



# REGIONAL ASSET MANAGEMENT PLAN - 2024

TŌ TAIAO – HE AHA NGĀ  
TINO TAKE?



FLOOD PROTECTION AND CONTROL WORKS  
RIVER MANAGEMENT  
LAKE LEVEL MANAGEMENT  
LAND DRAINAGE



*Waikato Regional Council Policy Series 2024/14*

*ISSN 2230-4363 (Online)*

*ISSN 2230-4339 (Print)*

*Published December 2024*

Peer reviewed by Zone Managers and Integrated Catchment Management Director February 2024

Approved for release by Business and Technical Services Section Manager February 2024

Endorsed for release by Integrated Catchment Management Committee April 2024

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# ACKNOWLEDGEMENTS

**Integrated Catchment Management Committee**

**Integrated Catchment Management Directorate**

# EXECUTIVE SUMMARY

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The Regional Asset Management Plan (RAMP) aims to provide a line of sight on how the Waikato Regional Council (WRC) vision and purpose is being translated through to the routine and improvement actions that are being performed on the flood management infrastructure, river and lake management infrastructure, and land drainage infrastructure activities undertaken by the council.

## Strategic Direction

Waikato Regional Council's purpose is "working together for a Waikato region that has a healthy environment, vibrant communities and strong economy".

Waikato Regional Council has six strategic priorities, and within those are goals for success. The following is how we're going to achieve these:

- Land use is appropriate for long term sustainability.
- Communities, society and the economy are less vulnerable and more resilient to the current and future risks of natural hazards.
- Economic growth ensures natural capital and ecosystem services are maintained.

## Purpose of Regional Asset Management Plan

The RAMP is designed as a tactical document aligned to the key issues raised in the Infrastructure Strategy (2024 – 2074). It is intended to help meet the council's statutory obligations and mission.

This document includes summaries of:

- "Levels of Service" required from the flood infrastructure, river management and lake level structure assets and land drainage assets.
- Roles and responsibilities of various council and community functions in the management and improvement of our asset base.
- Management expectations for the operation, maintenance, renewal, condition monitoring of the asset base.
- Key planned improvement initiatives to increase the effectiveness in delivering Level of Service (LoS) requirements and efficiency in management of assets.

To enable:

- Common understanding of the WRC asset management processes for flood management and land drainage, river management, and lake level management infrastructure.
- Level of service expectations from the asset base, risk thresholds, options, and costs.
- Discussion on the long term works programmes development approach and funding.
- A common communication tool for staff, council, catchment committees, sub committees, iwi, key stakeholders, and ratepayers.
- Management tools and processes that are live and adaptable regarding the changing needs of the assets.

## Aims of the Councils Infrastructure Management Activities

- To meet legislated requirements in the management of our assets.
- To meet WRC Long Term Plan (LTP) requirements.
- To manage the design, operating, maintenance, condition monitoring, renewals, and the review and improvement of activities of our assets and operations to meet agreed levels of service.

## Major Asset Types

The key asset types managed under this Regional Asset Management plan are:

- Pump Stations
- Flood gates
- Stopbanks & Spillways
- Detention Dams
- Drains
- Bridges
- Fencing
- Groynes
- Rock protection
- Weirs and culverts
- Boardwalks/jetties
- Natural assets (i.e. Wetland, planting, storage (room for the river) etc)

The assets owned and managed by WRC were re-valued in December 2022 and have been split by the services provided as follows in table 1:

**Table 1: Current Valuation of WRC Asset Base.**

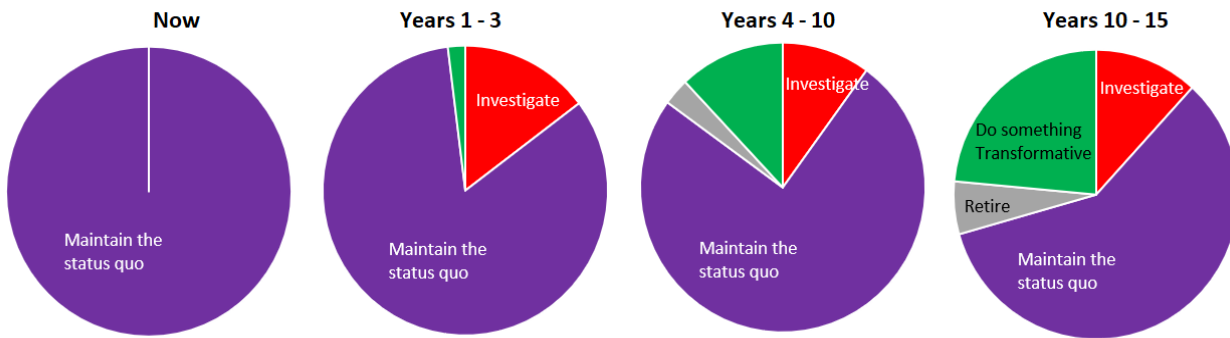
Services Provided	Optimised Replacement Cost (ORC) \$	Optimised Depreciated Replacement Cost (ODRC) \$
Catchment Management	\$5,818,120	\$1,702,666
Flood Protection	\$991,380,896	\$781,396,780
Lake Management	\$637,914	\$559,964
Land Drainage	\$66,938,717	\$62,080,361
Licence Management	\$42,062	\$32,385
River Management	\$57,197,658	\$32,079,294
<b>Total Asset Value</b>	<b>\$1,122,015,367</b>	<b>\$877,851,450</b>

## Key Challenges

The current Infrastructure Strategy has identified several key challenges facing our flood protection, land drainage, and catchment management services. These include:

- Changes in land use in areas where infrastructure is based.
- Morphology changes.
- Scheme affordability for its ongoing maintenance, repair, and upgrading.
- Climate change effects.
- Business capability.

Given the significance of the challenges, community affordability and in some instances practical solutions being unachievable, WRC has identified the need to change from our business-as-usual approach that is focused on maintaining current levels of service to consider alternative solutions. To address these challenges, we are proposing to move to a more informed, risk, benefit and resilience-based approach to our assets, operations, and service provision to our communities. This is a significant transformation, requiring a transition pathway that maintains current best practice, minimises the risk of change and gives us time to assimilate the required knowledge and processes. It also enables us to engage with our communities and key stakeholders in developing solutions together. This transformation pathway is outlined in figure 1 below.



**Figure 1: Transformation timelines.**

Four pathways (tactics) have been identified in transitioning to our new operating state these are:

- maintenance improvement – utilising and optimising our current practices.
- apply our sustainable development and infrastructure strategic priority.
- transformation – critically examining our asset base and engineering solutions.
- collaboration and research – utilising internal and external resources to inform our decisions.

