Kaipara District Council

Flood Protection and Land Drainage Strategic Activity Management Plan 2021-2031

June 2021

Status: Final

Kaipara te Oranganui

KAIPARA DISTRICT

Two Oceans Two Harbours

This document has been prepared by Kaipara District Council.

QUALITY STATEMENT

MANAGER		PROJECT TECHNICAL LEAD
Donnick Mugutso		David Usmar
CHECKED BY		
Ruth Harvey		……/……/……
REVIEWED BY		
Matthew Smith, Diane Miller		……/……/……
APPROVED FOR ISSUE BY		
Jim Sephton		……/……/……

42 Hokianga Road, Private Bag 1001, Dargaville 0340, New Zealand

TEL +64 9 439 3123, FAX +64 0 439 6756

REVISION SCHEDULE

Rev No	Date	Description	Signature or typed name (documentation on file).			
			Prepared by	Checked by	Reviewed by	Approved by
A	April 2020	1st Draft	D Jeffrey			
B	June 2020	2nd Draft for Elected members	D Jeffrey D Buttenshaw M Smith			
C	July 2020	3rd Draft	D Jeffrey, D Buttenshaw M Smith		M Borich	
D	Dec 2020	4th Draft	D Buttenshaw M Smith			
E	Feb 2021	Final Draft	M Smith	R Harvey	D Miller M Smith	J Sephton
F	June 2021	Final Draft Post Long Term Plan deliberations	D Usmar	R Harvey	D Miller	J Sephton

Contents

Tables

Figures

1 INTRODUCTION

1.1 FLOOD PROTECTION AND LAND DRAINAGE ACTIVITY

We protect people and property from flooding caused by severe weather events. Historically, this work was done through drainage boards. Only the Raupo Drainage District continues under a similar model. Responsibilities are mixed between Kaipara District Council (KDC) and Northland Regional Council (NRC). When land drainage district responsibilities were amalgamated with regional and territorial authorities through the Local Government Act 1984, the existing drainage committees decided to stay with their respective local authorities rather than come under the Regional Council's area of responsibilities. Raupo Drainage District was deemed to be a drainage area under section 504 of the LGA 1974, as part of the gazette notice re-organising local government, and forming the Kaipara District in 1989. All other Drainage Districts are created under the Government (Rating) Act 2002, the Council has the ability to collect targeted rates to fund activities undertaken in a defined area or catchment, set out in the Annual Plan.

The Raupo and northern area flood protection and land drainage networks represents a major investment by the community and is of vital importance to the quality of life of the district's residents and the sustainable management of both tidal and flood waters. The community expectation that this investment in land drainage assets is secure and managed in a way which maximises return in terms of outputs and costs as reflected in the overall objective of asset management (AM), which is:

'To meet the required level of service in the most cost-effective way through the creation, operation, maintenance, renewal and disposal of assets to provide for existing and future customers.'.

The goals of the Flood protection and land drainage networks are to achieve the following in a cost-effective manner:

- Protect land from tidal waters
- Control surface water during flooding
- Divert run-off from inland hills

In order to do this a number of drains, floodgates, stopbanks and a storm pump have been constructed and integrated with naturally formed channels to achieve these goals. These assets are overseen by self-managed drainage districts; and in the case of Raupo a formal committee to council comprised of representatives of the district who are assisted by Council staff and a land drainage co-ordinator.

A number of high risks have been associated with the land drainage network; these include but are not limited to:

- Stopbanks being overtopped at their current height due to climate change and predicted sea level rise
- Sea level rise results in land drainage assets inability to drain sufficiently at low tide; and
- Changes in regulations inhibit Council's ability to manage and control undesirable vegetation, or install other infrastructure as needed to manage the effects of the changing environment.

1.2 WHAT WE DO

We are conscious that we need to keep climate change in mind as we maintain and develop our flood protection and control activities. Climate change means more flooding from extreme weather events and rises in sea levels, affecting not just coastal areas but also our rivers and other waterways. The results of heavy

rains can put people, property, infrastructure, and roads at risk. Our assets are designed for the long term, and climate change means we will have to consider how best to manage our needs against costs.

Responsibilities overlap between KDC and NRC, managing flood protection and control works covering flood control schemes, river alignment control and land drainage. We co-ordinate land drainage work in 30 drainage districts of various sizes. These include Kaihu Valley and Mangatara Drainage Districts, both of which discharge into the Kaihu River, which is administered by the NRC. The largest district is the Raupo Drainage District where we provide administrative and technical support.

We have reviewed the 2017 NRC Draft Regional Policy Statement and will assess how the draft coastal flood maps will affect Kaipara district.

We maintain the current capacity of the land drainage network with:

- Weed spraying and drain clearance
- Floodgate and outlet maintenance in all districts
- Discretionary stopbank maintenance for the all districts
- Provide an agreed upon level of flood protection through various drainage system stopbanks and floodgates
- Monitor rivers for tidal and stormwater levels during weather events and warn of potential flooding
- Ensure drains have the capacity so floodwater recedes within three tidal cycles, the design Average Recurrence Interval (ARI) for rural areas is 10% however the level of service is 5% ARI (See performance measures)
- Stopbanks are to be maintained at 0.5m above extreme high tide
- Raupo Drainage Committee, a formal committee of this Council, is in place to perform delegated functions
- All flood protection activities outside Raupo are administered by informal community committees supported, where practical, by our Land Drainage Co-Ordinator. Landowners are responsible for maintaining privately-owned stopbanks
- Similar activities within the Dargaville urban boundary are administered through the stormwater programme
- NRC is responsible for catchment management. Refer to Northland River Management Policy.

1.3 BENEFITS TO THE COMMUNITY

- Our flood protection and control works are designed to protect people, property and infrastructure from flooding and tidal flows
- Protecting productive land and infrastructure are critical to our economic well being
- We protect and enhance our natural assets and open spaces

Contributions to the Community Outcomes include:

- Climate smart: Adapting infrastructure for stopbanks, floodgates and monitoring river level changes
- Healthy environment: Providing flood protection and resilience for areas within the District

