Long Term Plan 2018-28
Service Plan for Flood Protection & Control Works

As at March 2018

Approvals		
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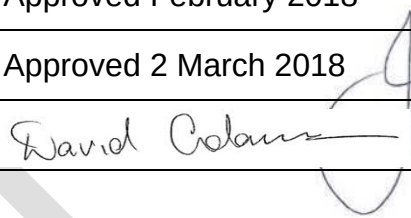
General Manager(s)	David Adamson	

Table of Contents

What does the overall Group of Activities do and why do we do it? 4
1. What does this activity deliver? 4
2. Why do we deliver this activity? 5
3. Specify Levels of Service 8
4. What levels of service do we propose to change from the current LTP and why? 17
5. How will the assets be managed to deliver the services? 21
6. What financial resources are needed? 24
7. How much capital expenditure will be spent, on what category of asset, and what are the key capital projects for this activity? 25
8. Are there any significant negative effects that this activity will create? 41
9. Does this Service Plan need to change as a result of a service delivery review? 41

What does the overall Group of Activities do and why do we do it?

Christchurch City Council builds, owns, operates and maintains water supply, wastewater, stormwater and solid waste networks to provide to support healthy communities and a prosperous economy.

These services are core business for the Council, required by the Local Government Act 2002, and governed by a number of other acts and legislation.

Council implements these services for the community through planning, day to day operations, planned and reactive maintenance, repair and renewal of damaged infrastructure, building new infrastructure and implementing improvements to the system and measures its performance in terms of safety, quality and reliability.

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 ground and 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,
- water quality treatment devices such as basins, wetlands, tree pits, raingardens and filtration devices
- 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.

Approximately half of this activity is delivered through the Land Drainage Recovery Programme (LDRP) and the majority of the remainder relates to construction of community facilities to improve water quality and service growth.

Around 30% of Christchurch residents live in areas at risk of flooding or coastal inundation. The key objective of this activity is to limit the effect of flooding on homes and Council infrastructure and allow emergency responses. 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.

Example – The Avon Stopbank network and Dudley Creek Diversion reduce the risks of flooding to large parts of the city. These assets will need maintenance, renewal and enhancement in order to cope with a changing climate and to address the effects of the earthquakes.

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 practice is required by everyone in the community. This activity is fundamental to achieving the community outcome of healthy waterways and the strategic objective of improved waterways.

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.

Example – The construction of stormwater ponds across the Upper Heathcote Catchment, like Wigram Basin, improve water quality in our waterways. More of these assets will be delivered across the city to achieve community outcomes and deliver to existing consents.

In delivering this service the Council provides a balanced mix of maintenance and renewals to preserve the levels of service as well as capital investment to respond to increasing demands for growth (both greenfield and infill) and improved stormwater discharge quality to address waterway degradation.

This activity is linked to the Stormwater Drainage activity.

2. Why do we deliver this activity?

This activity delivers to a wide range of Council's Strategic Priorities. Flood Protection and Control Works are a key part of providing:

- *Climate Change Leadership:* Management of our floodplains through this activity will promote safe and healthy communities and deliver to Council's priority for a modern and robust city infrastructure
- *Informed and proactive approaches to natural hazard risks:* Delivery of an all-hazards approach within this activity will provide for a more resilient community that is well informed. Climate change adaptation is a key driver when considering existing and future policy and investment. This activity is at the core of the LDRP, the implementation of which is a strategic priority for Council
- *Safe and Sustainable water supply and waterways:* Improvements in the ecological health of our waterways will be delivered with this activity in conjunction with the Stormwater Drainage activity through improved stormwater management practices and new infrastructure

Effective floodplain management reduces the risk of flooding and the negative environmental and cultural impacts on the receiving environment.
The Council is committed to a six values approach to Flood Protection and Control Works (Drainage, Ecology, Recreation, Culture, Heritage, Landscape).

Council is currently leading the way with a number of projects and programmes that focus on floodplain management, environmental benefits and delivery to an all-hazards approach.

Delivery of this activity meets Council's legislative requirements under the:

- Local Government Act 2002
- Health and Safety at Work Act 2015
- Building Act 2004
- Christchurch District Drainage Act 1951
- Christchurch Replacement District Plan
- Civil Defence and Emergency Act
- Water Supply, Wastewater and Stormwater Bylaw 2014
- National Policy Statement (NPS) on Urban Development Capacity 2016
- Soil Conservation and River Control Act 1941
- Resource Management Act 2017: "The management of significant risks from natural hazards" is a new matter of national importance in section 6 of the Resource Management Act 1991 (RMA). The amendments emphasise a risk-based approach to managing natural hazards planning and decision-making under the RMA" (http://www.mfe.govt.nz/sites/default/files/media/Fact%20Sheet%202%20-%20Revised%20functions%20for%20RMA%20decision%20makers.pdf)

In addition to the above, there are legislative requirements to be met for water quality. These include:

- The NPS on Freshwater Management. It has objectives and policies for freshwater quality that are to be implemented in Regional Plans and to which there must be regard when there is a resource consent application for a discharge;
- The policy in the Canterbury Land and Water Regional Plan (LWRP), and in particular its application to the Comprehensive Stormwater Network Discharge Consent (CSNDC) which Christchurch City Council (CCC) has applied-for to the Canterbury Regional Council. A likely key factor relevant to the final consent conditions will be the degree to which the Council is committed to progressively improve the quality of its discharges to meet specified water quality targets.
- The requirements of any applicable existing discharge consents from Environment Canterbury