## Key Improvement Areas

Improvement in both the effectiveness of delivery of the Levels of Service required and efficiency in the management of the WRC asset base has occurred over the last 3 years. Key highlights have been the introduction of Infor (asset management system), further development of the Asset Management Policy, updating our best practice project management processes, review and alignment of Levels of Service requirements across the catchment areas.

As a result of the 2022 Asset Management Maturity Assessment (AMMA)<sup>1</sup> and audits from AuditNZ KPMG<sup>2</sup> and the re-valuation process<sup>3</sup>, several areas have been identified for improvement and are highlighted in the table below:

**Table 2: Key asset management areas, and overview of planned improvement activities.**

Area	Improvement Activities
<i>Health and Safety</i>	Review progress against previous health and safety audits. Develop hazard and operability assessments for critical sites. Develop and deliver prioritised health and safety remedial action plans.
<i>Risk Management</i>	Review criticality matrix. Standardise risk quantification and reporting to align with corporate framework. Develop regional resilience models to inform viability and benefits of flood protection and land drainage schemes.
<i>Level of Service</i>	Develop strategies and plans for review of LoS and affordability of schemes including demand management.

<sup>1</sup> [Asset Management Maturity Assessments Final Version - Doc # 25944633](#)

<sup>2</sup> [KPMG Asset Management Audit Folder - Doc # 25714857](#)

<sup>3</sup> [2022 ICM Infrastructure assets Revaluation - Doc # 20293464](#)

Area	Improvement Activities
	<p>Review levels of service (LoS) and further develop key performance indicators (KPI's) including non-technical measures and align them across the zones.</p> <p>Establish soil conservation LoS and complete baseline soil quality data.</p> <p>Agree and implement changes to LoS with landowners, communities, and key stakeholders.</p>
<i>Asset Data and Information</i>	<p>Assess and prioritise key data and information issues and areas for improvement.</p> <p>Develop a proposal for the 2024 LTP for data and information improvement.</p> <p>Implement prioritised data cleansing projects.</p>
<i>Finance and Funding Strategies.</i>	<p>Update the Sustainable Infrastructure Decision Framework (SIDF).</p> <p>Integrate criticality and risk into the SIDF modelling.</p>



# TABLE OF CONTENTS

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<b>EXECUTIVE SUMMARY</b>	<b>iii</b>
Strategic Direction	iii
Purpose of Regional Asset Management Plan	iii
Aims of the Councils Infrastructure Management Activities	iii
Major Asset Types	iv
Key Challenges	iv
Key Improvement Areas	v
<b>TABLE OF CONTENTS</b>	<b>viii</b>
<b>TABLE OF FIGURES</b>	<b>x</b>
<b>GLOSSARY OF TERMS</b>	<b>xii</b>
<b>ACRONYMS</b>	<b>xv</b>
<b>1 ORGANISATION OVERVIEW</b>	<b>1</b>
1.1 Purpose, Vision, Objectives, and Measures	1
1.2 The Services We Provide	2
<b>2 ROLES AND RESPONSIBILITIES</b>	<b>5</b>
2.1 Governance Structure	5
2.2 Operations Structure	5
2.3 Relationship Requirements	6
2.4 Leadership Commitment	7
2.5 Detailed Accountabilities and Responsibilities	7
<b>3 LEVELS OF SERVICE</b>	<b>8</b>
3.1 Overview	8
<b>4 DEMAND MANAGEMENT</b>	<b>9</b>
4.1 Introduction	9
4.2 Challenge 1: Legislation	11
4.3 Challenge 2: Affordability	12
4.4 Challenge 3: Morphological Change	13
4.5 Challenge 4: Climate Change	15
4.6 Challenge 5: Land use change	17
4.7 Challenge 6: Business Knowledge and Capability	18
4.8 Other Demand Drivers related to key challenges.	19
4.9 Sensitivity Analysis	21
<b>5 ASSET HEALTH</b>	<b>22</b>
5.1 Asset Overview	22
5.2 Asset Summary: owned and managed assets	23
5.3 Typical Asset Issues	26
5.4 Condition monitoring results	28



<b>6</b>	<b>RISK MANAGEMENT</b>	<b>38</b>
6.1	Overview	38
6.2	Management of general risks	38
6.3	Natural Hazard risks	38
6.4	Work task specific risks	38
6.5	Asset specific risks	38
<b>7</b>	<b>LIFECYCLE MANAGEMENT PROGRAMMES</b>	<b>40</b>
<b>8</b>	<b>FINANCIALS</b>	<b>41</b>
8.1	Work category definitions	41
8.2	Policies	41
8.3	Funding Mechanisms	42
8.4	Asset Valuation	42
8.5	Historical Financial Performance	44
8.6	Forecasted spend profile	46
<b>9</b>	<b>SUPPORTING SYSTEMS</b>	<b>50</b>
9.1	Asset Information Systems	50
9.2	Asset Information Management	50
<b>10</b>	<b>CONTINUOUS IMPROVEMENT</b>	<b>51</b>
10.1	Improvement process overview	51
10.2	Continuous Improvement Plan	53
<b>11</b>	<b>APPENDICIES</b>	<b>54</b>
	A1 LGA Schedule 10 LTP related plan requirements	55
	A2 WRC Community Outcomes	56
	A3 Asset Lives	59
	A4 Community Adaptation Plans	60
	A5 Drainage Network Summaries.	61
	A6 Catchment Management Zone Summaries	71

# TABLE OF FIGURES

---

Figure 1: Transformation timelines.	v
Figure 2: Waikato Regional Council Strategic Priorities 2023 - 2025.	1
Figure 3: WRC strategic framework for flood protection, lake management and land drainage infrastructure.	4
Figure 4: Governance structure for flood, lake management and land drainage infrastructure.	5
Figure 5: Diagrammatic sketch of where Levels of Service requirements fit.	8
Figure 6: Waikato Regional Council – Key Challenges.	9
Figure 7: Transformation timelines.	10
Figure 8: Age Distribution of Flood Protection Assets	23
Figure 9: Condition grades of major asset types.	29
Figure 10: Flood gate condition 2022/2023.	30
Figure 11: Flood gate change in condition over last year.	31
Figure 12: Pumpstations condition 2022/2023.	32
Figure 13: Pump stations change in condition over last year.	33
Figure 14: Stopbank current condition 2022/2023.	34
Figure 15: Stopbanks change in condition over last year.	35
Figure 16: Stopbank current performance, by location.	36
Figure 17: Key infrastructure lifecycle management programmes	40
Figure 18: Value of assets by services provided.	42
Figure 19: ICM operational task funding by asset related activity.	44
Figure 20: Funding for each activity type, in 2022/23 Financial year, as split across zones.	44
Figure 21: Total 50-year expenditure forecast (includes inflation).	46
Figure 22: Councils Asset Management Maturity – Flood protection and Drainage asset management.	52
Figure 23: WRC Community Outcomes.	56
Figure 24: WRC Line of sight	57
Figure 26: The 10-step decision cycle.	60
Figure 27: District and ICM Zone management boundaries	71

### Owner of the document

The Owner of this document is the Manager, Business and Technical Services. If you have any suggestions for additions to this document or have found any errors, please pass them on to this person.