1.4 POTENTIAL NEGATIVE EFFECTS

Significant Negative effects **Identified significant negative effect/issue**	**Mitigation**
Drainage capacity A lack of drainage networks or maintenance on the existing network could result in increased flooding of farming and cropping communities in low-lying land near rivers, streams and canals.	Inspections and assessment of network capacity and monitoring of service requests relating to capacity issues. Planning continual improvement.
Climate Change The severity of storm events, including rainfall event intensity is projected to increase. Sea level rise will increase severity of coastal inundation and flooding.	Alignment with climate change adaptive strategies plans and implementation of those strategies.
Level of Service (LoS) versus Feasibility The construction and maintenance costs of infrastructure upgrades to meet a set level of service is beyond the means of the community to afford.	The provision of a set level of land drainage management should be assessed on a case-by-case basis. This will be managed through consultation with communities to determine the most practicable way forward, without negatively impacting on public health and the environment or creating risk to persons or property.
I**nfrastructure not maintained to the correct standard** Base infrastructure maintenance and renewals has been under resources leaving capacity and resilience issues.	A robust maintenance schedule is being developed with the maintenance contractor and asset management improvements are set to allow clarity on ownership and responsibility of core assets.
Future growth The spatial plans have identified the likely growth areas in Kaipara.	To enable future land use changes, the LoS require from land drainage activities will need to be set and appropriate funding allocated.
Public safety Public safety is at the forefront of network operations some assets however have an inherent risk	All risks to the public are elevated with urgency to the maintenance contractor and continual improvement is applied to the built environment. Land drainage utilises an open drain network which has fundamental risks.
Asset data Many aspects of the asset management system still require improvement.	The current asset data still has gaps and inconsistencies. Asset data management is a process of continual improvement and there are multiple improvement projects underway and planned. Accurate asset data is essential information to enable Council to efficiently plan future works and capital upgrades, as well as routine operational monitoring of the network. Data on stopbank condition is especially critical to understand the future burden for upgrade activities.

1.5 PURPOSE OF PLAN

The purpose of this Strategic Activity Management Plan (SAMP) is to summarise in one place KDC's (Council) strategic and long term management approach for the provision and maintenance of its land drainage assets.

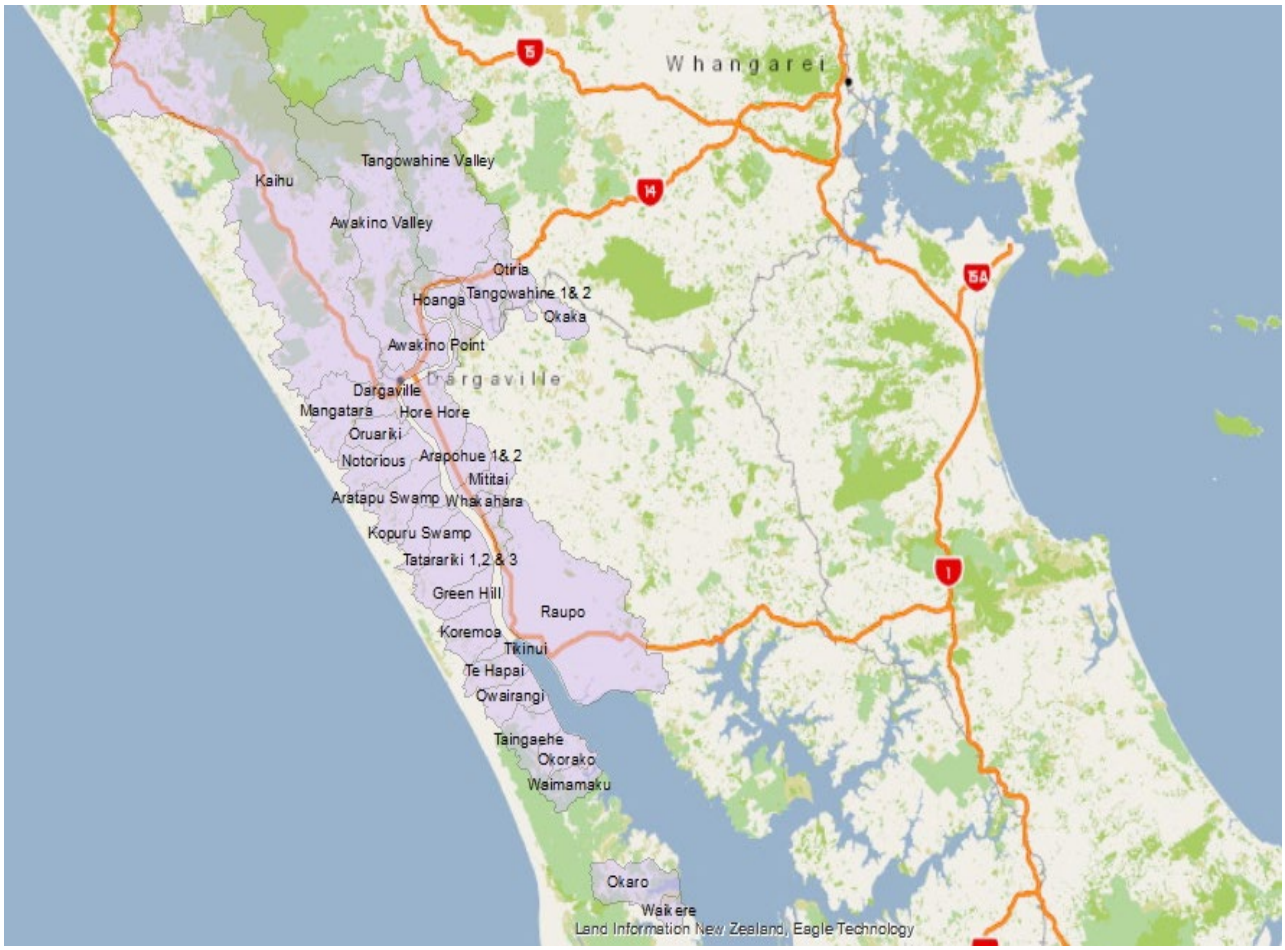
The AMP provides discussion of the key elements affecting management of Council's land drainage assets, including the legislative framework, links to community outcomes, policies and strategy, the proposed Levels of Service (LoS) and performance measures and demand, environmental and service management.

This SAMP covers a period of ten years commencing 01 July 2021. All expenditure is based on unit costs as at 30 June 2020.

Council's LTP identifies Council's purpose in relation to land drainage as "To minimise the risks and impacts of flooding attributed to inadequate land drainage" and "to enhance the sustainability of agriculture through cost-effective maintenance and enhancement of drainage networks."

1.6 DISTRICTS OVERVIEW

Figure 1: Land drainage districts



Currently Okaro, Okorako, Taingaehe and Waimamaku are not operational land drainage districts.

