dynamic adaptive pathway for making decisions for the communities given the uncertainty of the magnitude and timing of the effects of climate change. Given the scope of the project, it is unlikely that the process will be sufficiently advanced to assist with providing any guidance for infrastructure decision making within areas affected by coastal hazards. Therefore a suitable Council endorsed policy will be required to assist with asset renewal and maintenance decisions will be required to prevent wasting money through maladaptation or indecision. The use of low impact and sensitive urban designs used in Auckland and internationally should be further investigated to ensure we are moving forward as a modern city in a way that greatly benefits the wellbeing of city residents. Using green infrastructure also has the advantage of mitigating greenhouse gas emissions and enhancing biodiversity as well as managing flood risk. For capital works, guidance on carbon costing is needed to inform cost-effective minimisation of embedded carbon in the council's assets. Considering the whole-of-life emissions of assets, and minimising embedded carbon at the construction stage, has the potential to significantly reduce the overall greenhouse gases attributable to council and will contribute towards meeting council and city emissions targets. The funding envelope limits the amount of climate change works that are implemented. The projects related to Coastal Hazard Adaption Planning have all been pushed out beyond the first 10 years of the LTP. Council will be unable to make any major inroads into adaptation planning and implementation.

Strategic Priorities	Activity Responses
Ensuring a high quality drinking water supply that is safe and sustainable	By ensuring that all stormwater and flood protection infrastructure is maintained and operated to the correct standard and renewed at the optimum time, then the quantity of urban run-off contaminants entering the surface water system which may risk the quality of the drinking water supply in the shallow aquifers. This activity contributes to keeping wellheads and other water supply assets safe from damaging floodwaters.
Accelerating the momentum the city needs	Councils Land Drainage Planning teams are working with appropriate Council Strategic documents (such as the Integrated Water Strategy and various Stormwater Management Plans) to ensure that stormwater pipe upgrades and the provision of treatment/storage facilities are planned and/or provided ahead of development to prevent any delays. Council plans for the required funding many years in advance to ensure the funding is available when it is required. The proposed funding options will allow Council to meet the requirements of meeting development and growth unless there is any unforeseeable changes such as an increase in development costs, increased level of development etc. There will be limited opportunities to provide improvements to water body health or biodiversity. Climate change planning will progress for Coastal Hazard Adaptation, although the results of the project will not be realised in time to guide any works within the first 3 years of the LTP period.
Ensuring rates are affordable and sustainable	To meet the undertakings offered by Council to ensure that rates increases are minimised within the financially difficult times of the Covid-19 “fall-out”, the funding available for the activity has been capped to meet this Strategic Priority. This results in a difficult balancing act to manage the needs of the community with the ongoing needs of the activity. To therefore meet this priority, there will be reductions to some Levels of Service and the creation of some longer term generational “debt” through delaying renewal works, flood mitigation projects and climate change mitigation/adaptation projects. There is a risk that that there will be an increase in OPEX expenditure to cover the shortfall in renewals funding i.e. the assets will need on-going repair rather than being replaced.

4. Increasing Resilience

This Activity includes the management of the stormwater and waterways network to mitigate issues with the quantity of run-off which may negatively affect private and public property and the quality of the run-off that gets discharged into the receiving environment. This encompasses the "health" of the network and the ability of the network to respond and recover from acute and chronic environmental events such as flood, earthquake, tsunami and climate change effects.

Through the use of Stormwater Management Plans (SMPs) across Christchurch City and the settlements of Banks Peninsula, Council is implementing technical documents that not only outline how Council will comply with Environment Canterbury Discharge Consent conditions, but also how Council will meet the requirements of urban growth with consideration to some climate change responses (i.e. rainfall and tidal changes). Through the implementation of these SMP's by constructing treatment and storage facilities, increasing network capacity where identified, the construction of structures to manage flows etc, Council is building resilience into its networks to better manage those acute and chronic risks that may affect all residents over time. Please see Section 7.3.1 - Asset Planning Strategies of the AMP for more detail on this.

A programme of flood mitigation structures has been designed and constructed in the upper Ōpāwaho-Heathcote area to mitigate some of the effects of climate change on increased quantity or flood flows into the Ōpāwaho-Heathcote River. There is some automation included which will increase the ability to modify the operation over time as the rainfall patterns or land use in the area changes, increasing the resilience of these structures. There is more detail listed in the project brief below.

Council is undertaking investigation works to better understand the effects of climate change on our coastal and urban communities to provide guidance to the elected members for dealing with issues such as coastal adaptation. While OPEX funding is limited for procuring some of the necessary studies, the Natural Environment Team (from within the Strategic Policy team), along with the Stormwater and Waterways Planning team are also utilising resource from other government agencies to provide a shared and consistent investigation base. The OPEX funding for projects such as "LDRP 97 - Multi-Risk Hazard Analysis" (as detailed below) are essential for ensuing that future changes to planning/policy guidance and construction of new and renewal of existing infrastructure is carried out with the best available data. This will ensure that appropriate future investment is made without maladaptation, locking in pathways of future investment that will eventually lead to greater damage and losses to assets, buildings, communities and people. There are significant associated reputational and financial risks if this is not well managed, as well as possible legal repercussions.

One example in increasing resilience is through the delivery of the Ōtākaro Avon River Corridor (OARC) Regeneration Plan. This plan identifies setting back of stopbanks to make more room for the river and this also creates space for natural migration of estuarine habitat up the river. This will reduce the pressure on the stopbanks and our treasured estuarine ecosystems, making them more resilient to increases in sea level.

The flood protection and control works activity responds to natural hazard risks by

- Addressing impacts of climate change, sea level rise, other natural hazards in 30-Year Infrastructure Strategy and in various Stormwater Management Plans; and
- factoring resilience in capital projects and facility and flood protection works replacement programmes that have to look well beyond the 30-Year Infrastructure time horizon

The following projects and programmes are examples of current projects within the Asset Management Plan programme where Council is building resilience into our assets. These projects will position Christchurch to be better prepared for, and more resilient to, the disruptions identified in the *"Resilient Greater Christchurch Plan"* as most likely to impact community wellbeing.

LDRP 97 Multi-Hazard Risk Analysis:

Project Description	Council is currently undertaking an assessment of future flooding risk along the lower rivers, the Ihutai Avon-Heathcote Estuary and Sumner. This considers a changing climate, chronic stressors (e.g. rising groundwater) and other natural hazard shocks (e.g. earthquakes and tsunami) and explores the significance of co-located, co-incidental and cascading hazards. The purpose is to identify potential floodplain management approaches within a multi-hazard context.
Scope and Expected Impact	This project will improve resilience through building a more complete understanding of natural hazards, risks and intervention options. The project will consider both engineering and non-engineering intervention options for floodplain management and is closely linked with the coastal hazard adaptation planning work that is currently underway. It will not consider options for mitigation of other hazards. The project is planned to be delivered in stages for individual catchments over the next 3 years and will be used to inform adaptation planning.
The Case for Change	This project will directly inform adaptation planning which will inform Council's long term approach to manage flood risk.
The Resilience Dividend	The resilience dividend is very high with this project as it strengthens community understanding of risks, is the next step in delivery of risk reduction measures and allows for better optimisation of our future network infrastructure. This project directly leads to building understanding of natural hazard risks and works towards safe waterways.
Further Opportunities	There is a logical extension to the project to consider other non-flood hazard interventions to further strengthen infrastructure and planning decisions e.g. planting of the hillside catchments for mitigating sediment mobilisation, policy changes to require source control on all properties.