### Change register

Version	Release Date	Change Description
1	6th July 2018	2018/19 Regional Asset Management Plan Published, Available for use within Council
	9th January 2019	Updated with requested changes in appendix A4, and to Glossary of Terms
2	25th January 2021	All sections reviewed, and updated with new information ready for LTP discussion with RCM
	1 <sup>st</sup> July 2021	2021 Regional Asset Management Plan Published
3	25 February 2024	2024 rewrite complete, ready for review.
	12 <sup>th</sup> July 2024	2024 Regional Asset Management Plan Published

# GLOSSARY OF TERMS

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<b>Annual Plan (AP)</b>	The Annual Plan provides a statement of the direction of the WRC and ensures consistency and coordination in both making policies and decisions concerning the use of the WRC resources. It is a reference document for monitoring and measuring performance for the community as well as the WRC itself.
<b>Annual Exceedance Probability</b>	The probability of a storm event being exceeded in any one year
<b>Aggradation</b>	The accumulation of sediment in rivers and waterways due to sediment supply exceeding the waterways' ability to transport sediment.
<b>Asset</b>	An item, thing or entity that has potential or actual value to the organisation. An Infrastructure asset is an item that typically has a life longer than a year for example buildings, plant and machinery.
<b>Asset Management (AM)</b>	The combination of management, financial, economic, engineering, and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner.
<b>Asset Management System (AMS)</b>	A system (usually computerised) for collecting, analysing, and reporting data on the utilisation, performance, lifecycle management and funding of existing assets.
<b>Asset register</b>	A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, construction, technical, and financial information about each.
<b>Asset renewal</b>	Major work, which restores an existing asset to its original capacity or the required condition (stopbank top-up etc)
<b>Auditor General</b>	The Auditor General of the New Zealand Audit Office.
<b>Benefit cost ratio (BCR)</b>	A ratio which compares the benefits accruing to customers and the wider community from constructing a project with at projects costs.
<b>Brave Gen</b>	WRC Database software for the management of resource consents
<b>Capital expenditure (CAPEX)</b>	Expenditure used to create new assets or to increase the capacity of existing assets beyond their original design capacity or service potential. CAPEX increases the value of an asset.
<b>Climate change</b>	A long-term significant change in the average weather.
<b>Community</b>	A group of people who share a particular geographic location and or common interests, including landowners, beneficiaries of flood management and iwi.
<b>Community outcomes</b>	Outcomes developed with the community, which outline the community's vision and risk thresholds.
<b>Components</b>	Specific parts of an asset having independent physical or functional identity and having specific attributes such as different life expectancy, maintenance regimes, risk, or criticality.
<b>Condition monitoring</b>	Continuous or periodic inspection, assessment, measurement, and interpretation of resulting data, to indicate the condition of a specific component to determine the need for some preventative or remedial action
<b>Condition rating survey</b>	Survey carried out to assess the condition of assets.
<b>Conquest III</b>	WRC's previous Asset Management and Maintenance Action System. Now used for monitoring and reporting pending Infor functionality upgrade.
<b>Critical assets</b>	Assets for which the financial, business or service level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation. Critical assets have a lower threshold for action than non-critical assets.
<b>Culvert</b>	A structure that allows water to flow under a structure or other obstruction. Usually, a pipe.
<b>Current replacement cost</b>	The cost of replacing the service potential of an existing asset, by reference to some measure of capacity, with an appropriate modern equivalent asset.
<b>Deferred maintenance</b>	The shortfall in rehabilitation work required to maintain the service potential of an asset.

<b>Depreciated replacement cost (DRC)</b>	The replacement cost of an asset spread over the expected lifetime of the asset.
<b>Depreciation</b>	The wearing out, consumption or other loss of value of an asset whether arising from use, passing of time or obsolescence through technological and market changes. It is accounted for the by historical cost (or re-valued amount) of the asset less its residual value over its useful life.
<b>Detention Dam</b>	Typically an earth dam/embankment built to catch and detain surface runoff and stream water flow in order to regulate the water flow in areas below the dam.
<b>DISCOVER</b>	WRC Document management warehousing software
<b>Disposal</b>	Activities necessary to dispose of decommissioned assets.
<b>Edge protection</b>	Rockwork or planting to help maintain the integrity of Stopbanks or other flood defences structures.
<b>Enterprise Asset Management System (EAM)</b>	A combination of software, systems and services used to maintain and control operational assets and equipment. The resulting insights help maintenance teams make better decisions, enhance efficiency, perform preventive maintenance, and maximise investments in their physical assets.
<b>Emergency work</b>	The restoration work required to restore an asset damaged by a sudden and unexpected event (e.g. storm event) to its previous condition.
<b>Embankment</b>	In the Waikato Regional Council context, the term ‘Embankment’ is used to refer to earth structures used to control flood waters. This includes the following asset types: Stopbanks, Spillways and Detention Dams
<b>Flood</b>	A flood is when a water level, flow or extent exceeds an agreed threshold causing an adverse effect to people, property or the environment requiring flood risk management.
<b>Floodgate</b>	Adjustable gates used to control water flow for a variety of different reasons. Usually operated during high rainfall events.
<b>Flood Risk Management</b>	Managing the risk of flood impacts on people and property using a variety of mechanisms such as infrastructure, planning, modelling, emergency management and education.
<b>Flood Infrastructure</b>	Built (e.g., stopbanks, floodgates and pumpstations) or natural assets (e.g., wetlands) used to manage agreed risk thresholds (level of service) from flood waters on private and public property or the environment.
<b>Geographic Information System (GIS)</b>	Software which provides a means of spatially viewing, searching, manipulating, and analysing an electronic database.
<b>Land Drainage Risk Management</b>	Managing the risk of ponding and the waterlogging of soils/impacts on land productivity using a variety of mechanisms such as infrastructure, planning, modelling, and education.
<b>Land Drainage Infrastructure</b>	Built (e.g., drains) or natural assets (e.g., streams) used to manage agreed risk thresholds (level of service) for land drainage on private and public property.
<b>Infor</b>	WRC’s current Enterprise Asset Management and Maintenance Action System
<b>Level of Performance</b>	Specific indicators that demonstrate how the asset or organisational process is doing in relation to delivering levels of service. They may be a customer performance measure or a technical performance measure.
<b>Level of Service</b>	Outputs a customer or community receives from the organisation. They should describe what the organisation is agreed to deliver, including attributes relating to risk threshold, quality, reliability, responsiveness, sustainability, timeliness, accessibility, and cost.
<b>Life cycle management</b>	A process of managing an asset from initial construction through to disposal.
<b>Long Term Plan (LTP)</b>	The WRC’s 10-year programme setting out the community outcomes sought, key activities, levels of service, performance measures and funding.
<b>Net Present Value (NPV)</b>	The value of an asset to the organisation, derived from the continued use and subsequent disposal in present monetary values. It is the new amount of discounted total cash inflows arising from the continued use and subsequent disposal of the asset after deducting the value of the discounted total cash outflows.