Further, Flood Protection & Control Works service is critical for achieving and supporting Council's Strategic Priorities, including:

- Safe and sustainable supply water supply and improved waterways including:
    - Water quality and ecological health in our waterways continues to improve over time toward agreed environmental target levels
    - The proportion of our waterways that are safe for contact recreation and that can support mahinga kai is increasing
- Informed and proactive approaches to natural hazard risks:
    - The primary drainage network reduces the risk of surface water flooding and habitable floor flooding

    - Christchurch is well prepared for the impacts and consequences of natural hazards and can respond and recover quickly
    - Council infrastructure is able to function following expected natural hazard events
- Maximising opportunities to develop a vibrant, prosperous and sustainable 21st Century city
    - Flood Protection & Control Works are core infrastructure to ensure the city functions well and supports prosperity

The Community Outcomes that relate most directly to the Flood Protection & Control Works activity are:

- Strong Communities - Safe & Healthy Communities
- Healthy Environment - Healthy waterways
- Healthy Environment - Sustainable use of resources
- Healthy Environment - Unique landscapes and indigenous biodiversity are valued
- Prosperous Economy - Modern and robust city infrastructure and facilities network
- Prosperous Economy - Great place for people, business and investment

3. Specify Levels of Service

The Levels of Service, Performance Measures and Performance Targets for the Stormwater activity are provided below.

Green text indicates a new performance measure.
Black text indicates an unchanged performance measure.
Purple text indicates a performance measure proposed for modification
Red current performance text indicates a performance target that has not been met

Performance Standards Levels of Service	Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
					Year 1	Year 2	Year 3	
					2018/19	2019/20	2020/21	
Maintaining the natural waterways and associated structures and systems								

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1	Year 2	Year 3	
						2018/19	2019/20	2020/21	
14.1.1	Reduce risk of flooding to property and dwellings during extreme rain events	Community Outcome: Safe and healthy communities	Flood Models	New level of service – no current performance		Target 1Annual 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	Target 1 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	Target 1 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	Target 1 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

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1	Year 2	Year 3	
						2018/19	2019/20	2020/21	
14.1.1 Cont'd	Reduce risk of flooding to property and dwellings during extreme rain events	Community Outcome: Safe and healthy communities	GIS and Model	New level of service – no current performance		Non-LTP Target 2 Catchment models represent the current network (measured as a percentage of network): 90% of operational network greater than 300mm diameter or greater is included in model	Non-LTP Target 2 Catchment models represent the current network (measured as a percentage of network): 95% of operational network greater than 300mm diameter or greater is included in model	Non-LTP Target 2 Catchment models represent the current network (measured as a percentage of network): 99% of operational network greater than 300mm diameter or greater is included in model	Non-LTP Target 2 Catchment models represent the current network (measured as a percentage of network): 99% of network current
		Community Outcome: Safe and healthy communities	Contract Reporting and GIS	67 (number of sites)		Non-LTP Target 3 Number of monitoring sites (flow, level, rainfall): +2 (69)	Non-LTP Target 3 Number of monitoring sites (flow, level, rainfall): +2 (71)	Non-LTP Target 3 Number of monitoring sites (flow, level, rainfall): +2 (73)	Non-LTP Target 3 Number of monitoring sites (flow, level, rainfall): +7 (80)

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1 2018/19	Year 2 2019/20	Year 3 2020/21	
Major flood protection and control works are maintained, repaired and renewed to key standards									
14.1.2	Major flood protection and control works are maintained, repaired and renewed to key standards	Community Outcome: Modern and robust city infrastructure and facilities network. Community Outcome: Modern and robust city infrastructure and facilities network.	Annual LIDAR Survey *Department of Internal Affairs, Flood Protection & Control non-financial performance measure number 1* 5 year survey verification *Department of Internal Affairs, Flood Protection & Control non-financial performance measure number 1*	2015/16: Achieved 2015/16: Achieved		Target 1 Stopbank crest surveys are carried out at required intervals: Annually Target 2 Cross sectional surveys of selective waterways are carried out at required intervals: 2-5 yearly or as required	Target 1 Stopbank crest surveys are carried out at required intervals: Annually Target 2 Cross sectional surveys of selective waterways are carried out at required intervals: 2-5 yearly or as required	Target 1 Stopbank crest surveys are carried out at required intervals: Annually Target 2 Cross sectional surveys of selective waterways are carried out at required intervals: 2-5 yearly or as required	Target 1 Stopbank crest surveys are carried out at required intervals: Annually Target 2 Cross sectional surveys of selective waterways are carried out at required intervals: 2-5 yearly or as required