Monitoring of baseline indicators

Data collection and monitoring of background conditions.	Ongoing monitoring of tide levels, river flows, rain gauges and shallow groundwater provides a baseline from which to recognise how the climate is changing and to identify triggers and thresholds that can be used to signal the need for a change in adaptive pathways at appropriate times. Data can also be used to calibrate flood models and provide projections for future conditions. In the short term, monitoring can provide an indication of antecedent conditions ahead of incoming storms, helping to inform where flooding may occur and giving time to make preparations for response.

These projects will position Christchurch to be better prepared for, and more resilient to, the disruptions identified in the Resilient Greater Christchurch Plan as most likely to impact community wellbeing.

5. Specify Levels of Service

LOS number	C/M[1]	Performance Measures Levels of Service (LOS)	Historic Performance Trends	Benchmarks	Future Performance Targets				Method of Measurement	Community Outcome
					Year 1 2021/22	Year 2 2022/23	Year 3 2023/24	Year 10 2030/31		
Reduce risk of flooding to property and dwellings during extreme rain events										
14.1.6.1	C	Manage the risk of flooding to property and dwellings during extreme rain events: Annual reduction in the modelled number of properties predicted to be at risk of habitable floor level flooding of the primary dwelling in a 2% AEP Design Rainfall Event of duration 2 hours or greater excluding flooding that arises solely from private drainage	Properties per annum 2019/20: 44 2018/19: 57		≥0 properties per annum on a rolling three-year average	≥0 properties per annum on a rolling three-year average	≥0 properties per annum on a rolling three-year average	≥0 properties per annum on a rolling three-year average	Flood Models	Safe and healthy communities
Implement Flood plain Management Programme works to reduce flooding										
14.1.6.2	M	Manage the risk of flooding to property and dwellings during extreme rain events: Catchment models for the city represent the current network	2019/20: 95% 2018/19: 90%		95% of operational network 300mm diameter or greater is included in model	95.5% of operational network 300mm diameter or greater is included in model	96% of operational network 300mm diameter or greater is included in model	98.5% of operational network 300mm diameter or greater is included in model	GIS and Model (measured as a percentage of network within each model domain)	Safe and healthy communities

[1] C/M – Community or Management level of service (LOS)
Community LOS - Previously known as LTP LOS. These are LOS that are community facing and will be published in our Statement of Service Provision.
Management LOS - Previously known as Non-LTP LOS. These are LOS that are measured in the organisation to ensure service delivery.

LOS number	C/M[1]	Performance Measures Levels of Service (LOS)	Historic Performance Trends	Benchmarks	Future Performance Targets				Method of Measurement	Community Outcome
					Year 1 2021/22	Year 2 2022/23	Year 3 2023/24	Year 10 2030/31		
14.1.6.9	M	Manage the risk of flooding to property and dwellings during extreme rain events: Catchment models are updated and run to represent existing development (ED) and maximum probable development (MPD) flooding; Ōtākaro Avon River and other models at required intervals not greater than every 3 years			Ōtākaro Avon River	Ōpāwaho Heathcote River	Huritini Halswell River	Pūharakekenui Styx River, Sumner	Flood Models	Safe and healthy communities
Major flood protection and control works are maintained, repaired and renewed to key standards										
14.1.6.3	C	Manage the risk of flooding to property and dwellings during extreme rain events: Number of surface water network monitoring sites (flow, level or rainfall)	2019/20:2 2018/19:9		+2 sites (73)	+2 sites (75)	+2 sites (77)	+2 sites (95)	Contract Reporting and GIS	Safe and healthy communities
14.1.3.2	C	Major flood protection and control works are maintained, repaired and renewed to key standards: Stopbank crest surveys are carried out at required intervals	2018/19:Yes 2019/20:Yes 2017/18:Yes 2016/17:Yes 2015/16:Yes		Annually	Annually	Annually	Annually	Annual Survey *Department of Internal Affairs, Flood Protection & Control non- financial performance measure number 1*	Modern and robust city infrastructure and community facilities.
14.1.3.1	C	Major flood protection and control works are maintained, repaired and renewed to key standards: Cross sectional surveys of selective waterways are carried out at required intervals	2019/20: Yes 2018/19: Yes 2017/18:Yes 2016/17:Yes 2015/16:Yes		2-5 yearly or as required	2-5 yearly or as required	2-5 yearly or as required	2-5 yearly or as required	5 year survey verification *Department of Internal Affairs, Flood Protection & Control non- financial performance measure number 1*	Modern and robust city infrastructure and community facilities
14.1.3.3	C	Major flood protection and control works are maintained, repaired and renewed to key standards:	2019/20:100% 2018/19:100% 2015/16:		75%	75%	80%	100%	Bi-annual survey of critical stop banks. Target is measured as a proportion of actual stop bank length remediated out of the total non-	Modern and robust city infrastructure and community facilities

LOS number	C/M[1]	Performance Measures Levels of Service (LOS)	Historic Performance Trends	Benchmarks	Future Performance Targets				Method of Measurement	Community Outcome
					Year 1 2021/22	Year 2 2022/23	Year 3 2023/24	Year 10 2030/31		
		Stopbanks identified as not meeting the original design requirements for condition and/or height are repaired within 9 months							compliant length of stopbank requiring remediation within the required timescale. *Department of Internal Affairs, Flood Protection & Control non- financial performance measure number 1*	
14.1.8	M	Stormwater attenuation facilities are compliant with New Zealand Dam Safety Guidelines 2015: % of Stormwater Attenuation Facilities assessed and compliant with New Zealand Dam Safety Guidelines 2015	New measure		0%	0%	0%	0%	Ensure that all stormwater retention devices that can hold a volume greater than 20,000m^3 of water shall have a NZSOLD Consequence Assessment carried out, and if deemed appropriate a Potential Impact assessment with relevant assessment and safety reports completed with inspections and reviews being undertaken.	Safe and healthy communities
Waterways are clean and pollution is minimised										
14.1.7.1	M	Reduce pollution of waterbodies from discharge of urban contaminants to waterways: Annual rolling average reduction in the discharge of zinc/copper/Total Suspended Solids (TSS) to be equal or greater than that required to meet the reduction set in the Comprehensive Stormwater Network Discharge Consent (CSNDC) for 2023 and 2028, derived through contaminant load reduction modelling of the stormwater treatment facilities which have been installed	New measurement method		Pass	Pass	Pass	Pass	Annual modelling of reduction of contaminant load in stormwater discharges, and the determination of an annual rolling average reduction for comparison with the trend required to meet the CSNDC requirement for each of the specified years of 2023 and 2028.	Healthy water bodies

LOS number	C/M[1]	Performance Measures Levels of Service (LOS)	Historic Performance Trends	Benchmarks	Future Performance Targets				Method of Measurement	Community Outcome
					Year 1 2021/22	Year 2 2022/23	Year 3 2023/24	Year 10 2030/31		
14.1.7.5	M	Reduce stormwater contaminants in receiving waterways: Average annual of retrofit stormwater treatment to existing or brownfield development areas			≥10Ha per year	≥10Ha per year	≥10Ha per year	≥10Ha per year	5 year rolling average existing residential area retrofitted with stormwater treatment infrastructure	Healthy water bodies
14.1.7.4	M	Reduce pollution from discharge of industrial contaminants to waterways: Auditing of stormwater systems on industrial premises			≥15 per year	≥15 per year	≥15 per year	≥16 per year	Number of industrial premises audited annually	Healthy water bodies

6. Does this Activity Plan need to change as a result of a Service Delivery Review (S17A)?

A Section 17A Service Delivery Review (S17A) is a legal requirement under the Local Government Act and determines whether the existing means for delivering a service remains the most efficient, effective and appropriate approach. The legislation requires that a S17A Service Delivery Review should periodically assess:

"The cost-effectiveness of current arrangements for meeting the needs of communities within its district or region for good quality local infrastructure, local public services, and performance of regulatory functions".