Table 1: Drainage areas

Drainage areas	Description
Aoroa	One of the smaller districts it covers the Hardings Flats area between Notorious and Oruariki Drainage Districts
Arapohue #1	A large district that lies between Bradleys Landing and Mititai Roads along State Highway 12 south of Dargaville

Drainage areas	Description
Arapohue #2	District that lies along State Highway 12 below Bradleys Landing with the catchment extending up to Morrison Road near Maungaraho
Aratapu Swamp	One of the larger catchments which covers Oturei Settlement Road to Redhill Road along Pouto Road south of Dargaville
Aratapu Village	A smaller catchment that has been split up in the past which runs from Charity Hill Road to Redhill Road
Awakino Valley	A larger catchment which starts in the upper Waihue area and outlets below State Highway 14 and follows the Awakino River
Awakino Point	District runs from Awakino River running below State Highway 14 extending to Awakino Point North Road near the racecourse.
Greenhill	South of Te Kopuru, a smaller catchment below Repia Marae extending up towards Scarrott Road valley
Hoanga	Starting at Hoanga Road and extending to the Manganui River covering the flat lands
Horehore	A large district that covers the Turiwiri area south of Dargaville, from the Northern Wairoa Bridge to Bradleys Landing on both sides of State Highway 12
Kaihu River	Managed by NRC it follows the Kaihu River itself up past Mamaranui. Council pays a small fee for maintenance on the Dargaville section
Kaihu Valley	Covers the same area as above, but includes the Parore, Babylon, Taita, Waiatua areas either side of the Kaihu River, ending above Mamaranui along State Highway 12 north of Dargaville
Kopuru Swamp	Extending from south of Te Kopuru between Redhill Road and Turkey Flat Road catchment
Koremoa	Smaller Catchment between Koremoa Road and Te Maire Road south of Te Kopuru
Manganui River	Following the Mangonui River arm from the Northern Wairoa conducting river maintenance 6.2km east and 3.4km west of Pukehuia Road bridge
Mangatara	Sits between Baylys Coast Road and Mt Wesley Coast Road from State Highway 12 to the coast
Mititai	State Highway 12 south of Dargaville between Whakahara and Aropohue #2 drainage districts
Notorious	Pouto Road south of Dargaville, between from the Northern Wairoa River extending to the hills between Oturei Road and Harding Flats area
Oruariki	Road from the river, between Mt Wesley Coast Road and to Hilliam Road
Otiria	State Highway 14 east of Dargaville between Paradise Valley Road and Mapuna Road
Owairangi	On Pouto Road extending either side, between Burgess, Otara and Schick Roads
Taingaehe	This drainage district has a small amount of funds in it, but it is effectively on hold as per the drainage district residents request, sits below Tikinui catchment
Tangowahine #1	Towards Whangarei, sits between State Highway 14 and Tangowahine Road East, Tangowahine Settlement Road West and Jerebine Road
Tangowahine #2	Tangowahine Settlement Road East and opposite the entrance to the Mangonui River
Tangowahine Valley	Follows the Northern Wairoa River to the Tangowahine Valley River bridge
Tatarariki #1	Pouto Road between Turkey Flat Road and West Road to the River
Tatarariki #2	Pouto Road between West Road and Guy Road towards the River
Tatarariki #3	Pouto Road from Guy Road to Newsham Road
Te Hapai	Pouto Road from Sarich Road to Pinaki Road to the River
Tikinui	Pouto Road, between Te Maire Road and Sarich Road to the River
Waimamaku	Large district along Pouto Road between Ngatawhiti Road and Kellys Bay Road. District is on hold as is now in forestry. Incorporates Kellys Bay settlement and Mosquito Gully
Whakahara	State Highway 12 south of Dargaville and is the closest district to Toka Toka, between Tatarariki #3 and Whakahara Road

1.7 KEY ISSUES

The key issues Council are currently managing as part of the land drainage activity are summarised in the table below. These issues are further addressed the Assets section of this SAMP.

Table 2: Key Issues for Council's Flood Protection and Land Drainage activities

Issue	Description
Climate Change	Climate change is the leading risk to the existing land drainage districts and how they function, this puts into question the cost of future protection and where Council's responsibilities lie to continue the same or greater level of service
Sea Level Rise	Sea Level Rise, whilst a symptom of Climate Change is its own risk, this will put pressure not only on the ability of the stopbank to keep water out, but also the ability for existing districts to drain effectively when the floodgates do not have the ability to stay open for the same amount of time
Asset Ownership	During the implementation of the Local Government Act 1984 the ownership of land drainage district assets have fallen into an area of unknown ownership, and what the roles and responsibilities of landowners and councils are, is mixed and unclear
Land Drainage and Stormwater Catchment Maps	Whilst the land drainage district boundaries and the integrated networks were constructed to a high standard in the past, with the advances in technology and mapping it has highlighted how much is still unknown or not appropriately captured in the existing districts. This must be sorted out to ensure that the appropriate responses are undertaken for climate change and sea level rise.

2 THE ASSETS

Council operates 30 land drainage schemes. The details of those schemes can be found in the Raupo Land Drainage Scheme Plan and the Northern Area Scheme Plan.

The values of the assets are shown in the table below:

Table 3: Asset Value

	Optimised Replacement Cost	Optimised Depreciated Replacement Cost	Annual Depreciation
Raupo	$11,591,395	$10,504,297	$63,083
Other Assets	$6,147,200	$5,060,283	$32,196
Total	**$17,738,596**	**$15,564,580**	**$95,279**

Source: 2019 valuation

2.1 CRITICAL ASSETS

The criticality framework is documented in the KDC Activity Management Overview. The key assets and their criticality are presented below.

Table 4: Critical assets in network

Moderate Criticality		
Reticulation	Large culverts ≥ 900mm	• Consider pipes ≥ 900mm to be Moderate due to consequences of ground stability and/or flows taking alternative path in event of pipe failure • Capacity of these pipes is adversely impacted by high river levels associated with major rain events and/or spring tides
Reticulation	Inlets and Outlets	• There are three potential issues with these grates i.e. ○ potential for blockages of inlet grates with debris ○ potential for children to enter the drains if the grate is not in place; and ○ significant scouring of the beach leading to undermining of the pipe
Reticulation	Infrastructure in lowest parts of the district	• As identified by flood susceptibility maps (NRC or KDC as appropriate) • Minimum of Moderate criticality
High Criticality		
Reticulation	Pipes running under buildings	• High (Major)
Flood protection	Stopbanks on Wairoa (east and west), Awakino and Kaihu Rivers	• High (Extreme)
Flood protection	Floodgates	• High (Extreme)

3 DEMAND MANAGEMENT

3.1 COUNCIL'S APPROACH TO DEMAND MANAGEMENT

This section of the AMP analyses factors affecting demand including population growth and social changes. The impact of these trends are examined and demand management strategies are recommended to address demand and ensure:

- Existing assets' performance and utilisation are optimised
- The need for new assets is reduced or deferred
- Council's strategic objectives are met
- Provision of a more sustainable service
- Council is able to respond to customer needs

3.2 GROWTH AND DEMAND CHANGE

The process of demand management provides Council with a high-level tool to identify where infrastructure growth is likely to occur over a period of time. It enables a natural structured growth of the public system to occur. Without this type of assessment, ad-hoc development of localised stormwater systems occurs and can leave a burdensome, somewhat redundant legacy for Council to operate and maintain.

Demand management strategies provide alternatives to the creation of new assets to meet demand and look at ways of modifying customer demands so that the utilisation of existing assets is maximised and the need for new assets is deferred or reduced.