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1	Year 2	Year 3	
						2018/19	2019/20	2020/21	
14.1.2 Cont'd	Major flood protection and control works are maintained, repaired and renewed to key standards	Community Outcome: Modern and robust city infrastructure and facilities network.	Bi-annual LIDAR survey of critical stopbanks. *Department of Internal Affairs, Flood Protection & Control non-financial performance measure number 1*	New level of service – no current performance		Target 3 Stopbanks identified as being below their original design standard are repaired within 9 months. Measured as proportion of stop bank length identified as not meeting standard that is repaired within required timescale: 70%	Target 3 Stopbanks identified as being below their original design standard are repaired within 9 months. Measured as proportion of stop bank length identified as not meeting standard that is repaired within required timescale: 70%	Target 3 Stopbanks identified as being below their original design standard are repaired within 9 months. Measured as proportion of stop bank length identified as not meeting standard that is repaired within required timescale: 75%	Target 3 Stopbanks identified as being below their original design standard are repaired within 9 months. Measured as proportion of stop bank length identified as not meeting standard that is repaired within required timescale: 85%

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1	Year 2	Year 3	
						2018/19	2019/20	2020/21	
14.1.3	Implement Land Drainage Recovery Programme works to reduce flooding	Community Outcome: Modern and robust city infrastructure and facilities network.	Council's capital reporting system	N/A as floodplain management plans not yet available		Non-LTP Target 1 Delivery of works to meet floodplain management plans and remaining high priority plans: Start delivery of works to meet Heathcote, Avon and Estuary floodplain management plan objectives	Non-LTP Target 1 Delivery of works to meet floodplain management plans and remaining high priority plans: Ongoing delivery to Heathcote Floodplain management plans	Non-LTP Target 1 Delivery of works to meet floodplain management plans and remaining high priority plans: Start delivery of Avon Floodplain management plan	Non-LTP Target 1 Delivery of works to meet floodplain management plans and remaining high priority plans: Implement future stages of the Land Drainage Recovery Plan, including Estuary Floodplain Management Plan, as approved through Annual Plan

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1	Year 2	Year 3	
						2018/19	2019/20	2020/21	
14.1.4	Reduce pollution from discharge of urban contaminants to waterways	Community Outcome: Healthy waterways	Contaminant Load Modelling (CLM) supported by monthly water quality monitoring data in priority catchments.	New level of service – no current performance		Non-LTP Target 1 Average annual reduction in zinc measured through contaminant load modelling supported by water quality testing at priority catchments: >0%	Non-LTP Target 1 Average annual reduction in zinc measured through contaminant load modelling supported by water quality testing at priority catchments: >1%	Non-LTP Target 1 Average annual reduction in zinc measured through contaminant load modelling supported by water quality testing at priority catchments: >1%	Non-LTP Target 1 Average annual reduction in zinc measured through contaminant load modelling supported by water quality testing at priority catchments: >2%

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1	Year 2	Year 3	
						2018/19	2019/20	2020/21	
14.1.4 Cont'd	Reduce pollution from discharge of urban contaminants to waterways	Community Outcome: Healthy waterways	Contaminant Load Modelling (CLM) supported by monthly water quality monitoring data in priority catchments.	New level of service – no current performance		Non-LTP Target 2 Average annual reduction in sediment measured through contaminant load modelling supported by water quality testing at priority catchments:: >0%	Non-LTP Target 2 Average annual reduction in sediment measured through contaminant load modelling supported by water quality testing at priority catchments:: >1%	Non-LTP Target 2 Average annual reduction in sediment measured through contaminant load modelling supported by water quality testing at priority catchments:: >2%	Non-LTP Target 2 Average annual reduction in sediment measured through contaminant load modelling supported by water quality testing at priority catchments:: >3%

Performance Standards Levels of Service		Results	Method of Measurement	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10 2028/29
						Year 1	Year 2	Year 3	
						2018/19	2019/20	2020/21	
14.1.4 Cont'd	Reduce pollution from discharge of urban contaminants to waterways	Community Outcome: Healthy waterways	Contaminant Load Modelling (CLM) supported by monthly water quality monitoring data in priority catchments.	New level of service – no current performance		Non-LTP Target 3 Average annual reduction in copper measured through contaminant load modelling supported by water quality testing at priority catchments: >0%	Non-LTP Target 3 Average annual reduction in copper measured through contaminant load modelling supported by water quality testing at priority catchments: >1%	Non-LTP Target 3 Average annual reduction in copper measured through contaminant load modelling supported by water quality testing at priority catchments: >2%	Non-LTP Target 3 Average annual reduction in copper measured through contaminant load modelling supported by water quality testing at priority catchments: >2%

4. What levels of service do we propose to change from the current LTP and why?

The following is a summary of level of service changes.

Amended LTP 2016-25			LTP 2018-28			Rationale
LOS ID	LOS Description	Target (FY17/18)	LOS ID	LOS Description	Target (FY18/19)	
14.1.1 LTP	Ensure dwellings are safe from flooding during extreme rain events	Percentage of minimum specified floor levels for new dwelling consent applications which meet Building Act & District Plan requirements: 100%	N/A	N/A	N/A	Removed as measureable definition of target not assured of being available until FY18 or later (dependent on city-wide hydraulic stormwater model completion).
14.1.1 LTP	Ensure dwellings are safe from flooding during extreme rain events	Reported number of dwellings flooded in a 1 in 50 year event: Additional 20% reduction on 2014 “Above Floor” number (77)	N/A	N/A	N/A	Removed as could only be reported if a 50 year flood event occurred.
N/A	N/A	N/A	14.1.1 Target 1 LTP	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	Provides a clear link between the level of service and how this is achieved through modelling flood extents. Target re-defined to more directly reflect the stated focus of the Performance standard - to reduce flooding risk. The target now reflects this by indicating predicted reduction in the number of properties a risk, instead of an absolute number of properties at risk. Target amended from 80 to 50 properties to align with the “modified medium” funding scenario.