A review of flood protection and control works activities was initiated in July 2109 for two key reasons:

- the expiry of the existing 3 waters maintenance contracts and a desire to go out to market for these services
- to enable Council to be prepared for the outcomes of the Department of Internal Affairs' 3 Waters review

The section 17A review was completed in June 2020 and presented to Council in August 2020. The review confirmed that there were underlying challenges with the status quo. Central Government's water reform programme gained significant momentum in mid-2020 and Council agreed to sign a non-binding Memorandum of Understanding with the Crown at the same extra ordinary Council meeting in August 2020 regarding water reform. Due to the increasing pace of water reform, the status quo was the recommended way forward for the section 17A review. The reform is going to lead to significant changes to 3-waters service delivery across the country and adding in further structural change during the reform process was not seen to add value to Christchurch.

The Government has announced a new national water regulator and is reviewing how to improve the supply arrangements of drinking water, wastewater and stormwater, including financing provisions and decision-making capability. Any changes implemented at a national level will have an impact on Council's service delivery.

Given the uncertainty in terms of the outcomes and timing water reform, it is difficult to predict the impacts on the flood protection and control works activity service delivery structure. The Asset Management Plan is prepared on a “business as usual” assumption. Potential outcomes include:

- Regional or larger asset owning 2 waters entity

Regional, top of the South Island or full South Island entity that includes storm water and waterways

7. What levels of service changed from the LTP 2018-28 and why?

Modified

LTP 2018-28			LTP 2021-31				Options for consultation and engagement
LOS ID	LOS Description	Target (FY17/18)	LOS ID	LOS Description	Target (FY21/19)	Rationale	
14.1.7.1	Reduce pollution from discharge of urban contaminants to waterways	Average annual reduction in zinc measured through contaminant load modelling supported by water quality testing at priority catchments: >1%	14.1.7.1	Reduce stormwater contaminants in receiving waterways	Annual rolling average reduction in the discharge of zinc/copper/Total Suspended Solids (TSS) to be equal or greater than that required to meet the reduction set in the Comprehensive Stormwater Network Discharge Consent (CSNDC) for 2023 and 2028, derived through contaminant load reduction modelling of the stormwater treatment facilities which have been installed.	This new level of service is better aligned with the conditions of the Comprehensive Stormwater Network Discharge Consent	Management Level of service - None required
14.1.6.1	Reduce risk of flooding to property and dwellings during extreme rain events	Annual reduction in the modelled number of properties predicted to be at risk of habitable floor level flooding of the primary dwelling in a 2% AEP Design Rainfall Event of duration greater than 1.5 hours excluding flooding that arises solely from private drainage: 50 properties	14.1.6.1	Manage the risk of flooding to property and dwellings during extreme rain events	Annual reduction in the modelled number of properties predicted to be at risk of habitable floor level flooding of the primary dwelling : ≥0 properties per annum on a rolling three-year average	Makes the target more measureable with an average per annum target. The target is altered to match the level of service that could be obtained with the Recommended Funding Option proposed in the AMP. The duration rain event has been changed based on modelling work completed since the previous level of service was written.	None required
14.1.6.2	Reduce risk of flooding to property and dwellings during	Catchment models represent the current network (measured as a percentage of network):	14.1.6.2	Manage the risk of flooding to property and	Catchment models for the city represent the current network (measured as a percentage of network within each model	Minor rewording of target to better represent the current status of the hydraulic models and the time taken to build	Management Level of service - None required

LTP 2018-28			LTP 2021-31				Options for consultation and engagement
LOS ID	LOS Description	Target (FY17/18)	LOS ID	LOS Description	Target (FY21/19)	Rationale	
	extreme rain events	99% of operational network greater than 300mm diameter or greater is included in model		dwellings during extreme rain events	domain): 95% of operational network 300mm diameter or greater is included in model	them based on recent experience, as well as a better definition on the sizing of the pipework to be modelled	
14.1.6.3	Reduce risk of flooding to property and dwellings during extreme rain events	Number of monitoring sites (flow, level, rainfall): +2 (73)	14.1.6.3	Manage the risk of flooding to property and dwellings during extreme rain events	Number of surface water network monitoring sites (flow, level or rainfall): +2 (73)	The target levels have been updated with the current number of monitoring sites, and new future target numbers	Target modified in line with historic performance levels. Consultation not required.
14.1.3.3	Major flood protection and control works are maintained, repaired and renewed to key standards	Stopbanks identified as not meeting the original design requirements for condition and/or height are repaired within 9 months.: 75%	14.1.3.3	Major flood protection and control works are maintained, repaired and renewed to key standards	2021/22:75% 2022/23:75% 2023/24:80% 2030/31:100%	The target levels have been increased to align with the importance on maintaining the stop bank integrity given the risk to life in the event of a failure. Wording changes to clarify the intent of the level of service	Target moved in line with historic performance levels. Consultation not required.

LOS number	L/N	Performance Measures Levels of Service (LOS)	Historic Performance Trends	Bench marks	Future Performance Targets				Method of Measurement	Rationale for change	Options for consultation and engagement
					Year 1 2021/22	Year 2 2022/23	Year 3 2023/24	Year 10 2030/31			
New measures											
14.1.6.9	M	Manage the risk of flooding to property and dwellings during extreme rain events			Catchment models are updated and run to represent existing development (ED) and maximum probable development (MPD) flooding: Ōtākaro Avon River and other models at required intervals not greater than every 3 years: Ōtākaro Avon River	Ōpāwaho Heathcote River	Huritini Halswell River	Pūharakekenui Styx River, Sumner	Flood Models	New level of service to ensure that Council completes, improves and maintains its hydraulic models to ensure that the well-being of the communities are met by using the most current and up to date flood modelling technology.	New measure for existing service. Consultation not required.
14.1.7.5	M	Reduce stormwater contaminants in receiving waterways			Average annual of retrofit stormwater treatment to existing or brownfield development areas: ≥10Ha per year	≥10	≥10	≥10	5 year rolling average existing residential area retrofitted with stormwater treatment infrastructure	New level of service which ensures council continues to provide improvements to stormwater discharges into waterways in already developed areas.	Management Level of service - None required None required
14.1.7.4	M	Reduce pollution from discharge of industrial contaminants to waterways			Auditing of stormwater systems on industrial premises: ≥15 per year	≥15	≥15	≥16	Number of industrial premises audited annually	This new level of service is better aligned with the conditions of the Comprehensive Stormwater Network Discharge Consent	Management Level of service - None required None required

14.1.8	M	Stormwater attenuation facilities are compliant with New Zealand Dam Safety Guidelines 2015	New measure		% of Stormwater Attenuation Facilities assessed and compliant with New Zealand Dam Safety Guidelines 2015: 0%	0%	0%	0%	Ensure that all stormwater retention devices that can hold a volume greater than 20,000m^3 of water shall have a NZSOLD Consequence Assessment carried out, and if deemed appropriate a Potential Impact assessment with relevant assessment and safety reports completed with inspections and reviews being undertaken	This new measure is included to acknowledge Councils responsibility to ensure public wellbeing in the event that there is a fault with a major stormwater facility causing a failure similar to that of a dam breach. Amendment to proposed target from draft LTP (15%/30%/45%/100%) to 0% across the 10-year period, in the final LTP. The change to the Future Performance Targets is required as the OPEX funding requested to meet the for Level of Service 14.1.8 – "*Stormwater attenuation facilities are compliant with New Zealand Dam Safety Guidelines 2015"* targets has not been provided. Advice received April 2021 confirmed changes to legislation around Dam Classification (details to be confirmed by Central Government in late 2021, including a 2 year implementation period). The financial figures proposed in draft LTP (late 2020) allowed for a 5 year period and may have underestimated the number of facilities that council has that will be classified as "dams" based on the April advice on how dams are to be classified.	Management Level of service - None required