Precise demand forecasting for the management of land drainage infrastructure is a difficult undertaking. This SAMP has largely been based on historical data and growth predictions provided by Statistics New Zealand in order to identify potential future demand on the public stormwater infrastructure. This may not specifically affect the drainage districts, growth across the district and how it impacts on asset investment and the likely changes to the current Level of Service (LoS) in regards to stormwater management are directly relatable, although growth in townships within land drainage areas can adversely affect the operation of the districts and needs to be closely monitored. The other issue to growth and demand management is where growth occurs in townships traditionally protected by rural land drainage districts. There is an unrealistic expectation of the LoS, and protection provided by the district, that to implement lie outside of the districts' financial ability to provide. Finally climate change, sea level rise and growth can also be beneficial for the districts in identifying ways in which they can be utilised to facilitate land use change and promote growth and financial and economic benefits to the communities, though this may require support from external funding sources.

The impact of growth is currently managed in multiple ways:

Table 5: Examples of land drainage demand management strategies

Demand component	Land drainage examples
Operation Looks at LoS provided by the infrastructure and the application of best practice options for sustainable long-term management	• Maintaining the existing land drainage network through the application of efficient operations and maintenance will ensure that the current LoS is met whilst also identifying and highlighting any issues across the district, the better the network is maintained the more efficient it is

Demand component	Land drainage examples
Design Constantly changing standards allow for better land drainage design and management, Low Impact Design (LID) and treatment at source	• Application of low impact design as per existing standards and as technology is constantly improving allow for better stormwater management, reduced peak runoff and better water quality; and • Integration of improved technology and increased awareness of changes to stormwater management internationally, attendance at conferences and allowing consultants to raise any improvements they feel will better suit environmental needs, will ensure that the best solution to meet the required land drainage LoS will be constructed whilst also maintaining focus on environmental improvements and water quality
Incentives Encourage the application of LID throughout the community, soakage, rain gardens and other source treatment options	• Community education and interaction to promote the use of flow calming, detention/attenuation ponds and other source treatment options, this will enable the mitigation of damage from peak flows and to allow for water quality treatment prior to the discharge to the receiving environments
Community education and/or interaction Develop partnerships with the communities in the district	• Production of Engineering Standards to aid development in the selection of the best practicable option for land drainage management; and • Working with schools and engaging the community at an earlier level to promote water health
Connection denial Regulation of connections to the public system to promote long term stability	• Where development occurs within the urban area of the land drainage district, or where substantial increases in growth are identified Council may consider the option to force developers to treat and attenuate stormwater runoff from the development within their site boundaries this will help mitigate any large flows directly impacting on the current land drainage network

3.3 INCREASE IN LAND DRAINAGE SERVICES

With the proposed changes to the climate and sea level there is already growing concern regarding the current LoS and how this will be affected. It has already been proposed that catchment wide hydraulic assessments will need to be conducted to identify the changes in rainfall and expected runoff, and how this will be affected by sea level rise and what the repercussions to the current land drainage districts may be.

Due to sea level rise there will be other areas throughout Kaipara that may be identified as being at risk and may require the implementation of land drainage infrastructure.

3.4 TECHNOLOGICAL CHANGE

Historically the methodology for dealing with floodwaters was to collect it in large open drains and canals and discharge this through floodgates as soon as possible to remove this from the workable land. It is also noted that the current drainage district is situated in such a way that the time of concentration allows for large portions of floodwaters to be removed through the floodgates between tides before larger flows from the rear of the catchment make it to these points. This allows for the stakeholders' properties to remain mainly free of floodwaters whilst the floodwaters flow in a controlled manner into the receiving environment. Discharges were made direct to the receiving environment with little regard to the potential contaminants that they may contain, and the effects they could have on the stability and functioning of the ecosystems.

Over the past two decades there has been a philosophical shift in this principle as new technologies have been developed to promote LID in the management of floodwater. This involves implementing solutions to mimic the natural environment prior to development and managing the impacts on the receiving environments.

Such advancements in floodwater management include the application of a treatment train approach i.e. the use of two or more treatment methods in series to provide more effective contaminant removal, such as the use of ground soakage to maximise groundwater recharge and riparian planting around watercourses.

This shift in philosophy is supported by Council and guidance for its application is provided in the Engineering Standards and supporting documentation.

Technological advances in stormwater management are leading to more economically feasible devices entering the mainstream market and becoming more widely used. Stream restoration and riparian planting is replacing the standard lined channel, whilst the general treatment train approach to water quality is being applied to greatly improve discharge quality to lessen the effect on the receiving environment.

Council considers the use of wetlands and detention basins for stormwater management integral parts to mimicking the natural flow regime in the receiving environment, whilst providing good levels of treatment.

Council is committed to working with NRC to implement new technology for stormwater management throughout the Kaipara district. A constant awareness of technology changes is necessary to effectively predict future trends and their impact on the utility infrastructure assets.

Although as stated above there have been advances in land drainage management and how this can be implemented in either a limited capacity or on a larger grandiose scale, the terminology and engineering behind these practical solutions still hold the same for land drainage as it is stormwater that we are trying to treat and remove from the current network. Whilst there will still be a greater reliance on large canals and waterways to remove the peak flows, riparian planting, detention ponds and other source treatment options will still remain options when trying to treat for water quality and design.

This can be achieved through Council staff attending conferences, seminars and presentations along with seeking advice from professional advisors.

3.5 WATER QUALITY

Environmental considerations are an ever-changing issue. As such, there is a requirement for Council to provide the best service it can with the most up-to-date information.

With climate change and predicted sea level rise KDC will need to alter its focus and the considerations around flood levels, stormwater discharge and consented discharge limits to match the requirements from NRC, the change in public expectations and the altering natural environment.

Public perception of the impact of stormwater on the natural environment has altered noticeably over the last decade and has turned towards treating stormwater at the source and maintaining the quality of the harbours and waterways. The quality of stormwater runoff therefore has a significant impact on the quality of the receiving environment, being streams and rivers.

There is a growing awareness of the environmental issues related to the quality of stormwater runoff on the receiving environments of our streams, rivers and groundwater and its impacts on our cultural, social and economic well-being.

Council, in conjunction with NRC, and communities are dedicated to protecting receiving environments, to protect it for future generations and to improve on the existing state. This is achieved through:

- Management of silt runoff from new development earthwork areas (including silt pond requirements for developers)
- Management of point source contamination risks (through the current Engineering Standards and community education); and
- Monitoring the receiving environments.

It is likely that as time progresses and more knowledge is gained from monitoring programmes about the effects of contaminants on the receiving environments that more stringent conditions will be applied on resource consents granted by NRC, including, but not limited to:

- Targeted contaminant removal (for example reduction in zinc loads)
- Increased overall treatment efficiency of stormwater management devices; and
- Greater application of LID in the overall stormwater management on a catchment basis.

3.6 CHANGES IN WEATHER PATTERN

The expected changes in the climate experienced for Kaipara is detailed in the Kaipara Activity Management Overview.