Amended LTP 2016-25			LTP 2018-28			Rationale
LOS ID	LOS Description	Target (FY17/18)	LOS ID	LOS Description	Target (FY18/19)	
14.1.5 non-LTP	Implement Land Drainage Recovery Programme works to reduce flooding	Complete construction of the Heathcote Scheme	14.1.3 non-LTP	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 works to meet Heathcote, Avon and Estuary floodplain management plan objectives	Target descriptions changed to include high-priority works other than flood plain, and re-scheduled to align with current likely ("modified medium") funding scenario. Target reclassified as 'non-LTP' due to indicating progression towards desired outcome, and not providing performance measure of the outcome.
N/A	N/A	N/A	14.1.1 non-LTP Target 2	Reduce risk of flooding to property and dwellings during extreme rain events	Catchment models represent the current network (measured as a percentage of network): 90% of operational network greater than 300mm diameter or greater is included in model	Provides a clear link between the level of service and development and maintenance of comprehensive network models Reclassified as "non-LTP", as measure is focused more on management/process than on community outcome.
N/A	N/A	N/A	14.1.1 non-LTP Target 3	Reduce risk of flooding to property and dwellings during extreme rain events	Number of monitoring sites (flow, level, rainfall): +2 (69)	Provides a clear link between the level of service and development and maintenance of accurate network models Year 10 target value now defined. Reclassified as 'non-LTP' as measure is focused more on technical process detail and data acquisition than on community outcome.
N/A	N/A	N/A	14.1.2 Target 3 LTP	Major flood protection and control works are maintained, repaired and renewed to key standards	Stopbanks identified as being below their original design standard are repaired within ~~6~~ 9 months. Measured as proportion of stop bank length identified as not meeting standard that is repaired within required timescale: 70%	Provides a clear link between the level of service and responsiveness of the Council to risk. Targeted timeframe for executing repairs extended to allow realistic time for planning, design and construction of repairs. Percentage of repairs executed amended to reflect current likely ("modified medium") funding scenario.
N/A	N/A	N/A	14.1.4 Target 1 Non-LTP	Reduce pollution from discharge of urban contaminants to waterways	Average annual reduction in zinc measured through water quality	Provides a link between the level of service and how this is achieved though monitoring of water quality

Amended LTP 2016-25			LTP 2018-28			Rationale
LOS ID	LOS Description	Target (FY17/18)	LOS ID	LOS Description	Target (FY18/19)	
					testing at priority catchments: >0%	LOS descriptor amended to more accurately reflect the outcome which Council has control over - pollutants discharged from our network to waterways. Target descriptors amended to reflect primary source of data and to reflect current indications of likely performance based on modelling to date and the likely ("modified medium") funding scenario. Reclassified as 'non-LTP' as the measure is focused on technical rather than community-facing outcomes.
N/A	N/A	N/A	14.1.4 Target 2 Non-LTP	Reduce pollution from discharge of urban contaminants to waterways	Average annual reduction in sediment measured through contaminant load modelling supported by water quality testing at priority catchments: >0%	Provides a link between the level of service and how this is achieved though monitoring of water quality LOS descriptor amended to more accurately reflect the outcome which Council has control over - pollutants discharged from our network to waterways. Target descriptors amended to reflect primary source of data and to reflect current indications of likely performance based on modelling to date and the likely ("modified medium") funding scenario. Reclassified as 'non-LTP' as the measure is focused on technical rather than community-facing outcomes.
N/A	N/A	N/A	14.1.4 Target 3 Non-LTP	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: >0%	Provides a link between the level of service and how this is achieved though monitoring of water quality LOS descriptor amended to more accurately reflect the outcome which Council has control over - pollutants discharged from our network to waterways. Target descriptors amended to reflect primary source of data and to reflect current indications of likely performance based on modelling to date and

Amended LTP 2016-25			LTP 2018-28			Rationale
LOS ID	LOS Description	Target (FY17/18)	LOS ID	LOS Description	Target (FY18/19)	
						the likely ("modified medium") funding scenario. Reclassified as 'non-LTP' as the measure is focused on technical rather than community-facing outcomes.

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

The flood protection and control work service is managed according to best practice to ensure that Council complies with its statutory requirements and achieves the levels of service as expected by the community. Management processes include:

Plan: assess current flood risk, determine future needs and identify, evaluate and recommend options to achieve reduction in flood risk in accordance with Council guidelines and policies. Develop options for floodplain management with an all-hazards approach

Regulate: issue standards, specifications and bylaws to ensure that the service is safe, reliable and resilient and enforce adherence through the Council's consent processes

Build: conceptualize, design, specify and procure contractors to build new assets

Operate: ensure that flood protection and control networks and facilities are operated appropriately, efficiently and effectively

Maintain: perform planned and cyclic maintenance for a reliable and compliant service
Repair and renew: review asset condition in the context of age, material, maintenance, etc. and establish a prioritized programme for asset repair and renewal to ensure effectiveness and efficiency of supply

Customer services: receive, prioritize and respond to customer complaints and requests for services

How are works identified and prioritised?