LOS number	L/N	Performance Measures Levels of Service (LOS)	Historic Performance Trends	Bench marks	Future Performance Targets				Method of Measurement	Rationale for change	Options for consultation and engagement
					Year 1 2021/22	Year 2 2022/23	Year 3 2023/24	Year 10 2030/31			
										Until some initial investigation work is done, the final on-going cost is unknown.	
14.1.6.1	M	Manage the risk of flooding to property and dwellings during extreme rain events			Catchment models are updated and run to represent existing development (ED) and maximum probable development (MPD) flooding at required intervals not greater than every 2 years. Target: completion of the Styx River Catchment Model	Updates to Avon, Heathcote and Sumner models	14.1.6.1	M	Manage the risk of flooding to property and dwellings during extreme rain events	The inclusion of this LoS is to ensure that the models prepared and maintained by Council are “future proofed” by considering future development levels as proposed in Council documents such as the District Plan, rather than levels that represent current development – as needed to verify calibration etc.	Management Level of service - None required

LOS number	L/N	Performance Measures Levels of Service (LOS)	Historic Performance Trends	Bench marks	Future Performance Targets				Method of Measurement	Rationale for change	Options for consultation and engagement
					Year 1 2021/22	Year 2 2022/23	Year 3 2023/24	Year 10 2030/31			
Removed											
14.1.7.3	M	Reduce pollution from discharge of urban contaminants to waterways			Average annual reduction in copper measured through contaminant load modelling supported by water quality testing at priority catchments: >2%				Contaminant Load Modelling (CLM) supported by monthly water quality monitoring data in priority catchments.	This item was removed and replaced with new levels of service that better represent the water quality outcomes consented to be met under the Comprehensive Stormwater Network Discharge Consent conditions.	Management Level of service - None required
14.1.5	M	Implement Land Drainage Recovery Programme works to reduce flooding			Delivery of works to meet floodplain management plans and remaining high priority plans: Start delivery of Avon Floodplain management plan				Council's capital reporting system	This item was removed as the outcome can be met under the Comprehensive Stormwater Network Discharge Consent conditions requirements for meeting the stormwater quantity components of the various Stormwater Management Plans.	Management Level of service - None required

8. How will the assets be managed to deliver the services?

Assets under this activity fall into 8 groups as follows (refer to table 7.1, page 81 of the Asset Management Plan (AMP);

1. Reticulation
2. Waterway lining
3. Open waterways
4. Open waterway structures
5. Hydrometrics
6. Pump stations
7. Flood protection structures
8. Treatment and storage facilities

The current 2020 Valuation found the total value (optimised replacement cost) of the assets covered by this AMP to be $2.12 Billion. Over 86% of this value is associated with the 935km of pipes and 28,000 nodes (inlets, outlets, manholes etc.) that make up the reticulation network.

As part of an increase in Asset Maturity required by Council, the renewal programming of assets also considers the importance of "Critical Assets". Critical assets are those whose failure would likely result in a significant disruption in service and financial, environment and/or social cost. Together with asset condition data (where derived by the limited CCTV data of pipes held, the more comprehensive but not current 2016 LDRP 98 Open Channels Condition Assessment for waterways or age data for pumping stations and facilities) helps prioritise renewals profiles for each asset class.

To plan for new assets for growth, upgrades for backlog due to historic land use changes or as identified by a risk assessment, the Planning department relies on strategy documents such as Te Wai Ora o Tane - Integrated Water Strategy document and Stormwater Management Plans and the accompanying Implementation Plans being developed. Projects to create new assets are prioritised according to the programmes delivering Area Plans, the Urban Development Strategy and the Land Use Recovery Programme. It is these plans, programmes and strategies which drive the development of the asset creation plan. For more detail see Section 7.3.1. – Asset Planning Strategies (page 84) of the AMP.

Asset planning must also address the significant issues for infrastructure as defined in the 30-year planning horizon embodied within the Infrastructure Strategy

The other path that Council acquires assets is through the vesting of infrastructure provided as part of development. Capital works are carried out to adhere with Council's standard design, specification and construction documents. If the quality of construction is demonstrated through the provision of the required quality assurance records and compliance with Contract and/or Consent documents the hand over will be accepted. Once the asset has been accepted by Council, the asset information is captured within the asset management systems, and provision made for the appropriate operation and maintenance of the asset, according to the life-cycle plan for that asset.

Operation and maintenance costs associated with stormwater and waterway assets are considered to be associated with waterways, utilities or flood protection and are not further split between the asset groups listed above. There are three contracts for the maintenance and operation of the assets, with the main one being the "Land Drainage Maintenance Contract". The funding for the maintenance activities are a mixture of planned works and reactive works. This allows the greatest flexibility

for the funding provided and a mixture of works that are required to meet levels of service for amenity and public satisfaction as well as fault resolution. There is more detail on the organisation of the Operations and Maintenance service provision in Section 7.5 Operations and Maintenance of the AMP.

As discussed in Section 12 of this Activity Plan, there are a number of high level management risks to the business as well as more detail and specific risks related to the activity in Section 5.3.2 - Activity Specific Risks (page 54 of the AMP). In brief, some of the specific risks include: a historic underspend in renewals of infrastructure (including CCTV inspections) which could result in a major failure resulting in expensive replacement works, breach of consent conditions and reputation damage; insufficient CAPEX provision for better network understanding through model construction, insufficient OPEX funding for maintenance leading to deferrals, greater network degradation and higher capital replacement costs. The issues with insufficient funding for better understanding of the effects of climate change on the infrastructure, the ability to meet mandated carbon neutrality goals committed to by Council and the need for guidance from Council are also covered in the Risk Tables in this document and the AMP.

The funding cap will mean that some projects are delayed to beyond either the 3 year or the 10 year funding period or individual programme/project budgets have been reduced. There will be a resulting loss in ability to renew our asset base to match the rate in which we are “using it”, or provide an improvement above the current level of asset base i.e. we will not make any major inroads towards improving water course health or starting either investigative or physical works to prepare for climate change e.g. commencing hillside stabilisation (where practicable) to minimise sedimentation in our waterways due to erosion resulting from higher intensity rain events. We will be providing all works needed to meet growth in the city, as well as to meet the conditions of the Comprehensive Stormwater Network Discharge Consent.

Please note that at the time of writing, the Draft Infrastructure Strategy (IS) had not been completed to allow discussion on how the IS may affect the activity or the ability to deliver the service. It is anticipated that the main issues related to the activity will need to be updated to reflect the funding constraints that were bought in after the Draft IS was prepared.