Some of the potential impacts of climate change on land drainage infrastructure could include:

- Increased flood frequency resulting from more intense rainfall
- Increased number of systems that do not have an appropriate LoS capacity, due to increased overall rainfall and raised groundwater tables
- Increased coastal flooding through higher tide and surge levels
- Increased flooding due to higher tides and rainfall breaching existing stopbanks
- Increased flooding due to higher **low** tides retaining stormwater and inundating an existing system by removing the ability for it to drain completely

- Potential overwhelming of existing treatment devices leading to increased contaminant loadings in the receiving environment; and
- Increased coastal and fluvial erosion resulting from increased tide variations and discharges from the stormwater system.

NRC monitors rainfall at five sites throughout the Kaipara district to understand the long-term effects of climate change on rainfall patterns. In addition, the National Institute of Water and Atmospheric Research (NIWA) maintains rainfall monitoring through an automatic station in Dargaville.

The development of Council's Engineering Standards provides design rainfall for Dargaville, Tinopai, Maungaturoto and Mangawhai areas of the district, being the main population centres. The rainfall depths provided in the Engineering Standards have been estimated up to the 100-year event; 72-hour duration and include adjustment for 95% confidence.

For developments in other areas the current Engineering Standards acknowledges NIWA's High Intensity Rainfall Design System (HIRDS) version 2, which outlines rainfall depths + 1.65 standard error + 17% climate change allowance.

4 PROPOSED LOS AND PERFORMANCE MEASURES

4.1 COMMUNITY ENGAGEMENT

In the first instance Council consults with the drainage committees who represent the community. If required Council will engage the public to gain an understanding of customer expectations and preferences. This enables Council to provide a LoS that better meets the community needs. Council's knowledge of customer expectations and preferences is based on:

- Drainage Committee meetings
- Feedback from public surveys and public meetings
- Feedback from elected members
- Analysis of customer service requests and complaints; and
- Consultation via the Annual Plan and LTP process.

Council undertakes customer surveys on a regular basis, using the National Research Bureau Ltd. These customer perception surveys assess levels of satisfaction with key services, including stormwater, and the willingness across communities to pay for service improvements.

4.2 THE LEVEL OF SERVICE (LoS)

The following assumptions underlie the levels of land drainage service:

- Drains will have the capacity to enable floodwater to recede within three tidal cycles, design Average Recurrence Interval (ARI) for rural areas is 10%
- Stopbanks are 2.6m above Mean Sea Level leaving 0.5m above extreme high tide for the Raupo area
- Raupo Drainage Committee, a formal committee of Council, is in place to perform delegated functions
- All flood protection activities outside of RDD are administered by informal community committees supported, where practical, by Council's Land Drainage Co-Ordinator, in accordance with each Committee's request for assistance. Maintenance on privately owned stopbanks is undertaken by the landowner; and
- NRC is responsible for catchment management.

The LoS reported in the table below are customer focused and are included in the LTP:

Table 6: LoS and performance measures

Measuring performance				
What we measure	**LTP Year 1 Target 2021/2022**	**LTP Year 2 Target 2022/2023**	**LTP Year 3 Target 2023/2024**	**LTP Year 4-10 Target 2024/2031**
The number of flood events not contained by the drainage schemes up to a 1:5-year flood.	0			
Service requests for broken, blocked, or failing floodgates.	< 10 service requests per year	< 7 service requests per year	< 5 service request per year	< 5 service requests per year
Service requests for additional cleaning of drains i.e. missed by the monitoring and maintenance programmes.	< 5 service requests per year			

Measuring performance				
What we measure	LTP Year 1 Target 2021/2022	LTP Year 2 Target 2022/2023	LTP Year 3 Target 2023/2024	LTP Year 4-10 Target 2024/2031
Biannual inspection of our drainage network to ensure it can contain a 1:5-year flood.	2 inspections per year			
Targeted maintenance of the stopbank system in the Raupo Drainage District to prevent tidal flows from inundating private property during high tide and/or when the river is in flood.	Minimum yearly inspections and targeted maintenance completed			

Improvement plan: Targeted maintenance of all stopbanks, stopbank ownership and ensuring all land drainage protections are at the same standard will be an improvement over the next LTP Period.

4.3 SYSTEM ADEQUACY

This largely reflects the capacity of the system to capture and convey the flows arising from extreme weather events without damage occurring to habitable floors or arable land. This is not well defined across the district and it is intended to undertake a number of SWCMP studies in areas subject to growth or with known historical issues. This will identify capacity shortfalls, works that should be undertaken and also- minimum floor levels that should be adopted for any new construction inside the land drainage boundaries. The SWCMPs will provide a level of clarity that the desired level of capacity can be achieved for each of the subject areas that is not currently available and will provide much needed guidance on the effects of proposed sea level and climate changes. Areas that have not been studied and/or upgraded will remain at the LoS that has been historically provided.

There are two primary elements to the discharge of floodwater and KDC has limited capability to influence either at this time:

Water quality

Floodwater discharges, collects and conveys whatever contaminants are on the ground surface into the receiving waterways. This varies from grow contaminants such as rubbish, drink bottles etcetera, biological contaminants such as e-coli, chemical contaminants such as zinc, fertilisers etcetera and particle contaminants such as clay.

There is a range of technologies available to reduce these contaminants including chemical treatment, physical filters and settling ponds together with natural processes that focus on reducing flow velocities, maintaining groundcover and encouraging natural filtration by directing flow through planted areas. These tend to work best with less intense storms when volumes and flow rates are lower.

KDC has limited resourcing in this area with the main direction coming from the land drainage committee itself, and also with the main focus being on removing flood waters as soon as possible and not relying on retention/detention structures within the existing flow paths. There are currently two detention ponds at the south end of the drainage district which perform satisfactorily in providing attenuation during large storm events, there is no requirement or focus on upgrading these at this date.

While KDC supports a greater focus on water quality it can only be implemented where practicable and is not always possible in every situation, the members and stakeholders of the RDD understand and promote water quality though temper this with the requirement to allow floodwaters unfettered access to the discharge points to maintain the current LoS to the greater community.

Flow rates

A discharge consent could specify flow rates for a particular return period storm but KDC has very limited capacity to influence this.

4.4 DESIGN PARAMETERS

Design parameters for all new land drainage assets are not well defined. Documentation on the history of land drainage in the RLD district identifies design capacities for drains and canals but does not specify standards of construction for any assets.

As a result, the installation of new culverts has varied, with undersized and oversized culverts been installed.

The Drainage Committees, together with Council, needs to review what knowledge they have regarding design standards and document a definitive standard for the design and construction of land drainage assets.

Future standards could either be included in Council's existing engineering design standards or separately in a specific land drainage standard for design and construction.