Core Renewals
There are core renewal programmes to cover all asset types and detailed methodologies for development of these renewals programmes are being developed in the Draft Lifecycle Management Manual with results in the 2018 Land Drainage Asset Management Plan.

At a high level:

- Long term (years 4-30) budget planning is based on installation year and theoretical useful life where the theoretical useful life takes into account material, manufacturer, manufacturing standard, condition assessment results and expert judgement from literature.
- Short term (years 1-3) budgets and programs identify and prioritise specific renewals projects based on condition assessment results, performance assessment results, breakage rates, criticality, obsolescence, risk and alignment with transport (road) renewal works and developement.

For the **LDRP** Council and community expectations of the programme are high with a strong desire to see the most flood prone areas remediated as soon as possible. As such considerable efforts are going into identifying and prioritising projects and maximising savings and efficiencies at project level to enable the greatest benefits in the shortest time. There are a range of tools used to aid prioritisation of projects within the programme:

- The City Wide Stormwater Model, validated by floor level surveys etc., is being used to better define the extent of flood risk and will inform long term sustainable decision making.
- The City Wide Economic Assessment Model has better defined cost benefit assessments that do not easily consider differences between above and below floor flood risk, infrastructure versus policy responses (e.g. managed retreat), future climate change effects, etc.
- Strategy and Planning Group's consideration of Natural Hazards and Three Waters strategies will begin to better inform the LDRP and potentially identify areas for savings or alternative funding.
- Project investigations consider the cost benefits of a number of options and identify cost by damage, remediation, and enhancement.

A prioritised physical works package has been developed based upon an engineering intervention approach of defence. The budget estimate for the entire programme totals $1.2 billion (+/-40%). The projects have been categorised and prioritised in groups:

- LDRP high priority
- Avon River Flood Protection
- Heathcote River Flood Protection Programme
- Styx River Flood Protection Programme
- Estuary and Sumner Flood Protection Programme
- LDRP Medium/Low Priority
- Strategic policy decisions still need to be made before investing in new flood protection infrastructure (including stop banks, tide barriers or flood pumps), particularly as the effects of sea level rise become evident. Other options such as strategic retreat may be more cost effective.

The prioritisation of the groups is based upon a range of weighted, qualitative and quantitative criteria:

- Flood risk and effects
- Cost benefit
- Alignment with long-term planning objectives, other programmes and projects (Regenerate Christchurch, Otakaro, DCL, roading etc)
- Five values (non-drainage values i.e. ecology, landscape, recreation, heritage, culture)

There are a range of defence measures included in the programme, such as:

- Stopbanks
- Pump stations
- Channel modifications, e.g. widening, regarding, bank trimming
- Storage
- Property level defences e.g. house raising

Growth, Backlog and Improved Levels projects are established through network planning processes for issue identification and assessment. This includes responding to known flooding issues and areas of planned growth.
Prioritisation is based on assessment of the level of capital works needed to achieve compliance to statutory obligations, meet current Levels of Service and Council objectives as currently defined, and to provide the flood protection and stormwater management service in a sustainable manner in accordance with customer expectations. Priorities are determined from analysis applying the qualitative and quantitative criteria applied to the LDRP programme.

6. What financial resources are needed?

Table 6.1 – Current and Proposed Budget

FLOOD PROTECTION- FLOOD PROTECTION				
	2017/18 Annual Plan	2018/19	2019/20	2020/21
	000's			
Operational Budget				
Management of existing infrastructure	714	739	762	785
EQ - Flood Protection	117	114	118	120
Activity Costs before Overheads	831	853	880	904
Corporate Overhead	33	38	45	48
Depreciation	10	98	212	374
Interest	-	-	-	-
Total Activity Cost	**874**	**989**	**1,137**	**1,326**
Funded By:				
Fees and Charges	-	-	-	-
Grants and Subsidies	-	-	-	-
Total Operational Revenue	**-**	**-**	**-**	**-**
Net Cost of Service	**874**	**989**	**1,137**	**1,326**
Funding Percentages:				
Rates	100.0%	100.0%	100.0%	100.0%
Fees and Charges	0.0%	0.0%	0.0%	0.0%
Grants and Subsidies	0.0%	0.0%	0.0%	0.0%
Capital Expenditure				
Improved Levels of Service	-	5	5	73
Increased Demand	7,168	13,736	35,326	40,269
Renewals and Replacements	12,915	2,911	3,519	8,005
Total Activity Capital	**20,083**	**16,652**	**38,849**	**48,346**

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

There are three primary drivers of capital work undertaken within this activity: growth, renewals and backlog due to earthquake damage and degradation of the city's waterways. Managing stormwater flows and the assets associated with this activity to provide the required levels of flood protection is made more complicated by the increasing effects of climate change. Design standards for new infrastructure require increasing capacity to allow for climate change effects, which affect all capital expenditure drivers and physical works.

Growth
Growth projects relate to new infrastructure or upgrades to existing infrastructure to service new development and account forapproximately 30%of the planned annual capital expenditure (capex) for this activity over the LTP period (FY19 – FY28).The majority of the proposed flood protection and control works growth projects are within the Styx and Heathcote (South West Area) catchments and will be delivered in conjunction with new developments that are planned in these catchments. These projects are required to meet consenting requirements for the new development and without them the development could not proceed.