9. What financial resources are needed?

Flood Protection & Control Works 000's	Annual Plan 2020/21	LTP 2021/22	LTP 2022/23	LTP 2023/24	LTP 2024/25	LTP 2025/26	LTP 2026/27	LTP 2027/28	LTP 2028/29	LTP 2029/30	LTP 2030/31
Activity Costs before Overheads by Service											
Flood Protection	2,073	3,492	3,643	3,824	4,030	4,263	4,510	4,786	5,071	5,375	5,693
	2,073	3,492	3,643	3,824	4,030	4,263	4,510	4,786	5,071	5,375	5,693
Activity Costs by Cost type											
Direct Operating Costs	181	22	22	23	23	24	24	25	26	26	27
Direct Maintenance Costs	775	2,232	2,370	2,522	2,697	2,896	3,108	3,350	3,601	3,867	4,148
Staff and Contract Personnel Costs	1,116	1,238	1,251	1,279	1,310	1,342	1,378	1,411	1,445	1,482	1,519
Other Activity Costs	-	-	-	-	-	-	-	-	-	-	-
	2,073	3,492	3,643	3,824	4,030	4,263	4,510	4,786	5,071	5,375	5,693
Activity Costs before Overheads	**2,073**	**3,492**	**3,643**	**3,824**	**4,030**	**4,263**	**4,510**	**4,786**	**5,071**	**5,375**	**5,693**
Overheads, Indirect and Other Costs	218	348	371	378	392	427	431	452	486	489	509
Depreciation	300	348	612	878	1,104	1,364	1,581	1,742	1,926	2,147	2,294
Debt Servicing and Interest	26	29	50	72	107	150	201	237	277	311	335
Total Activity Cost	**2,616**	**4,216**	**4,676**	**5,152**	**5,634**	**6,204**	**6,723**	**7,218**	**7,760**	**8,323**	**8,832**
Funded By:											
Fees and Charges	34	35	35	36	37	38	39	40	41	42	43
Cost Recoveries	-	-	-	-	-	-	-	-	-	-	-
Total Operational Revenue	**34**	**35**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**
Net Cost of Service	**2,582**	**4,181**	**4,641**	**5,116**	**5,597**	**6,166**	**6,684**	**7,178**	**7,720**	**8,281**	**8,789**
Funding Percentages:											
Rates	98.7%	99.2%	99.2%	99.3%	99.3%	99.4%	99.4%	99.4%	99.5%	99.5%	99.5%
Fees and Charges	1.3%	0.8%	0.8%	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%
Grants and Subsidies	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cost Recoveries	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Capital Expenditure											
Replace Existing Assets	907	4,427	2,579	1,483	1,169	1,029	1,091	1,249	4,478	1,275	1,693
Improve the Level of Service	8,704	17,019	21,837	11,810	17,290	28,777	25,851	23,795	24,111	22,572	30,138
Meet Additional Demand	14,764	22,441	14,571	17,648	26,853	20,949	16,867	17,792	17,745	20,815	16,653
Total Activity Capital	**24,376**	**43,886**	**38,988**	**30,941**	**45,312**	**50,754**	**43,809**	**42,836**	**46,334**	**44,662**	**48,485**

Funding Consideration

Local Government Act 2002 Section 101 Funding Consideration. The following tables are based on the financials from the previous page.

Funding Policy

Funding Principles

User-Pays	Exacerbator-Pays	Inter-Generational Equity	Separate Funding?
Low	**Low**	**Low**	**High**

The table above shows how Council has considered funding in relation to the Activity, using a simple high / medium / low scale:

- User-pays – the degree to which the Activity can be attributed to individuals or identifiable groups rather than the community as a whole;
- Exacerbator-pays – the degree to which the Activity is required as a result of the action (or inaction) of individuals or identifiable groups;
- Inter-generational equity – the degree to which benefits can be attributed to future periods; and
- Separate funding – the degree to which the costs and benefits justify separate funding for the Activity.

Where an Activity is paid for through a number of funding mechanisms, Council's practice is to meet its operating costs in the first instance from fees & charges and grants & subsidies (subject to the considerations outlined above). If the Activity requires further operational funding, this remainder is funded through rates.

This capital programme will be funded in accordance with the following principles:

Investment type	**Initial funding**	**Serviced and/or repaid by:**
• Renewal / replacement	• Rates and debt	• Rates
• Service Improvement and other assets	• Debt	• Rates
• Growth	• Debt and Development Contributions	• Rates and Development Contributions

Operating Cost Funding Policy

This table below shows Council's broad funding target for the Activity (i.e. how much is paid for by individuals / groups, and how much by the community as a whole), and the associated funding mechanism used (i.e. general rates, targeted rates, user charges, etc.). As the precise balance between individual / group and community funding may vary in practice (particularly for volumetric fees and charges), the funding target for each of the below tables is expressed in broad terms rather than specific percentages:

- Low = this source provides 0%-25% of the funding for this Activity;
- Medium = this source provides 25%-75% of the funding for this Activity; and
- High = this source provides 75%-100% of the funding for this Activity.

Funding Target		Funding mechanism	
Individual / Group	Community	Individual / Group	Community
Low	**High**	• **Fees & Charges (Low)**	**Targeted Rate on whole district(High)**

Capital Cost Funding Policy

Rates	Borrowing	DC s	Grants and Other
Low	**High**	**Low**	**-**

Please refer to Section 9 of the Asset Management Plan (AMP - pages 141-151) for a comprehensive breakdown and commentary on the CAPEX and OPEX expenditure applied for by the business as the Recommended Option, the funding cap for the 3 Waters and Waste Unit funding option, the funding approved through the LTP process and the financial projections and trends. Please note that due to the intrinsic link between the Stormwater Drainage and the Flood Protection & Control Works Activities, it is impracticable to separate the costs between them. Therefore, the financial figures below represent the funding for the whole Land Drainage activity not just the Flood Protection & Control Works portion. Several key figures are included below.
The charts below illustrate the planned spending over the next ten years, by spend type and by activity based on the funding provided (the Land Drainage portion allocated of the funding cap for 3 Waters and Waste). The graph on the left indicates the division of CAPEX expenditure which shows that the main portion of the funding that has been allocated to ensuring that Council meets the Comprehensive Stormwater Network Discharge Consent conditions and funding obligations for growth and development. Renewal works are still being underfunded due to the budget constraints and lower level of asset management maturity to better assess when assets require replacement. Flood Mitigation works – as indicated under "Total EQ Recovery" – is greatly reduced in this LTP following the completion of many of the LDRP/EQ Recovery projects and several years of relatively low rainfall. As in past LTP budgets, improvement works (e.g. waterway enhancement) remains a low funding priority given the competing needs for funding in the other areas of the Activity.