5 MAINTENANCE AND OPERATING STRATEGY

5.1 MAINTENANCE AND OPERATIONS

Table 7: Maintenance strategies for land drainage assets

Asset/failure mode	Action	Key service criteria	Impact
General maintenance			
All assets	Maintain assets in a manner that minimises the long term overall total cost while ensuring efficient day-to-day- management	Cost/affordability	Low/Medium – increased costs and risk of failure
Unplanned maintenance			
All assets Disaster i.e. cyclone and/or major flooding, stopbank collapse, floodgate collapse, pump malfunction	Maintain a suitable level of preparedness for prompt and effective response to flooding, stopbank or floodgate collapse or pump failure by ensuring the availability of suitably trained and equipped staff and service delivery contractors. Specifically: local engineers and property owners	Flood prevention	Medium – flooding of private property
Planned inspections			
All assets	Undertake scheduled inspections as justified by the consequences of failure on LoS, costs or safety	All	Low Slow to react to minor flooding caused by premature asset failure
Planned preventative maintenance			
As with planned inspections	Undertake programme of planned asset maintenance to minimise the risk of critical asset failure (e.g. pump overhaul) or where justified economically (e.g. racetrack re-levelling)	All	As with planned inspections

5.2 RENEWALS STRATEGIES

The general renewal strategy is to rehabilitate or replace floodgate structures or gates, when justified by:

- **Asset performance:** Renewal of an asset when it fails to meet the required LoS. The monitoring of asset reliability, capacity and efficiency during planned maintenance inspections identifies non-performing assets. Indicators of non-performing assets include:
  - Excessive inflow of river water during high tide
  - River water is migrating between the floodgate and the stopbank; and
  - The floodgate does not have sufficient capacity to drain floodwaters within two days.
- **Economics:** It is no longer economic to continue repairing the asset (i.e. the annual cost of repairs exceeds the annualised cost of renewal). An economic consideration is the co-ordination of renewal works with other planned works such as road reconstruction.

Planned and reactive replacement works are prioritised and then programmed or, in urgent cases, undertaken immediately.

Table 8: Selection criteria for asset renewal

Priority	Renewal criteria
1 (High)	• Failure has occurred and renewal is the most efficient lifecycle cost alternative • Asset failure of key system component is imminent • Regular maintenance required: **more than three visits annually;** and • Road upgrading scheduled for the current financial year.
2	• Maintenance requiring **more than three visits per two month period** in past twelve months; and • Difficult to repair, due to fragile nature of material, or obsolescence.
3	• Pipe or structure maintenance involving two to three visits annually.
4	• Existing assets have a low level of flexibility and efficiency of replacement alternative.
5 (Low)	• Existing asset materials or types are such that known problems will develop in time.

The renewal strategy will be reviewed at least annually.

If work is deferred for any reason, this work will be re-prioritised alongside the next year's renewal projects and a revised programme established.

Renewal works identified by way of the above renewal strategies may be deferred if the cost is beyond the district's ability to fund it. This situation may arise if higher priority works are required on other infrastructure assets; short term peaks occur in expenditure or if an inadequate rating base exists.

When renewal works are deferred, the impact of the deferral on economic inefficiencies and the scheme's ability to achieve the defined service standards will be informally assessed. Although the deferral of some renewal works may not impact significantly on the short term operation of assets, repeated deferral will create a liability in the longer term.

A register of all deferred works will be maintained, the total value of which will be recognised in the financial reporting.

Note*:* Stopbanks, drains and canals are not considered for renewal. Their functionality is preserved through regular maintenance.

5.3 DEVELOPMENT STRATEGIES

Currently, Council and the drainage committee have no intention of developing the network to create more or greater areas of land drainage, though Council will be reviewing the current status of the land drainage areas and their ability to cater for climate change and sea level rise.

5.4 DISPOSAL STRATEGIES

Due to the nature of this activity, it is unlikely that any drainage assets will need considered for disposal.

The only exception to this statement is the depot building and land, which are now surplus to the needs of the drainage committee. Options in relation to this asset are now being considered by Council.

5.5 LAND DRAINAGE OPERATION PLAN

The general operational plan is to maintain the current capacity of the drainage network through regular inspection of the network and minimisation of interference in hydraulic capacity (weed clearing, spraying etcetera).

The table below shows the operational strategies carried out to ensure that the defined LoS are met and the key service criteria that are affected if the action is not carried out.

Table 9: Land drainage operational strategies

Asset/failure mode	Action	Key service criteria	Impact
Drains and channels			
Drains	Weeds will be controlled to minimise loss of hydraulic capacity Frequent inspections to ensure hydraulic capacity is maintained	System capacity and efficiency	Med/High – flooding
Unable to reach assets to maintain	Access roads to the floodgates, drains and the pump station will be maintained to provide a level of vehicular access appropriate to each area	Responsiveness	Low – delay in completing maintenance activity
Floodgates			
Debris build-up keeps gate open/shut against water flow	Floodgates regularly inspected and cleared if necessary, to ensure correct operation	System capacity and efficiency	Low – minor flooding in low lying areas near river
Stopbanks			
Stopbanks Slumping of banks results in increased risk of overtopping	Stopbanks inspected frequently to ensure bank stability is preserved, and weak or low areas can be identified and adequately addressed	System capacity and reliability	High – over topping results in stopbank damage and flooding

Asset/failure mode	Action	Key service criteria	Impact
Saltwater infiltration through the stopbank	Stopbanks inspected regularly to ensure that there is no sign that salt water is piping through the bank	Reliability	Critical – failure of a section of stopbank at high tide or during a storm event 'could' have extreme repercussions for the residents of that district
Storm pump			
Pump station Mechanical or electrical failure	The pump station will be inspected, and maintenance undertaken on the pump motor on a monthly basis to ensure pump is in satisfactory condition	Reliability	Medium – pump failure occurs and flooding results
Portable pump Mechanical failure	The portable pump will be tested annually to ensure standby pumping capacity is available in the event of a failure at the pump station	Availability/reliability	Low – localised flooding

6 EXPENDITURE FORECASTS

6.1 OPERATIONS AND MAINTENANCE EXPENDITURE

The 10 year forecast for operations and maintenance costs for land drainage assets in the Kaipara District are shown in the following graphs.

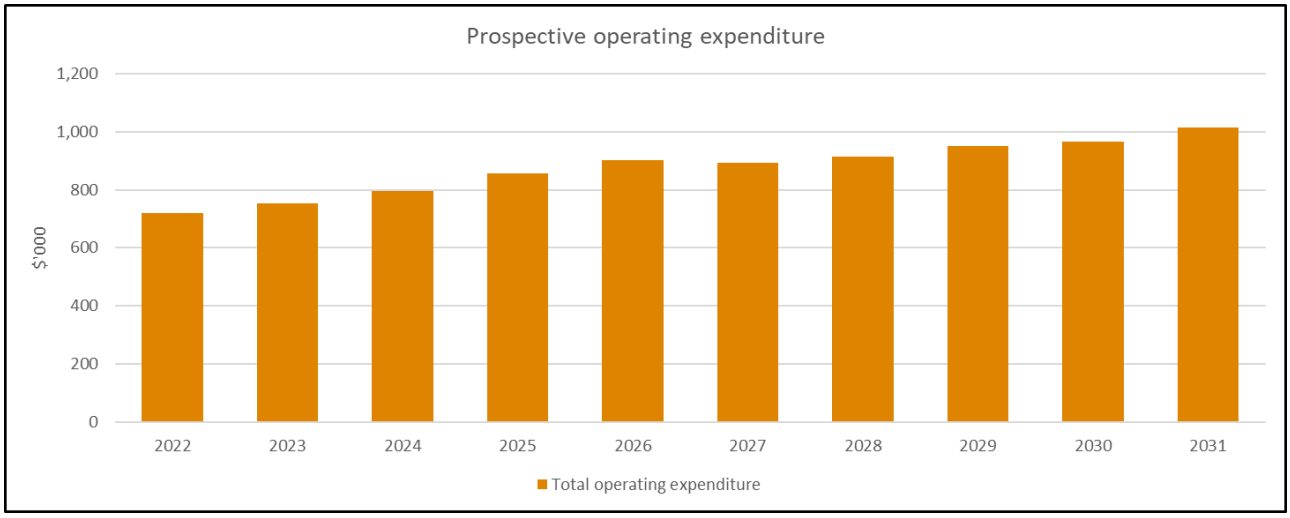
They do not provide for inflation over the 10 year period and do not include the following:

- Costs that would be allocated by Finance including depreciation, interest charges, write-offs and land rates payable for land occupied by facilities
- Costs associated with staff

Table 10: OPEX forecasts

For the year ended:	Annual Plan	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget
30 June	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031
	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000
Prospective Funding Impact Statement											
Activity selection: Flood Protection and Control Works, All, All											
Operating funding											
Sources of operating funding											
General rates, uniform annual general charges, rate penalties	78	136	164	170	63	322	332	341	-90	-50	-9
Targeted rates	714	843	911	957	956	996	989	1,013	1,049	1,053	1,089
Subsidies and grants for operating purposes	0	0	0	0	0	0	0	0	0	0	0
Fees and charges	8	0	0	0	0	0	0	0	0	0	0
Internal charges and overheads recovered	0	0	0	0	0	0	0	0	0	0	0
Interest and dividends from investments	0	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tax, fines, infringement fees and other receipts	0	0	0	0	0	0	0	0	0	0	0
Total operating funding	**800**	**979**	**1,074**	**1,126**	**1,019**	**1,318**	**1,321**	**1,354**	**959**	**1,003**	**1,080**
Application of operating funding											
Payments to staff and suppliers	419	555	577	607	655	686	676	694	725	726	755
Finance costs	0	1	1	1	0	0	0	0	0	0	0
Internal charges and overheads recovered	89	163	175	188	202	216	216	218	226	240	259
Other operating funding applications	0	0	0	0	0	0	0	0	0	0	0
Total applications of operating funding	**508**	**719**	**752**	**795**	**858**	**902**	**893**	**913**	**951**	**966**	**1,014**
Surplus (deficit) of operating funding	**293**	**260**	**322**	**331**	**161**	**416**	**429**	**441**	**9**	**37**	**66**

Figure 2: Prospective OPEX



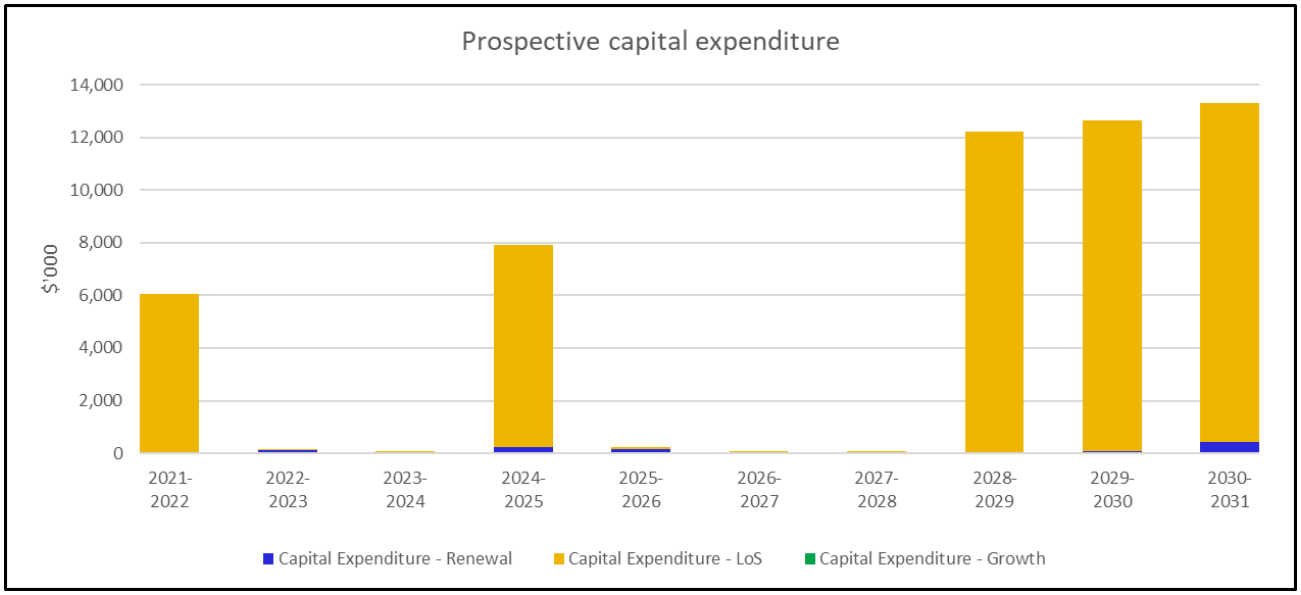
6.2 CAPITAL EXPENDITURE

The 10 year forecast for capital expenditure is shown in the table below:

Table 11: CAPEX forecast

For the year ended:	Annual Plan	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget	Budget
30 June	2020-2021 $'000	2021-2022 $'000	2022-2023 $'000	2023-2024 $'000	2024-2025 $'000	2025-2026 $'000	2026-2027 $'000	2027-2028 $'000	2028-2029 $'000	2029-2030 $'000	2030-2031 $'000
Prospective Funding Impact Statement											
Activity selection: Flood Protection and Control Works, All, All											
Capital funding											
Sources of capital funding											
Subsidies and grants for capital expenditure	0	6,000	0	0	7,791	0	0	0	12,599	13,015	13,445
Development and financial contributions	0	0	0	0	0	0	0	0	0	0	0
Increase (decrease) in debt	16	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Gross proceeds from sale of assets	0	0	0	0	0	0	0	0	0	0	0
Lump sum contributions	0	0	0	0	0	0	0	0	0	0	0
Other dedicated capital funding	0	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding	**16**	**5,999**	**-1**	**-1**	**7,790**	**-1**	**-1**	**-1**	**12,598**	**13,014**	**13,443**
Applications of capital funding											
Capital expenditure - to meet additional demand	0	0	0	0	0	0	0	0	0	0	0
Capital expenditure - to improve the level of service	0	6,060	62	63	7,655	67	69	71	12,193	12,523	12,861
Capital expenditure - to replace existing assets	155	0	103	0	249	179	0	0	4	100	435
Increase (decrease) in reserves	155	200	157	267	47	170	359	369	410	428	213
Increase (decrease) of investments	0	0	0	0	0	0	0	0	0	0	0
Total applications of capital funding	**310**	**6,260**	**321**	**330**	**7,951**	**415**	**428**	**440**	**12,607**	**13,051**	**13,509**
Surplus (deficit) of capital funding	**-293**	**-260**	**-322**	**-331**	**-161**	**-416**	**-429**	**-441**	**-9**	**-37**	**-66**
Funding Balance	**-1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Figure 3: Prospective CAPEX