There are two key reasons why expenditure on growth projects needs to substantially increase above previous levels as were set in the current LTP. Firstly, there is significant development growth following finalisation of the District Plan. Previous planning has been based on development taking place at a steady pace, but there is currently a growth surge which requires significant stormwater infrastructure. This equates to approximately 30% of the proposed capital expenditure. Secondly, land costs are a significant component of stormwater facilities. With land costs continuing to increase, the cost of delivering the required stormwater infrastructure is increasing above previously planned budgets.

Renewals
The flood protection pump stations and control structures have been maintained reactively on an "as needed" basis and many of their components are now at end of life or require major overhaul or upgrade. As a result, an increase in renewals is required over that provided in the 2015-25 LTP.. In addition, damage from the earthquakes has reduced the expected life of assets. Failures due to inadequate renewals will increases the risk of flooding that will result in damage to infrastructure, utilities and private property with associated widespread disruption and health and safety risks.

Implementation of the-planned programme of renewals will enable renewal of some assets with the objective of maintaining required performance levels to be maintained and maintainthe current risk of service loss or disruption during a storm event.

Backlog
Backlog relates to projects which primarily provide catch-up on historical issues which is required to meet the required level of service fort eh existing community. In this activity, there are two main types of backlog – 'business as usual' backlog and backlog due to earthquake.

'Business as Usual' Backlog
Significant investment will be required to maintain and operate the existing and expanding stormwater network and improving waterways including meeting current and future stormwater network discharge consent conditions Significant capital expenditure is planned in the LTP period and beyond to facilitate this through retro-fit of stormwater treatment facilities to existing developed areas. Many of these facilities are multi-functional, providing both water quality treatment

as well as flood-mitigating stormwater detention capacity .Also, in some cases, facilities can provide backlog for a developed area as well as capacity for growth from adjacent new development.

Some additional capital investment is signalled within the LTP for delivery of new flood control works within existing developed areas to address areas currently at elevated levels of flood risk.

Backlog due to Earthquake Damage Effects – LDRP Projects
The LDRP projects address the effects of the Canterbury Earthquakes. These projects are the largest component of the capital expenditure identified to deliver Flood Protection and Control services, accounting for over 40%-of the planned annual capex over the LTP period.

Heathcote River Floodplain Management projects have been prioritised within the first four years of the LTP to reduce flooding along the Heathcote River as quickly as possible. The effect of damage to land and infrastructure alongside the Heathcote River has been to increase the severity of flooding to existing flood prone land, mostly within the flood plain defined by the river terraces. Some new areas are now exposed to the risk of inundation. There have also been effects on existing flood mitigation infrastructure, stormwater systems, critical roads as well as other services. Properties adjacent to the Heathcote River were noted by the Mayoral Flood Taskforce as being second most significant cluster of post-earthquake flooding after Flockton. The Heathcote River projects include new storage basins, dredging, bank stabilisation and consideration of low stopbanks. Other components of the Floodplain Management measures (such as the Flood Intervention Policy) are included in the Stormwater and Land Drainage activity.

Following completion of the Heathcote River Floodplain Management projects there is significant budget to address the long-term floodplain management issues for the Avon River. Currently there are approximately 6,000 properties at risk of flooding in the Avon River floodplain, and this number could increase to 9,000 in the future with climate change. The multi-hazard investigation will present adaptive floodplain management strategies for the Avon River and other areas significantly affected by climate change. These strategies are likely to include a mix of infrastructure investment and policy application. Currently protection is provided to many areas by the temporary stopbanks along the Avon River, but these have a limited life (20 years) and a significant investment will be required in the future to address flooding in these areas.

As well as the large floodplain management projects, there are a number of other areas which have increased flooding vulnerability due to the earthquakes. Some of these have been initiated and are itemised in the LTP, but the remainder are identified as 'LDRP Future Programme' and will be undertaken following the major Heathcote and Avon River projects.

The main justifications for expenditure on flood protection and control works assets are:

- Providing infrastructure to facilitate development and ensure a prosperous economy
- A renewals programme based on condition assessments and targeting infrastructure near failure
- Restoring the drainage network to pre-earthquake condition and performance levels in terms of flooding effects in particular
- Improving the city's waterways, in terms of drainage, ecology, culture, recreation, heritage and landscape – the 'six values'
- Improving the quality of discharges to our waterways so as to meet consent conditions and other criteria

The capital programme as put forward as the recommendation in the LTP is based on the staff assessment of the minimum level of capital works needed to achieve compliance to statutory obligations, meet current Levels of Service and Council objectives as currently defined, and to provide the flood protection service in a sustainable manner in accordance with customer expectations. The recommendation does not include projects being considered for implementation by Otakaro, Regenerate Christchurch or DCL, or works which will decrease the percentage of Condition Grade 5 assets.

The key programmes and projects are shown in Table 7.1, along with the programme or project drivers and implications if delayed or not implemented.

The planned capex is shown by the bars in Figure 7.1.