<b>Non-structural measures</b>	Flood mitigation measures to separate the community from floodwaters.
<b>Optimised renewal decision making (ODM)</b>	An optimisation process for considering and prioritising all options to rectify performance failures of assets. The process encompasses NPV analysis and risk assessment.
<b>Performance Assessment</b>	Assessing if the current infrastructure is continuing to deliver the current level of service agreed with the community.
<b>Pumpstations</b>	Facilities designed to pump large amounts of water from one place to another. Used by WRC to aid in removing surface water behind stopbanks during flood events.
<b>Reach</b>	A defined section of a river, used for management purposes
<b>Remaining useful life (RUL)</b>	Remaining Useful Life of an asset or asset component. (Generally Useful or Effective life less age).
<b>Risk threshold</b>	The point at which a community can no longer tolerate the impacts of a natural hazard event. Adaptation actions or pathways should be implemented prior to a community risk threshold being reached.
<b>River Management Works</b>	Assets built to influence the course, characteristics, or flow of a river to provide some benefit to fish migration, water navigation, and landowners.
<b>River Training Works</b>	Structures built to alter the course of a river channel to suit a perceived need.
<b>Stakeholder</b>	A person or organisation who has a legitimate interest in an activity e.g., community, Iwi, etc.
<b>Stopbank</b>	An embankment adjacent to a river or watercourse, which retains floodwaters from flowing onto a floodplain.
<b>Spillway</b>	A section of embankment adjacent to a river or watercourse designed to be overtopped at a predefined flood level to relieve pressure on the downstream river system and flood protection scheme.
<b>Structural measures</b>	Structures or physical works constructed to keep floodwaters away from existing development e.g. stopbanks
<b>Sustainability</b>	The process of meeting the needs of the present community without compromising the ability of future generations to meet their own needs.
<b>Weir</b>	A man-made barrier across the width of a river channel used to alter river flow by slowing down the rate at which water moves downstream.

# ACRONYMS

AEE	Assessment of environmental effects	LIA	Land Improvement Agreement
AEP	Annual Exceedance Probability	LIDAR	Light Detection and Ranging
AM	Asset management	LoS	Levels of Service
AMIS	Asset management information system	LTP	Long Term Plan
AMP	Asset management plan	LWWCS	Lower Waikato Waipā Catchment Scheme
AP	Annual Plan	MFE	Ministry for the Environment
ARI	Average recurrence interval	MFish	Ministry of Fisheries
AS/NZS	Australia and New Zealand Standards	NAMS	National Asset Management Steering (Group)
BAP	Best appropriate practice	NES-FW	Resource Management (National Environmental Standards for Freshwater) Regulations 2020
BATS	Business and Technical Services	NIWA	National Institute of Water and Atmospheric Research
BAU	Business as Usual	NPV	Net present value
BRE	Business risk exposure	NZIAS16	New Zealand International Accounting Standard
CDEM	Civil Defence Emergency Management	NZTA	New Zealand Transport Agency
CE	Chief Executive	OAG	Office of the Auditor General
CM	Catchment Management	ODM	Optimised decision making
DOC	Department of Conservation	ORC	Optimised replacement cost
DRC	Depreciated Replacement Cost	ODRC	Optimised depreciated replacement cost
EAM	Enterprise Asset Management System	ORDM	Optimised renewal decision making
EMO	Emergency Management Officer	O&M	Operations and maintenance
EW	Environment Waikato <sup>4</sup>	PMI	Project Management Institute
FM	Flood Management	PMO	Project Management Office
FRM	Flood Risk Management	QA	Quality assurance
GHD	Gutteridge Haskins and Davey	RAMP	Regional Asset Management Plan
GIS	Geographic Information System	RAMSAR	Ramsar Convention
GR	General Risk	RM	River Management
GRC	Gross replacement cost	RMA	Resource Management Act 1991
H&S	Health and safety	RPS	Regional Policy Statement
IAM	Institute of Asset Management	RUL	Remaining useful life
ICM	Integrated Catchment Management	SCRCA	Soil Conservation and Rivers Control Act
IIMM	International Infrastructure Management Manual	SLA	Service Level Agreements
IMP	Iwi Management Plan	SLT	Senior Leadership Team
IPCC	Intergovernmental Panel on Climate Change	SNZ HB	Standards New Zealand Handbook (Risk)
IRIS	Integrated Regional Information System	SSoW	Safe System of Work
IT	Information technology	TA	Territorial authority
KPI	Key performance indicator	WRC	Waikato Regional Council
LCM	Life cycle management	WRP	Waikato Regional Plan
LGA 2002	Local Government Act 2002	ZMP	Zone Management Plan

<sup>4</sup> Name changed to Waikato Regional Council April 2011

# 1 ORGANISATION OVERVIEW

## 1.1 Purpose, Vision, Objectives, and Measures

### 1.1.1 Context

The Waikato is the fourth largest region in New Zealand covering most of the central North Island. It covers 25,000 square km (2.5 million ha) stretching from the Bombay Hills and Port Waikato in the north to Mokau on the west coast and across to the Coromandel Peninsula on the east coast. In the south it extends to the slopes of Mt Ruapehu and to the east the Kaimai Ranges. The region has several lakes including the country's largest, Taupō, and the longest river, the Waikato, which passes through eight hydro-electric dams and flows into the Tasman Sea at Port Waikato after a journey of 425km from Lake Taupō. The region has one city (Hamilton) and 10 district councils, three of which lie across the regional boundary.

The council's infrastructure assets protect 3000km<sup>2</sup> of land, as well as critical services and infrastructure from the impact of floods. The land protected in the Lower Waikato and Waihou Piako catchments are estimated to contribute over \$400m annually to the GDP of NZ.

Most schemes were built in the late 1950 and 1970. Expectations and regulatory requirements have changed since then as have climate patterns. Urban areas are ever expanding too, meaning more stormwater runoff into our waterways.

The challenge now is managing these schemes in a way that meets future needs without impacting the natural environment or incurring excessive affordability burdens across generations of rate payers.

### 1.1.2 Organisation Purpose

Waikato Regional Council's (WRC) activities provide guidance and support for the sustainable development of the Waikato region, to ensure the region grows and develops in a way that keeps its values safe for future generations. WRC also has a broader responsibility in combination with others for the economic, social and cultural well-being of the regional community.