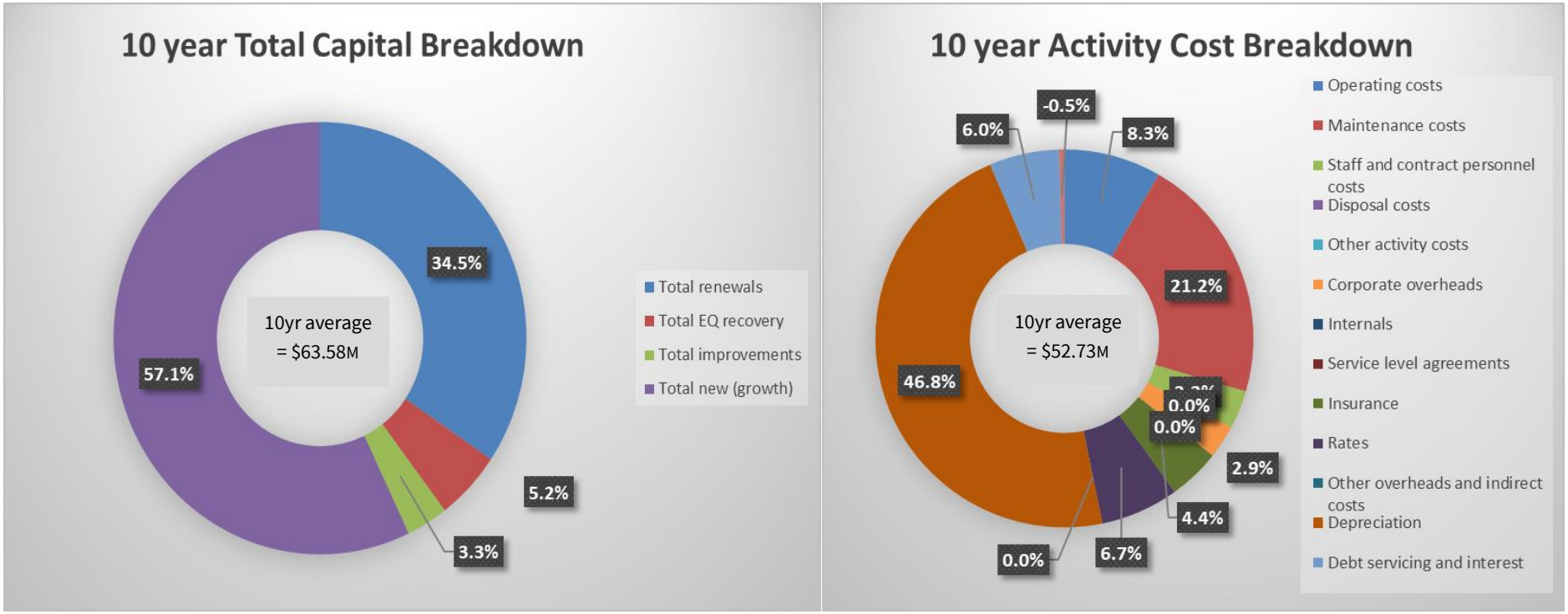

Figure 9.1: Forecast Land Drainage Activity Breakdown

The projected total cost of providing the necessary core services covered by this activity, including operations, maintenance, renewal, upgrade, improvement and earthquake recovery over the 10 years of the Long Term Plan (LTP) from Financial Year 21/22 to Financial Year 2031/32 (FY22 – FY32) is **$2,073 million**. The historic expenditure for the 10 year period FY2011 to FY2020 was **$609 million**.

The significant projected increase is primarily due addressing specialist projects such as the Otakaro Avon River Corridor works, backlog upgrades to address predicted flooding areas and programmes of work to start adaptation to climate change and environmental improvement/restoration works.

The actual funding allocated to providing the necessary core services covered by this Activity plan over the 10 years of the LTP is **$1,163million**. This is **56%** of the cost (as outlined above) to provide optimised asset management at the lowest lifecycle cost.

The allocated funding leaves an annual average shortfall of **$910 million** over the 10 years of the LTP (all values exclude inflation).

A snapshot of key financial indicators is shown below, including the historic ten year average and how this compares with the next LTP period.

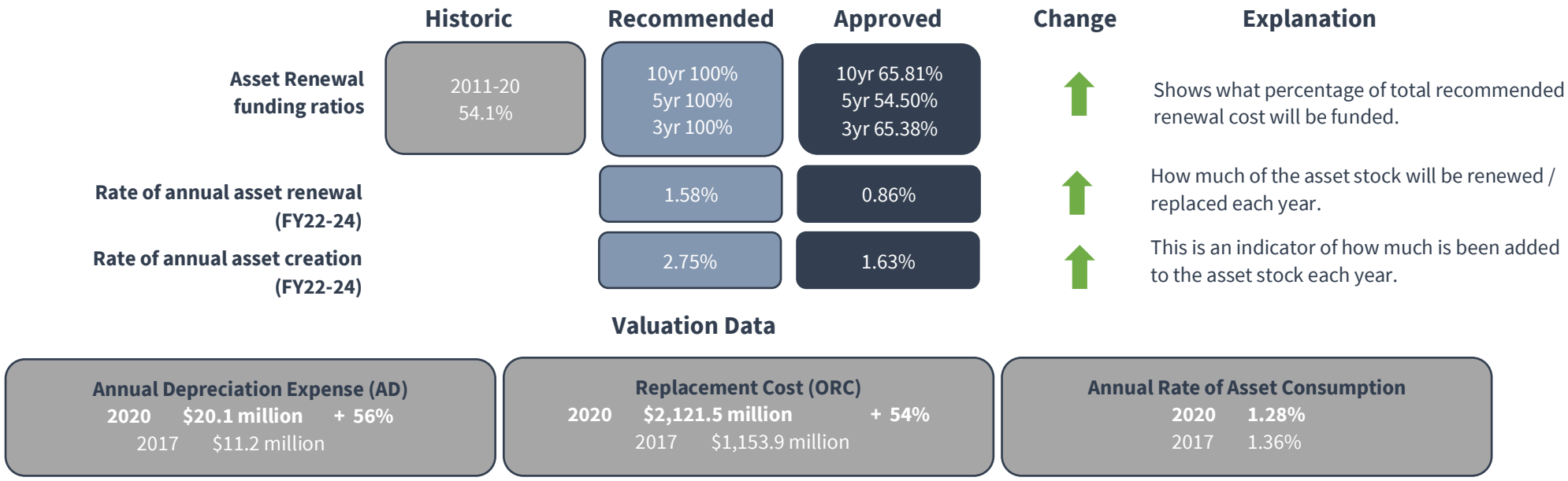

Figure 9.2: Financial Indicators

10. How much capital expenditure will be spent, on what category of asset, and what are the key capital projects for this activity?

Activity	Driver	ID	Project Name	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	Total
Flood Protection			**($000)**											
	Asset Renewal													
		336	SW Pump Station Reactive Renewals	131	135	138								404
		510	Programme - SW Treatment & Storage Facility Renewals			226	483	495	508	522	536	552	567	3,889
		37843	Programme - SW Pump & Storage Reactive Renewals				71	75	96	107	110	103	103	665
		41868	Programme - SW Pumping & Storage Civils & Structures Renewals								1,659	10		1,669
		41869	Programme - SW Pumping & Storage Instrumentation, Control & Automation Renewals (ICA)		699									699
		41870	Programme - SW Pumping & Storage Electrical Renewals								1,659	10		1,669
		41871	Programme - SW Pumping & Storage Mechanical Renewals							114		80	491	685
		48908	SW Health & Safety Renewals	16	5	5	3	3	5	6	5	5	5	58
		49963	SW Flood Protection Structure	175	158	81	83	85	87	89	88	91	93	1,030
		50349	SW Reactive Flood Protection Asset Renewals (excl PS's)		134	68	70	72	74	76	75	77	79	725
		60214	SW Mackinder Drainage Basin Renewal (Wigram Road)		266									266
		60327	Programme - SW Treatment Renewals		52	54	50	53	69	77	79	74	73	581
		60376	Programme - SW Quantity Modelling	254	268	518	409	246	253	259	267	274	282	3,030
		61639	SW Dudley Creek Earthquake Damaged Drain Linings	628	620									1,248
	Growth													
		369	Programme - SW Piped Systems - New Pipe Drains			177	537	550	565	580	596	613	630	4,248
		973	Programme - SW South West Waterways Detention & Treatment Facilities					426	1,204	3,660	3,219	3,114	630	12,253
		990	Programme - SW Open Water Systems - Open Drains Reactive Works		205	210	235	241	519	533	525	540	630	3,638
		2415	Programme - SW Management Plan on Pūharakekenui - Styx Waterway Detention & Treatment Facilities	5	5	5	5	426	1,782	6,980	11,041	14,990	12,908	48,147
		2679	SW Prestons & Clare Park	804										804
		32243	SW Eastman Sutherland and Hoon Hay Wetlands	11,278	4,720	3,430								19,428
		33975	SW Spreydon Lodge Infrastructure Provision Agreement (IPA)	5	220	2,500	3,703	1,180						7,608
		33976	SW Rossendale Infrastructure Provision Agreement (IPA)	842	512	1,048	1,804							4,206
		33980	SW Owaka Basin	249										249
		36063	SW Coxs - Quaifes Facility	250	563									813
		37343	SW Highsted Land Purchase & Construction of Waterways, Basins & Wetlands	2,446										2,446
		38022	SW Blakes Road Stormwater Facility (Works 1)	3,000	1,046	1,432	1,233							6,711
		38088	SW Gardiners Stormwater Facility	1,481	1,328									2,809
		38090	SW Greens Stormwater Facility	5	46	1,100	5,257	4,790	3,783					14,981