The above budgets are based on asset need requirements in the graphs and table below:

Table 12: 10 year Capital projects

Primary driver	Community	LTP Project name	Expected timing	Total
LoS	District-wide	District-wide land drainage – Te Kopuru stopbank	2021/22	$3,500,000
		District-wide land drainage – Awakino East stopbanks	2024/25	$7,000,000
		District-wide land drainage - Improvements	Annual	$600,000
		District-wide land drainage – Eastern Wairoa stopbanks	2028/29 - 2030/31	$15,000,000
		District-wide land drainage – Kaihu stopbanks	2028/29 - 2030/31	$15,000,000
Renewal	Aratapu Swamp	Charity Hill Road floodgate	2029/30	$50,000
	Awakino Point	Awakino Point floodgate replacements	2031/32	$25,000
	Awakino Valley	Awakino district floodgate replacements	2029/30 - 2030/31	$60,000
	Horehore	Hore Hore floodgate replacement	2030/31	$103,500
	Mititai	Mititai floodgate #1	2030/31	$82,000
	Notorious	Notorious floodgate #6	2030/31	$50,000
	Oruariki	Oruariki Stream floodgate	2024/25	$130,000
	Owairangi	Owairangi floodgate replacement	2030/31	$50,000
	Raupo	Raupo Gent floodgate	2022/23	$65,000
		Internal stopbanks	2021/22	$2,500,000
		Double gate FG44	2022/23	$35,000
		Raupo Northash Thompson	2024/25	$100,000
		Raupo Whitcombe floodgate	2025/26	$80,000
	Tatarariki #1	Tatarariki #1 floodgate	2025/26	$80,000
	Tatarariki #3	Tatarariki #3 floodgate	2028/29	$3,000
			Total	**$44,513,500**

7 RISK MANAGEMENT (INCLUDING HEALTH AND SAFETY)

The table below identifies Council high and extreme risks, together with potential impact, current controls and an action plan to mitigate, minimise or manage the risk.

Table 13: Summary of extreme and high risks

LoS failure indicator	Asset group	Asset sub-group	Caused by	Risk Severity	Controls	
					Existing	To develop
Flooding, slips, accidents and injuries	Open drain network	Public open drains	Liability from third party accident in open drains	H	The piping of open drains is considered on a case by case- basis	
Unavailability of urban roads, flooding	Piped network	Inlets and outlets	Vandalism	H	Routine and reactive inspections	
	Flood Alleviation Infrastructure	Stopbanks	Extensive damage (earthquake or other natural hazard)	H	Response planning	
		Flood detention systems	Extensive damage (earthquake or other natural hazard)	H	Response planning	
	Managerial and governance risks	Corporate risk	Inadequate Corporate Risk Policy	H	Council Corporate Risk Policy developed 2012	
Inefficient management of assets, significant asset or service failure occurs with no management plan	Asset design and construction risks	Asset records	Asset records not up-to-date	H	Asset records from physical works projects and maintenance activities are updated into AssetFinda	To include all asset changes in asset register

8 CONTINUOUS IMPROVEMENT

8.1 OVERVIEW

The following priority improvement tasks have been identified after consideration of priorities identified in the indicative AM assessment and gap chart analysis:

Asset knowledge

1 **Asset capacity**. Investigation of stopbank levels and relative increase in high tide levels from design levels and assessment of potential overtopping during high rainfall events.

2 **Asset Lives**. Start collecting installation dates for all future renewals and where possible determine installation dates for existing assets.

Strategic planning

1 **Asset protection**. Investigate options to retain creeping/slumping banks in problem drains.

2 **Resource consents.** Determine impact of WASP on floodgate outlet maintenance and reflect impact in this SAMP.

3 **Culvert replacement**. Determine required culvert sizes in roadside drains to ensure drain capacity preserved.

4 **Ponding areas**. Identify and map extent of ponding areas during flooding for different rainfall events.

Information systems

1 Asset lifecycle costing. Collect operation, maintenance, and renewal costs at component level to enable a better understanding of maintenance and renewal trends to be developed and reflected in future AMPs.

Strategic Activity Management Plan (SAMP)

1 **Plan update**. Update the relevant information in the SAMP following the completion of the above tasks.

8.2 ASSET MANAGEMENT IMPROVEMENT PROGRAMME

The 3 year improvement programme identifies priorities for the improvement tasks detailed below.

Table 14: 3 Year Improvement Plan

Description	When
• Investigate and commence stopbank improvement projects funded through external funds - Raupo internal stopbanks (G and K Canals) and Te Koporu to Dargaville stopbanks • Model infrastructure requirements for flood susceptible areas to allow LoS under increasing rain intensity and river level. Use this to plan LoS projects for stopbanks, floodgates and other network infrastructure • Complete asset data for stopbanks in the all land drainage districts. Develop a standard for routine condition assessment of these assets in 100m lengths by the contractor and complete this assessment • Murphy Bower stopbank construction commences subject to landowner agreement • Asset data collated into Asset Management system (Assetfinda) (three year plus project to include all of the drainage district unless a chunk of money goes towards it) • Increasing support to land drainage districts for increasing pressures of climate change • Develop maintenance schedule with maintenance contractor and asset management improvements for clarity on ownership and responsibility of core assets	2021/2022
• Continue investigating floodgate and infrastructure options in all drainage districts • Continue modelling infrastructure requirements for flood susceptible areas to allow LoS under increasing rain intensity and river level. Use this to plan LoS projects for stopbanks, floodgates and other network infrastructure	2022/2023
• Continue investigating floodgate and infrastructure options in all drainage districts • Continue modelling infrastructure requirements for flood susceptible areas to allow LoS under increasing rain intensity and river level. Use this to plan LoS projects for stopbanks, floodgates and other network infrastructure • Increasing support to land drainage districts for increasing pressures of climate change • Construction of stopbank improvements completed	2023/2024
• Continue investigating floodgate and infrastructure options in all drainage districts • Complete modelling infrastructure requirements for flood susceptible areas to allow LoS under increasing rain intensity and river level. Use this to plan LoS projects for stopbanks, floodgates and other network infrastructure • Continue to increase support to land drainage districts for increasing pressures of climate change • Align investigations, modelling and feasibility activities with climate change adaptive strategies [adaptive pathways planning decisions]	2024/2031