### 1.1.3 Strategic Direction

WRC revisited its strategic direction<sup>5</sup> and priorities for the period 2023-2025, considering the Local Government Act, legislative amendments, and internal and external drivers of change. The revised strategic priorities are summarised in figure 2.

The strategic priorities provide the framework to develop and prioritise all work within the WRC. One of these priorities relates to the provision of sustainable infrastructure as part of WRC's flood protection, drainage lake, and river management activities.



Figure 2: Waikato Regional Council Strategic Priorities 2023 - 2025.

<sup>5</sup> [Waikato Regional Council - Strategic direction](#)



## 1.2 The Services We Provide

The Regional Asset Management Plan (RAMP) focuses on the management of flood protection, drainage, river, and lake (level) management infrastructural assets.

It is expected that this is achieved through:

- Coordinated efforts across Council directorates
- Clear line of sight at all stages of decision making to community outcomes<sup>6</sup>
- In consultation with community groups and iwi
- Living the values of Waikato Regional Council everyday

Below in Table 3 it shows the works that are in scope for the delivery of the flood protection, drainage, and river management activities to deliver on the council’s legislative requirements.

**Table 3: Council work areas in scope of the RAMP**

Area	Details
<b>Flood Protection</b>	<ul style="list-style-type: none"> <li>• Operation &amp; Maintenance of flood control assets.</li> <li>• Works programme to reduce deterioration caused by erosion, deposition &amp; flood events.</li> <li>• Technical investigations and strategies to balance environmental, community, and social-economic risks.</li> <li>• Monitoring condition and effectiveness of asset management strategies.</li> <li>• New capital works delivery and upgrading existing assets where additional functionality is justified.</li> <li>• Risk &amp; Resilience assessments.</li> </ul> <p>Councils’ strategic priorities are applied i.e., Biodiversity, Biosecurity and Climate action strategies.</p>
<b>River Management</b>	<ul style="list-style-type: none"> <li>• Operation &amp; Maintenance of river management assets.</li> <li>• Protecting and stabilising riverbanks.</li> <li>• Monitoring &amp; control of bank erosion.</li> <li>• Removing blockages.</li> <li>• River training works (channel management).</li> <li>• Gravel and sand management.</li> <li>• Fence installation &amp; maintenance.</li> <li>• Spatial Planning and land use review.</li> <li>• Risk &amp; Resilience reviews.</li> </ul> <p>Councils’ strategic priorities are applied i.e., Biodiversity, Biosecurity and Climate action strategies.</p>
<b>Lake Level Management</b>	<ul style="list-style-type: none"> <li>• Management &amp; Maintenance of lake level assets.</li> </ul> <p>Councils’ strategic directions are applied i.e., Biodiversity, Biosecurity and Climate action strategies.</p>
<b>Land Drainage</b>	<ul style="list-style-type: none"> <li>• Operation &amp; Maintenance of land drainage networks (both natural, modified, and artificial).</li> <li>• Risk &amp; Resilience reviews.</li> </ul> <p>Councils’ strategic priorities are applied i.e., Biodiversity, Biosecurity and Climate action strategies.</p>

<sup>6</sup> [Takatū Waikato – Making a Stand for the Waikato Strategic Direction 2023-2025](#)

### 1.2.1 WRC Works Areas Out of Scope of the RAMP

The RAMP does not cover other aspects of Council’s work across the region, namely:

- Biosecurity and Biodiversity programmes
- Policy and Strategy development
- Water and Air quality monitoring
- Buses and Transportation management efforts

That said, some biosecurity actions are completed as part of our operating processes, like ensuring vehicle plant and equipment hygiene are met, and maintenance activities such as weed clearing and spraying occur. Biodiversity considerations form part of our project and maintenance processes for example inclusion of fish friendly pumps, use of green solutions like tree layering on riverbanks and riparian planting following construction works.

### 1.2.2 Legislative Requirements

The WRC has responsibilities under various acts of parliament. A detailed list of the legislative framework WRC works under to manage our assets can be found in the RAMP Operational Manual February 2024<sup>7</sup>.

The key overarching levels of service requirements from the Land Drainage and Flood protection legislation are outlined in table 4 overleaf.

**Table 4: Legislative focus areas for flood protection and drainage assets management by any council**

Area	Details
<b>Flood Protection, River, and Lake level Management</b>	<b>System adequacy and maintenance:</b> The major flood protection and control works that are maintained, repaired, and renewed to the key standards defined in the local authority’s relevant planning documents (such as its asset management plan, annual works programme and long term plan).
<b>Land Drainage</b>	<b>System adequacy:</b> The number of flooding events that occur in a territorial authority district. <b>Response times:</b> The median response time to attend a flooding event, measured from the time that the territorial authority receives notification to the time that service personnel reach the site.
<b>All Areas</b>	<b>Customer satisfaction:</b> The number of complaints received by a territorial authority about the performance of its system, expressed per 1000 properties connected to the territorial authority’s system.

<sup>7</sup> [RAMP Operational Manual February 2024 - Doc # 28457474](#)

### 1.2.3 Documentation Hierarchy

The Asset Management Policy requires the Asset Management Plan to meet both the council’s statutory obligations and mission.

The Regional Asset Management Plan does this by bringing together the strategic and tactical requirements laid out through legislation, the WRC mission statement and long-term plans and policies. It provides a comprehensive picture of how the various documents are being translated through to the routine and improvement actions being performed on the flood protection, lake level management, river management, and land drainage assets managed by the council.

It also provides a summary on how well long-term goals are being achieved, allowing a review of whether the current tactics are effective.

Figure 3 shows the linkages between the Regional AMP, key legislative requirements, national and regional policy directive, WRC plans and policies, and other individual plans.



Figure 3: WRC strategic framework for flood protection, lake management and land drainage infrastructure.

### 1.2.4 RAMP Assumptions

This Regional Asset Management Plan (RAMP) has been prepared based on the following assumptions:

- The plan is based on currently available information and data.
- Financial forecasts are for 50 years.
- Financial estimates are to be updated as part of the 2024 LTP preparation / adoption process.
- Existing levels of service are to be maintained, where feasible to do so.
- Council will endeavour to meet all legal and consent requirements for the maintenance and operation of their assets.

## 2 ROLES AND RESPONSIBILITIES

### 2.1 Governance Structure

The Waikato Regional Council is governed by fourteen councillors elected from eight constituencies. The elected council delegates responsibility for various functions to several standing committees. Those committees provide oversight to various aspects of council management & prioritisation.

The Risk and Assurance Committee provide oversight to ensure infrastructure risks, and business processes such as capital project procurement and asset revaluations are managed appropriately.

The Integrated Catchment Committee manages specific community requirements and provides oversight to the services provided for infrastructure.