Figure 7.1 Planned Capital Expenditure

Table 7.1 Proposed Capital Programme – Note: all dollars include inflation

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
Growth					
973	South West SMP – Defined Projects - Waterways Detention and Treatment Facilities	19,848	0	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk	• Failure to improve water quality • Waterway degradation
45210	South West SMP – Provisional Projects – Waterways Detention and Treatment Facilities	4,356	0	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk	• Failure to improve water quality • Waterway degradation
15751	Sparks road development drainage works	2,658	2,658	→ Facilitate greenfields development → Maintain or improve water quality → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality
32243	Sutherlands Basin (Welsh) SW Treatment	3,928	3,928	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
33975	SW Spreydon Lodge Infrastructure Provision Agreement	7,061	5,852	→ Existing developer agreement in place → Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
				→ Remain compliant with global discharge consents	
33976	SW Rossendale Infrastructure Provision Agreement	3,612	3,355	→ Existing developer agreement in place → Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
				→	•
33979	SW Owaka Corridor	3,112	1,237	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents
33980	SW Owaka Basin	1,108	1,108	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
36063	SW Coxs - Quaifes Facility	13,933	8,505	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
				→	•
41900	SW Creamery Ponds	1,308	0	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
				→	•
				→	•

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
				→	•
				→	•
				→	•
2415	STYX SMP – Defined Projects - Waterway Detention and Treatment facilities	51,917	0	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk	• Failure to improve water quality • Exacerbation of flooding • Degradation of waterways
45211	STYX SMP – Provisional Projects – Waterway Detention and Treatment facilities	3,145	0	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk	• Failure to improve water quality • Exacerbation of flooding • Degradation of waterways
36062	SW Bullers Stream Naturalisation and Facility	943	943	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
37342	Highsted on Tulett IPA	2,159	2,100	→ Developer agreement in place → Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
37343	SW Highsted Land Purchase & Construction of Waterways, Basins & Wetlands	7,168	5,352	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
37904	SW Summerset at Highsted IPA	3,139	3,139	→ Developer agreement in place → Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
38088	SW Gardiners Stormwater Facility	3,818	2,809	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
38022	SW Works 1 Stormwater Facility	8,687	3,668	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
41896	SW Styx Centre Cost Share	500	500	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk → Remain compliant with global discharge consents	• Greenfields development is delayed, interrupted or halted • Non-compliance with existing ECan consents • Failure to improve water quality • Exacerbation of flooding
				→	•
				→	•
44345	SW Highfield North Basins	2,597	1,493	→ Facilitate greenfields development → Improve waterway ecosystems → Reduce flood risk	• Greenfields development is delayed, interrupted or halted • Exacerbation of flooding
44417	SW Guthries Thompson Basins	772	157	→ Facilitate greenfields development → Improve waterway ecosystems → Reduce flood risk	• Greenfields development is delayed, interrupted or halted • Exacerbation of flooding

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
				→	•
				→	•
				→	•
				→	•
				→	•
				→	•
44577	SW Highsted Styx Mill Reserve Wetland	2,482	157	→ Facilitate greenfields development → Maintain or improve water quality → Remain compliant with global discharge consents	• Failure to improve water quality • Non-compliance with existing ECan consents

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
				→	•
				→	•
44585	SW Highsted Wetland, Highams Basin & Styx Stream	14,509	0	→ Facilitate greenfields development → Improve waterway ecosystems → Reduce flood risk	• Greenfields development is delayed, interrupted or halted • Exacerbation of flooding
Backlog					
				→	•
41899	SW Carrs Corridor	1,239	0	→ Maintain or improve water quality	• Failure to provide treatment for Owaka Pit site • Could affect design of Wilmers facility project
2679	Prestons/Clare Park Stormwater	1,729	1,729	→ Facilitate greenfields development → Maintain or improve water quality → Reduce flood risk	• Greenfields development is delayed, interrupted or halted • Failure to improve water quality • Exacerbation of flooding
				→	•