Activity	Driver	ID	Project Name	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	Total
		38091	SW Otukaikino Stormwater Facility	5	5	5	5	1,175	3,103	4,639				8,937
		41896	SW Styx Centre Cost Share	500	1,023	1,048								2,571
		41900	SW Creamery Ponds							204	1,284			1,488
		41999	Programme - SW Outer Christchurch Ōtukaikino Waterways Detention & Treatment Facilities			5	26	58	118	24	186	638	911	1,966
		44417	SW Guthries Thompson Basins					157	377	303				837
		44421	SW Kainga Basins		51	524	4,475	3,624	2,258					10,932
		44577	SW Highsted Styx Mill Reserve Wetland	105	563	1,258	3,084	5,503	2,310					12,823
		44585	SW Highsted Wetland, Highams Basin & Pūharakekenui - Styx Stream	1,050	3,637	2,874	4,958	1,994						14,513
		51269	SW Highfield Northwest Basins Infrastructure Provision Agreement (IPA)	109										109
		53890	SW Copper Ridge Private Development Agreement (PDA)	5	5	241								251
		56116	SW Snellings Drain Enhancement at Prestons South	5	326	1,121								1,452
		56179	SW Waterways & Wetlands Land Purchases Reactive Works	298	316	619	805	825	847	870	894	920	945	7,339
		60265	SW Quaifes Murphys Extended Detention Basin			52	725							777
	Level of Service Improvement													
		56950	SW South New Brighton Set-Back Bund (Bridge Street to Jetty)	349	104									453
		63038	Programme Flood and Stormwater Priority Works (OARC)	1,600	12,035	2,619	3,758	4,843	2,823	2,319	2,384	1,227	630	34,238
	Meeting Current Levels of Service													
		2416	Programme - SW Ōtākaro - Avon Waterway Detention & Treatment Facilities					209	3,105	4,353	3,576	5,508	8,786	25,537
		19398	Programme - SW Ōpāwaho - Heathcote Waterways Detention & Treatment Facilities				420	858	3,473	4,784	5,495	5,429	6,142	26,601
		33259	SW Wairarapa, Wai-iti & Tributaries (LDRP 510)			478	757	1,764	1,694					4,693
		35140	SW Mid Heathcote Bank Stabilisation (LDRP 518)	25	53									78
		41638	SW Upper Ōtākaro - Avon (LDRP 511)				192	1,214	979					2,385
		41899	SW Carrs Corridor (Stage 2)	150						624				774
		41987	SW Addington Brook & Riccarton Drain Filtration Devices	5	1,023	629	483	1,969	1,062	58	119	1,681	4,372	11,401
		41998	Programme - SW Estuary & Coastal Waterways Detention & Treatment Facilities			5	5	1,234	5,162	6,229	5,821	5,608	4,499	28,563
		42000	Programme - SW Banks Peninsula Settlements Waterways Detention & Treatment Facilities			5	5	58	118	121	1,249	1,648	1,512	4,716
		42008	Programme - SW Lyttelton Stormwater Improvements			273	449	920	1,014					2,656
		44056	SW Knights Drain Ponds (LDRP 509)	3,500	2,046	589								6,135
		45166	SW Southshore Emergency Bund (LDRP 525)	6										6

Activity	Driver	ID	Project Name	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	Total
		45455	SW Curletts Flood Storage (LDRP 526)	587										587
		46181	SW Heathcote Dredging (LDRP 527)	366	8									374
		48359	SW Hereford Street Pipe Renewals (Oxford Terrace to Colombo)	55										55
		48918	SW Upper Heathcote Storage Optimisation (LDRP 530)	1,153	532	524	537	550	565	580	596	613	630	6,280
		54802	SW Carrs Corridor Infrastructure Provision Agreement (Stage 1)	65										65
		56166	SW Waikākāriki - Horseshoe Lake Stormwater Treatment Facility (OARC) (Stage 1)	5	848	1,867	3,477	4,648	2,349					13,194
		56168	SW Open Drains Reactive Works	49	51	52								152
		56178	SW Piped Systems Reactive Works	49	51	52								152
		57718	SW Waikākāriki - Horseshoe Lake Stormwater Treatment Facility (OARC) (Stage 2)		5	47	1,074	1,651	1,694	4,674	4,769			13,914
		60036	SW Horners Kruses Land Purchase	4,316	358	52	54	2,239						7,019
		60235	SW Bishopdale Flood Management				295	4,312	1,129	29	30			5,795
		60241	SW Paparua Stream Flood Management					165	652	12	12			841
		60242	SW Riccarton Main Drain Flood Management									184		184
		60243	SW McCormacks Bay Flood Management			26	752	11	11					800
		60246	SW Lower Heathcote Valley Flood Management				107	768	11	12				898
		60247	SW Weir Place Flood Management			128	11	11						150
		60249	SW Greenpark Flood Management				460	11	11					482
		60251	SW Hillsborough Flood Management								60	307	1,663	2,030
		60252	SW Marion Street Flood Management									61	1,071	1,132
		60254	SW Briggs Road Flood Management										329	329
		60255	SW Remuera Avenue Flood Management				353	22						375
		60256	SW Redcliffs North Flood Management										189	189
		60355	Programme - SW Coastal Flood Management									307	315	622
		60386	SW FM Flood model build Styx and Citywide renewals	100	161	189	305							755
		61615	SW South New Brighton & Southshore Estuary Edge Flood Mitigation	500	818	2,095	1,718	1,321						6,452
		62924	SW Flood Management Avon River Flood Modelling (OARC)	828	211	713	66							1,818
		62925	SW Flood Management LDRP 521 Stage 1 Waitaki Street (OARC)	3,312	3,534	1,467	2,012							10,325
		63671	Hoon Hay Basin Outlet and Cashmere Stream Control Structure (Eastman Sutherlands)	3,223	242	393								3,858
Flood Protection Total				**43,889**	**38,988**	**30,942**	**45,311**	**50,756**	**43,810**	**42,838**	**46,334**	**44,664**	**48,485**	**436,017**

11. Does this activity have any significant negative effects on social, economic, environmental or cultural wellbeing, now or in the future?

Negative Effect	Mitigation
Social	
Social, cultural and environmental effects of construction works	Management of construction activities to minimise risk of non-compliance with relevant consent conditions.
Social, cultural and environmental effects of stormwater discharges into waterways	Ongoing education and works programme to reduce contaminant load. Develop and deliver stormwater management plans that consider all six values and set appropriate, measurable performance targets. Monitor stormwater discharges and instigate appropriate remedial actions as may be necessary to address potential non-compliances.
Future risk to levels of service as climate change and sea level rise strain the effectiveness of stormwater and flood management system (projected increased stormwater volumes in more frequent, more extreme events and decreasing hydraulic gradient). Risk to living assets through more frequent, more intense drought, higher temperatures and seasonal shifts.	Investigations to better understand how climate change will affect demand and capacity in order to maximise effectiveness of future investment and adaptation. Engage community in cost vs LOS discussion. Work with town planners and those engaged in community consultation on dynamic adaptive planning to ensure a holistic approach is taken.
Social and economic effects of flooding caused by declining stormwater conveyance and flood storage capacity due to urban infill	Appropriate provisions in the District Plan and the Stormwater Bylaw and increased provision of Council resources for community education, monitoring and enforcement
Economic	
Cost to Council / ratepayers of operating flood management system	Follow documented procedures and industry best practice for cost minimisation. Follow technological developments and implement cost saving initiatives on a continuous improvement basis. Focus process of defining key performance indicators on cost efficiency. Ensure staff are kept updated with technological and operational best practice through attendance at conferences and participation in specialist industry working groups.
Cost to Council/ratepayers of future work needed to upgrade system in order to appropriately manage projected increased volumes of stormwater in more frequent, more extreme events and decreasing hydraulic gradient resulting from climate change and sea level rise. Risk of eutrophication of wetlands and waterways and devegetation of assets in drought.	Investigations to better understand how climate change will affect demand and capacity in order to maximise effectiveness of future investment and adaptation. Work with town planners and those engaged in community consultation on dynamic adaptive planning to ensure a holistic approach is taken.