Flood and Land Drainage Sub- committees made up of members from the local community from within the protected area, district council, and iwi representatives. They provide specific knowledge of local conditions and concerns to the council and staff.

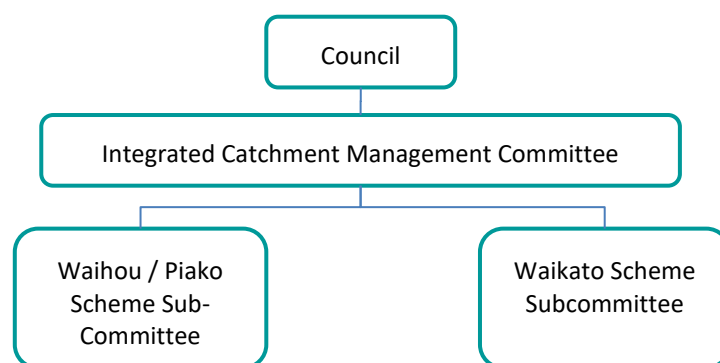


Figure 4: Governance structure for flood, lake management and land drainage infrastructure.

### 2.2 Operations Structure

The Council is divided into different directorates, with several providing functions to support the delivery of infrastructure across the region.

#### 2.2.1 Executive Leadership team

The executive leadership team have overall responsibility for implementing the Long-Term Plan, Financial strategy and 50-year Infrastructure strategy on behalf of the council and affected communities.

#### 2.2.2 Integrated Catchment Management Directorate

The Director of Integrated Catchment Management is accountable for ensuring the Long Term Plan and business-as-usual activities occur.

The Integrated Catchment Management directorate are responsible for delivering the various infrastructure related work programmes on the ground. This includes:

- Pest plant control on council owned or managed land, waterways, lakes.
- River Management and Lake Level Management.
- Capital and maintenance work on existing infrastructure and development of new infrastructure.
- Asset Management and compliance monitoring.
- Working with local communities and district councils on understanding regional natural hazard risks.

To manage these activities the ICM Directorate is split into four operational areas teams and one technical services team.

### **2.2.3 Customer, Community and Services Directorate**

The Customer, Community and Services directorate provides support through ensuring staff have access to systems enabling them to capture and access information about the ongoing condition of the infrastructure assets, capture issues and work performed, and can coordinate with other agencies during events requiring emergency management.

### **2.2.4 Finance and Business Services Directorate**

The Finance and Business Services directorate ensure finance and business management functions, including long term planning, risk management, rating, capital project management, and procurement management are delivered using the correct procedures and staff are acting in a fiscally responsible manner while carrying out their duties.

### **2.2.5 Resource Use Directorate**

The Resource Use Directorate monitoring compliance all new and existing assets and take appropriate action when non-compliance is identified.

### **2.2.6 Science, Policy and Information Directorate**

The Science, Policy and Information Directorate provides technical information and long-term forecasts on climate, legislative and policy changes, social and environmental issues that may affect infrastructure assets performance and locations.

During emergencies the directorate is responsible for the gathering of environmental data (rain fall, river heights etc.) enabling the active management of flood infrastructure assets.

They also are responsible for the management and provision of spatial information on infrastructure assets to staff and the public.

## **2.3 Relationship Requirements**

Relationships are key to ensure the level of protection and service offered by the infrastructure assets is maintained. This includes working with both internal and external stakeholders to ensure each catchments need are prioritised and managed.

Those living within a flood protected zone, or drainage area pay most of the costs towards the upgrading and maintenance of each scheme or system. It is critical they know of works coming up, and the affect they will have on their future rates bills to ensure discussions around affordability occur if needed, or changing the levels of services provided occurs if the current levels are now not sustainable.

WRC acknowledges the special position of tangata whenua within the region and the unique status of the relationship between the Crown and Māori under the Treaty of Waitangi. Council further acknowledges that the relationships it has with Māori are central to the fulfilment of its statutory responsibilities.

Iwi and hapu have a physical, spiritual, and cultural connection with the environment and provide a unique and complementary view of the interaction between the land and waterways and are involved when reviewing if a catchment requires different management practises. Co-management arrangements are in place and include joint management agreements between iwi and the regional council on the way we will work together.

Guiding principles are provided by Te Mana o Te Wai<sup>8</sup>, which embeds tangata whenua values in waterway and lake management.

Other key relationships include collaboration between regional and local authorities which is critical to ensure coordinated management across the region. Management of natural hazards, flood mitigation, and

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<sup>8</sup> [Te Mana o te Wai - Hierarchy of obligations](#)

regional and district statutory planning for instance are examples of critical community services where both regional and local council have statutory roles where a coordinated approach is essential.

Other entities with connected statutory roles are the Department of Conservation (DOC) and Fish and Game established under the Conservation Act 1987. Both have statutory roles that create an interest in the way Rivers and Drainage schemes are managed. This requires collaboration, consultation and information sharing to ensure that scheme management is delivered in a way that recognises the values of both DOC and Fish and Game.

More details of the key stakeholders, and specific requirements of interactions are available in the RAMP Operational Manual February 2024<sup>9</sup>.

## 2.4 Leadership Commitment

Implementation of the Regional Asset Management Plan (RAMP) and Asset Management Levels of Service requires leadership commitment throughout the Council.

This is demonstrated by:

1. Chief Executive and ICM Director endorsement of Asset Management Policy and Infrastructure Accounting Policy.
2. Section Managers, Zone Managers and Team Leaders providing visible support and updates on Asset Management objectives, plans, and Levels of Service performance as part of regular BAU communications.
3. Roles and Responsibilities outlines in the RAMP embedded in WRC ICM organisation.

## 2.5 Detailed Accountabilities and Responsibilities

Detailed Roles and Responsibilities within the council, as relates to the management of infrastructure assets is located in the Infrastructure Roles and Responsibilities<sup>10</sup> document.

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<sup>9</sup> [RAMP Operational Manual February 2024 - Doc # 28457474](#)

<sup>10</sup> [Infrastructure Roles and Responsibilities within Waikato Regional Council - Doc # 26520847](#)

# 3 LEVELS OF SERVICE

## 3.1 Overview

In the Long-Term Plan Levels of Service are developed as KPIs to enable reporting to council and committees on the organisation’s delivery of initiatives. These Levels of Service are recorded in the LTP document.

The second levels of service are those agreed with specific catchment and or drainage communities on the level of protection and service that will be provided by flood, catchment, and drainage infrastructure assets.

These levels of service requirements come from 4 sources (see Figure below).