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
2416	AVON SMP – Defined Projects - Waterways Detention and Treatment facilities	16,725	153	→ Maintain or improve water quality → Facilitate greenfields development → Reduce flood risk	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
45212	AVON SMP – Provisional Projects – Waterways Detention and Treatment facilities	2,562	0	→ Maintain or improve water quality → Facilitate greenfields development → Reduce flood risk	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
34808	Cranford Basin Dudley Diversion	57	57	→ Reduce flood risk	• Reduce flood risk
41987	SW Addington Brook Filtration Devices	12,752	123	→ Maintain or improve water quality	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
41988	SW Treepits and Raingardens New Brighton Suburban Centre	223	62	→ Maintain or improve water quality	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
369	Piped Systems - Pipe Drains (New)	6,798	575	→ Facilitate greenfields development → Efficiently managed network	• Greenfields development is delayed, interrupted or halted
990	Open Water Systems - open drains reactive	2,310	365	→ Improve waterways → Reduce flood risk	• Waterways degraded
19398	Heathcote SMP	28,305	0	→ Facilitate greenfields development → Maintain or improve water quality	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
45213	Heathcote SMP – Provisional Projects	13,607	0	→ Facilitate greenfields development → Maintain or improve water quality	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
41998	Estuary and Coastal SMP	0	0	→ Maintain or improve water quality	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
41999	Outer Christchurch Otukaikino SMP	382	21	→ Facilitate greenfields development → Maintain or improve water quality	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
42000	Banks Peninsula Settlements SMP	371	0	→ Facilitate greenfields development → Maintain or improve water quality	• Failure to improve water quality • Non-compliance with future ECan consents (CSNDC)
42008	Lyttelton Stormwater Improvements	2,717	0	→ Efficiently managed network → Reduce flood risk	• Exacerbation of flooding
34337	SW Bells Creek Ferry Road Storm Filter Vault	104	104	→ Maintain or improve water quality	• Failure to improve water quality
Backlog to address increased flood risk due to earthquake effects					
44056	LDRP 509 Knights Drain Ponds	6,834	6,834	→ Repair earthquake damage → Reinstate pre-earthquake flood risk to the Knights Drain catchment → Improve water quality discharging to the Avon River	• Flood risk will remain in the catchment • Failure to improve water quality • Failure to deliver on community commitment that this project will proceed • Interrupt property negotiations
35140	LDRP 518 Mid Heathcote Bank Stabilisation	1,350	1,350	→ Repair earthquake damage to high-priority sections of the banks → Alignment of LDRP with Heathcote Masterplan	• Banks remain unstabilised • Hazards and potential hydraulic constraints remain
33259	LDRP 510 Wairarapa, Wai-iti and Tributaries	4,492	0	→ Repair earthquake damage → Reinstate pre-earthquake levels of flood risk to the associated catchments	• Waterways will remain in their earthquake-damaged state • Flood risk will remain at greater than pre-earthquake levels

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
28037	LDRP LTP year 4 & onwards	0	0	→ Overall budget for the LDRP for re-prioritisation as investigations proceed.	• N/A – this budget has now been planned into projects for the next 10 years
41638	LDRP 511 Upper Avon	2,246	0	→ Repair earthquake damage in the Upper Avon → Re-instate pre-earthquake levels of flood risk to the associated suburbs	• Upper Avon will remain in an earthquake-damaged state • Flood risk will remain at greater than pre-earthquake levels in the Upper Avon catchment
41639	LDRP 521 Avon Floodplain Management Implementation	97,866	0	→ Reduce the risk of flooding, post-earthquake, for those affected by fluvial or tidal flooding in the Avon River	• Flood risk remains at above pre-earthquake levels in at least the intermediate term
				→	•
41641	LDRP 523 Flood Remediation Reticulation Works	611	611	→ Repair high-priority stormwater pipes damaged by the earthquakes	• Health and safety concerns surrounding these pipes remain • Flood risk remains
				→	•
45455	LDRP 526 Curletts Flood Storage	7,525	3,130	→ Reduce post-earthquake flood risk to the upper and mid reaches of the Heathcote River	• Flood risk will remain at greater than pre-earthquake levels in the Heathcote River • Heathcote River Floodplain Management Plan implementation delayed
46181	LDRP 527 Heathcote Dredging	14,823	14,823	→ Reduce post-earthquake flood risk to the upper and mid reaches of the Heathcote River	• Flood risk will remain at greater than pre-earthquake levels in the Heathcote River • Heathcote River Floodplain Management Plan implementation delayed

CPMS ID	Candidate Title	10 Year Plan FY19-28 $'000	3 Year Plan FY19-21 $'000	Drivers	Implications if delayed / not implemented
46474	LDRP 528 Eastman Wetlands	20,625	20,625	→ Reduce post-earthquake flood risk to the upper and mid reaches of the Heathcote River	• Flood risk will remain at greater than pre-earthquake levels in the Heathcote River • Heathcote River Floodplain Management Plan implementation delayed
46688	LDRP 529 Heathcote Low Stopbanks	21,347	809	→ Reduce post-earthquake flood risk to the upper and mid reaches of the Heathcote River	• Flood risk will remain at greater than pre-earthquake levels in the Heathcote River • Heathcote River Floodplain Management Plan implementation delayed
				→	•
Renewals					
510	Treatment & Storage Facility Renewals	3,912	0	→	•
36943	Detention & treatment facility renewals work package	247	247	→	•
37843	SW Pumping Reactive Renwals PRG	1,399	386	→	•
41868	SW Pumping & Storage Civils & Structures Renewals PRG	1,437	0	→	•
41869	SW Pumping & Storage ICA Renewals PRG	228	228	→	•
41870	SW Pumping & Storage Electrical Renewals PRG	2,041	2,025	→	•
41871	SW Pumping & Storage Mechanical Renewals PRG	608	468	→	•
41967	Flood Protection Asset Reactive Renewals (excl PS's) PRG	2,723	192	→	•
41968	Flood Protection Structure Renewals PRG	962	368	→	•
42003	SW H&S Renewals PRG	121	70	→	•
				→	•
				→	•
				→	•

8. Are there any significant negative effects that this activity will create?

Effect	Mitigation
Cost to Council / Ratepayers of operating flood protection and control works.	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 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.
Social, cultural and environmental effects of construction works and ongoing floodplain management	Management of construction activities to minimise risk of non-compliance with relevant consent conditions. Develop and deliver floodplain management plans that consider all six values.

9. Does this Service Plan need to change as a result of a service delivery review?

A Service Delivery Review or Exemption report (Section 17A) for this activity has been carried out**.** Based on the outcome of this report no changes to the service plan or delivery model are required.