Negative Effect	Mitigation
Meeting increasing community and regulatory requirements for improved stormwater quality requires ongoing CAPEX and OPEX commitment by Council	Ongoing education and works programme to reduce creation of stormwater contamination at source and reduce contaminant load, necessary to reduce the reliance on infrastructure for contaminant removal through provision of stormwater treatment facilities and devices. Provision of adequate CAPEX and OPEX to meet the regulatory requirements and community levels of service
Meeting community and regulatory requirements for management of stormwater quantity, including flooding and the effects on it from climate change, requires ongoing CAPEX and OPEX commitment by Council	Appropriate provisions in the District Plan and the Stormwater Bylaw and increased provision of Council resources for community education, monitoring and enforcement Timely development and implementation of an effective Council Climate Change Adaptation Plan Provision of adequate CAPEX and OPEX to meet the regulatory requirements and community levels of service
Environmental	
Embedded carbon in capital works contribute to council & district greenhouse gas footprint.	Take a whole-of life approach to greenhouse gases. Seek guidance on carbon pricing in order to affordably minimise embedded carbon in capital works. Train staff as necessary.
Urban development increases the contaminant load in stormwater discharges	Retrofit treatment of existing urban areas
Cultural	
Without suitable consideration for cultural values with how we renew, plan for, construct and operate our networks, Council will not meet runanga and central government legislation requirements.	By conserving and improving our landscapes and biodiversity which are taonga, mahinga kai will be enhanced through our activities. This can be achieved over time by ensuring that good stormwater management practice is carried out by Council in its planned works and maintenance activities, and by the community in general.

12. What risks are identified and what controls and mitigations are planned?

Council's Risk Policy and assessment framework outlines its approach to managing risk. The framework provides a way to consistently identify, record and assess risks, and prioritise those that need to be mitigated.

Risk management is inherent in all of Council's Land Drainage activity processes. Significant risk management strategies for this activity include:

- **Management escalation and review:** The Land Drainage Operation and Maintenance team holds a weekly management meeting to review progress on operational activities.
- **Asset design:** For Council delivered projects, all elements are designed and delivered in accordance with Council's Infrastructure Design Standards and Construction Standard Specification. These two documents set in place the expectations of fit-for-purpose design and construction practises.
- **Delivery:** During construction, quality assurance processes are in place to confirm that the works are undertaken in accordance with expectations and guidelines.

A detailed overview of Council's approach to managing the Land Drainage risks is outlined in the Chapter 5 of the Land Drainage Asset Management Plan.

In various briefing presentations to the Councillors, the following high level risks were outlined as being key to the activity. There are a number of more specific risks that affect the activity, but they are not presented in this document due to the number of risks and quantity of detail.

Risk Title There is a risk that/of:	Caused By:	Resulting In:	Controls and Mitigations
Increased flooding of houses and businesses, that places the community at an unacceptable risk to their health and wellbeing, and their physical assets	• due to failure of high consequence assets, stemming from a compounded lack of prioritised spending in this area • due to increased failures of stop banks, pumping stations, stormwater pipes and waterway linings	• A risk to human life, particularly in the case of stop bank failure • Damage to and loss of usage of public and private infrastructure including lifelines with Council being liable for repairs • Increasing OPEX costs to support temporary repairs vs renewal/replacement costs • Reputational damage to Council • Possibility that residents and businesses will relocate out of Christchurch.	• Increase modelling resource application to identify specific risk factors and therefore required future OPEX (maintenance) and CAPEX (renewal) spending requirements • Increased comms and engagement with community through community boards

Risk Title There is a risk that/of:	Caused By:	Resulting In:	Controls and Mitigations
Inability to put in place the adaptations to Council operations required to address the impacts of climate change, which include: • increased flooding • changes to groundwater • more frequent and more intense rain events.	• Lack of clarity regarding the implementation requirements of Councils' Climate Change Strategy and Policy • Timeliness of decision-making and prioritisation of resources and funding to address adaptation requirements, leading from the above cause • The activity projects nominated to provide Council with funding to begin to address the risks associated with climate change and the resulting coastal hazard adaptation work have all been deferred by 10 years • These works included groundwater management, lower river erosion and hill sediment deposition management and floodplain management works. Funding to carry out investigation works into the effects of climate change and proposals for adaptation have been greatly reduced.	• Maladaptation and sub-optimal renewal and planning investment • Councils response to the declared "Climate Emergency" is further delayed • Pushing the costs of carrying out mitigation works into later LTP periods, requiring a higher investment in a shorter time to meet adaptation requirements • Areas of high flood risk which flooded in March 2014 will not have risk reduced in next 10 years • New flood prone areas maybe created due to the effects of climate change increasing a backlog of work for future generations through current underinvestment • Reputational damage as Council is seen to be not progressing at a fast enough pace and not able to react to adaptation requirements • Unable to support population movements as a result of climate change.	Creation of a policy, while waiting for the Draft Climate Change Strategy to be approved by Council, to allow informed infrastructure renewal/new works and maintenance operations within the Coastal Hazard Adaptation Planning areas to be made.
Loss of unique landscapes and indigenous biodiversity, and deterioration of water body health, through Council failing to deliver: 1) waterway enhancements 2) treatment of water from: • brownfield/existing development – both commercial and council-owned • roading and transport projects	• The existing work programme for Waterway Ecology and Water Quality Improvement has had all funding deferred for 10 years • Specific (small) projects created for dealing with some known areas requiring improvement have been deferred for 3 years • Lack of financial provision for purchase of lands for long term ecological/environmental improvements by Council	• Inability to improve waterway health through investment in enhancement and biodiversity • Continued trends of loss of habitat in the city's waterways impacting indigenous invertebrates, aquatic and avian species • Failure in meeting obligations for protecting Maori values for freshwater including mahinga kai • Failure to meet council set community outcomes for Healthy Waterbodies	• Review waterway setback requirements in the District Plan to prevent encroachment and provide more space for enhancement. • Legislate changes to council requirements to require source control on industrial, commercial and residential properties • Creation of a planning document outlining a prioritisation of the waterways to focus on and the funding envelope which may be required for e.g. land purchase etc.

As discussed above, there are a number of activity specific risks that were identified as part a robust risk identification process during the AMP writing process, initially to identify the activity specific related from the ProMapp risk register, and then expand on this with the risks and challenges that face the business. All of these risks are contained in Section 5.3.2 - Activity Specific Risks and relate to risks such as:

- major infrastructure failure;
- outdated or inadequate flood models;
- failures of stormwater facilities due to criticality, performance and underfunding;
- climate change effects on infrastructure;
- residential development and encroachment;
- insufficient investment of CAPEX and OPEX; and
- inability to meet Councils Carbon Neutrality goals.

It is recommended that the risk tables in Section 5 of the AMP are viewed in conjunction with this Activity Management Plan to understand the challenges that face the activity, the mitigation measures, and the residual risk levels.