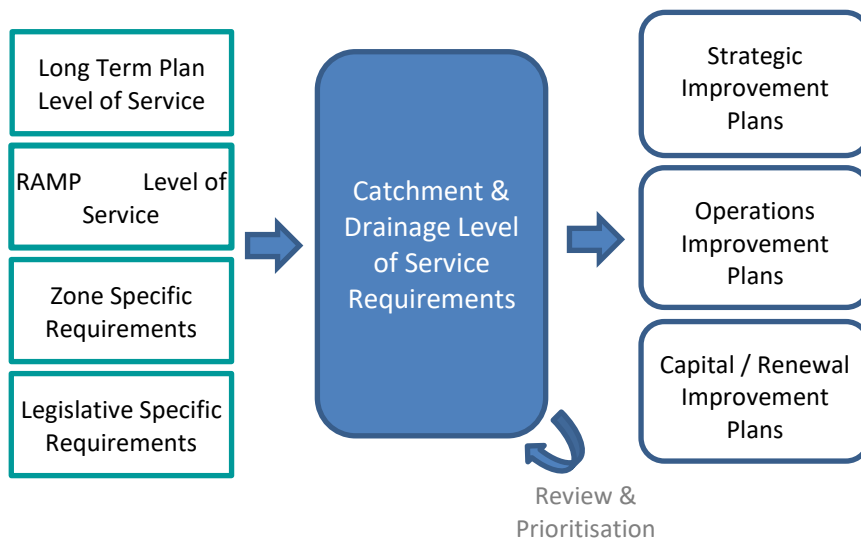


Figure 5: Diagrammatic sketch of where Levels of Service requirements fit.

Details on how the Levels of Service are developed in the RAMP Operational Manual 2024<sup>11</sup>.

From understanding the standard required, and then the local condition and performance of the assets, work plans can then be developed for their ongoing operation and repair.

### 3.1.1 Measurement of achievement

Managers’ report to Committees on legislative requirements, and any other measures agreed with the committee at the frequency agreed with the committee.

Managers’ report to Executive Leadership team on financial achievement of Long-Term Plan and Business as Usual activities.

Changes in levels of service for specific drainage, channel, river, and flood protection systems are made only after consultation through the Long Term Plan processes, where the councillors make the decision on whether public consultation is required or where a new Level of Service is requested, with the targeted ratepayers involved, endorsed through the appropriate committee, and approved by councillors.

Owners of specific improvement plans aligned to achieving Level of Service measures report quarterly on progress to plan, and effectiveness of actions.

Past Performance against targets are located in the appropriate committee or council reports.

<sup>11</sup> [RAMP Operational Manual February 2024 - Doc # 28457474](#)

# 4 DEMAND MANAGEMENT

## 4.1 Introduction

The objective of demand management planning is to consider current and future requirements including demographic, regulatory and climactic changes.

The current draft of the Infrastructure Strategy has identified six key challenges facing our flood protection, land drainage and catchment management services outlined in figure 7 below. These are covered in more detail later in this chapter.



Figure 6: Waikato Regional Council – Key Challenges.

Given the significance of the challenges, community affordability and in some instances practical solutions being unachievable, WRC has identified the need to change from our business-as-usual approach that is focussed on maintaining current levels of service to consider alternative solutions. To address these challenges, we are proposing to move to a more informed, risk, benefit and resilience-based approach to our assets, operations, and service provision to our communities.

Non-asset solutions can include insurance, green engineering and change of land use. It is considered that the most effective way of managing future demand for both new services and changes to levels of service is via a multi-faceted approach. Key issues and future demand areas are captured in WRC’s Infrastructure Strategy (IS) summarised on the next page.

This is a significant transformation, requiring a transition pathway that maintains current best practice, minimises the risk of change and gives us time to assimilate the required knowledge and processes. It also enables us to engage with our communities and key stakeholders in developing solutions together.

The transformation pathway to more resilient communities is outlined overleaf.



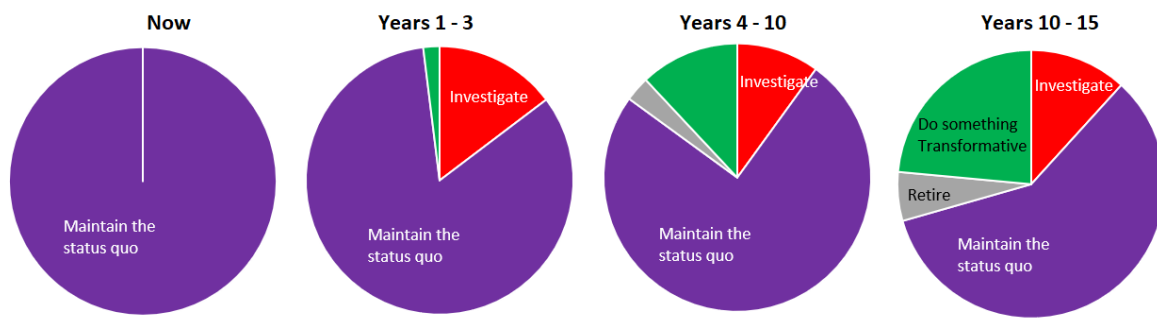


Figure 7: Transformation timelines.

Four tactics (pathways) have been identified in transitioning to our new operating state these are:

1. Maintenance improvement – utilising and optimising our current practices.
2. Apply our Sustainable development and infrastructure strategic priority.
3. Transformation – critically examining our asset base and engineering solutions.
4. Collaboration and research – utilising internal and external resources to inform our decisions.

It is noted that the challenges are often inter-related and an action or impact in one area can have a subsequent effect (positive and negative) in other challenge areas. The Infrastructure Strategy contains a timeline of strategic actions that will be delivered over the course of 3, 10 and 20+ years. Success of the strategy has been defined as:

- Flood management and drainage services are provided in cost effective and efficient way. Improved community resilience to flooding effects, so that the time taken to recover after an event remains the same as today for those areas protected by the scheme.
- Ecosystem services provided by land and water are maintained or improved.
- Nature-based solutions are considered alongside more traditional engineered approaches.
- Council explores cost effective alternatives, including Mātauranga Māori, for flood management and drainage. The quantum of land within flood and drainage area that can be used productively is maintained where appropriate.
- Council makes investment decisions that reduce community vulnerability, risk, and support adaptive responses.
- The council can make long-term decisions on investment need and communities are able to make long-term decisions on the use and development of their land.
- Council removes barriers and enable initiatives to diversify economic activities.

Each of the key challenges are outlined in more detail in the following sections, including a summary overview, areas affected, the effects anticipated and current gaps in knowledge.

## 4.2 Challenge 1: Legislation



The schemes were built with the sole purpose of enabling economic development across the region. Decisions involved the local landowners, who voluntarily (and in some cases involuntarily) donated land to their area's defences. Depending on the district, these agreements were gazetted, and the approach to how the land would be managed after the defences were built was agreed to verbally or captured in meeting minutes.

Time has moved on with over half of the farms now having been sold or being managed by the descendants of those involved in the original development and decisions. Memories have faded as new people have become involved with maintaining the land. Land use has changed as new technologies, methodologies, and markets have become available.

From both a landowner and community perspective, priorities have changed. A more holistic approach is required when making decisions on the upkeep of the existing infrastructure, and the necessity of additional infrastructure.

There have been more than 15 legislation changes since our last Infrastructure Strategy was adopted in 2021. More legislative changes are expected over the coming 12 months with the inception of a new central government. We must respond to legislative and regulatory changes, and we expect that they will continue to change substantially over the next 50 years.

### Areas affected

Flood protection infrastructure, Drainage Networks, River, and Lake Management.

### Effects

The impact of legislative changes depends on the scale and scope of such changes and the timeframe in which they are implemented and need to be complied with. Most legislative changes tend to increase standards and operating requirements and complexity. That in turn adds cost to both capital and operational activities a recent example being the requirement to install safe fish passage on our pump stations.

Legislative change has and will likely continue to require a greater focus on the environmental health of our land, waterways, and native flora and fauna, and the health and safety of people. New acts and legislative change can impact both positively and negatively on our asset base, operations, and our ability to maintain current levels of service. Replacing our assets on a like for like basis is no longer the default option, and we need to consider the impact on the environment more thoroughly including giving effect to Te Mano o te Wai, up and downstream fish passage and carbon footprint to name a few.

### Gaps in Knowledge or strategies

Nationally legislative requirements are changing. Several recent and historical acts have been identified for review. Many of these directly relate to, and impact on, our activity areas. The full impact cannot be known until the changes come into play. Utilising special interest groups (SIG's) and industry lobby groups such as Local Government New Zealand will help in bridging knowledge gaps and developing new strategies and action plans.

Nationally a cost-effective solution for upstream passage of native shortfin & longfin eels does not exist. We don't have a funding policy in place for the implementation of capital new works for the likes of fish passage or other significant upgrades driven by legislative changes.

## 4.3 Challenge 2: Affordability



The majority of the councils' assets were constructed between the late 1950's to 1970's and according to the requirements of the day, with varying design standards, expected asset lives, and levels of service in mind. Regulatory, climactic, morphology and land use change have impacted on the expectations of the assets, meaning that many do not meet current requirements. Added to this, insurance companies are re-evaluating the level of risk they are willing to insure against and may not cover flooding in high-risk areas across our region. Overcoming these shortfalls requires significant investment (including accommodating inflationary pressures of recent times) and needs to be cognisant of asset age, life expectancy,

condition, and performance. These aspects combined mean that council may not have / be collecting adequate monies through rates and depreciation to cover the cumulative range of impacts being experienced. These are inter-generational issues and simply increasing the rates take, or debt burden is not a solution and a combination of asset-based options and financial solutions will be required.

### Areas affected

All ICM's current asset base, landowners, targeted and general rate payers and communities overall.

### Effects

An ineffective asset base compromises all aspects of the ICM's services. It means we may not be compliant with current legislative requirements (Health and Safety at Work Act, Resource Management Act etc). It adds risk to our operational activities and flood and erosion / sedimentation risk to our communities and can compromise the economic productivity of the region.

Paying for the solutions on the other hand can add undue financial pressures to our rate payers and communities meaning schemes may become unaffordable or changes to levels of service are required.

### Gaps in knowledge or strategies

We don't currently have deterioration modelling for all our asset base in terms of condition, and or performance meaning we can't improve on our current funding prioritisation model.

Asset rationalisation and standardisation is embryonic within WRC and will take considerable time to identify opportunities and implement optimised solutions to reap the full benefits.

Increasing contractor engagement is an easy win. Unfortunately, the market is volatile at present, and we could end up locking in unit rates that fall over the next few years. Equally demand for our types of service provision are still in peak demand and rates could continue to rise. This especially the case given the quantum of remedial works being undertaken across the region following the severe weather events.

There are complexities around identifying and negotiating payment for scheme beneficiaries who are not currently contributing to costs.

Financial and economic viability of schemes is currently not known and will require complex modelling and extensive community and stakeholder engagement to get agreement and implementation of options.

The original schemes were partially funded from central government. There is no easy pathway currently available for communities to access central government funding to enable further development of flood defences for their area. The new Government may herald a change in current funding policy and approach from ministries and other crown entities. This could put at risk existing and future programmes of works as well as removing an essential budget stream.

## 4.4 Challenge 3: Morphological Change



We work in a dynamic environment with ever present change. Some of these changes are due to natural events, sometimes exacerbated by human activity, others are due solely to human activity. We see influences from the mountains to the sea with erosion, landslides, deposition of sediments, debris and rock impacting on our asset base and operational activities. Erosion can undermine the

structural integrity of our and community assets including land. Sediment and debris build up can seriously impair the functionality of the drainage system both up and downstream of our assets and can lead to further morphological changes in rivers and streams such as increased risk of flooding or erosion. Lakes can become land locked; river and coastal areas can be smothered in sediment impacting on the productivity and amenity value of these areas.

The Waikato region has several different dominant soil structures on which current infrastructure is built on, the majority being sand, clay, (relatively stable), peat and marine muds less stable and more prone to subsidence.

Subsidence of land is becoming a significant issue for our region, particularly in peat and marine mud areas. Land subsidence around our assets has the effect of reducing its performance and, or compromising the level, alignment, and structural integrity thus reducing its remaining useful life. This impacts both operating and maintenance costs, depreciation and ultimately rates. We are seeing accelerated rates of subsidence in some areas, the causes for this include more intensive farming practices and/or more extensive drainage causing land collapse, and the reduction of soil moisture levels.

### Areas affected

Floodgates, Pumpstations, Gravity and Pumped Drainage Networks.

### Effects

Assets are left “high and dry”, unable to gravity discharge or pump water out of canals, rivers, and drains. Floodgates and weirs that are too high causing water to back up into the surrounding area when there is water in the system. This leads to crop and grass cover damage.

### Gravity Drainage Systems

Levels of service are determined by the drainage network capacity and the downstream water levels. If the ground has subsided and there is not a minimum of a 1:17 drop, the water cannot flow to the floodgate and to the river / canal. It will build up and pond on the low-lying land. Also, if the drained land is close to or lower than the river / canal level, then the floodgate will not open due to the back pressure, and the water will build up on the low-lying land.

As subsidence continues, if these networks are to continue working, they will need to be switched to pumped drainage networks. Local areas could put in private pumping systems. In larger schemes this additional cost will affect the sustainability of current farming practises and the ability of those farms to remain economic to operate. Alternatives could be for farming to cease, and or these areas reverting to wetlands.

### Pumped Drainage Systems

Subsidence affects the ability to get water to the pump station, so it can't be removed. This can result in pumps switching on and off and burning out or being damaged causing unexpected maintenance costs.

Lowering the pump water intake, while using the same pump, increases power consumption to move the same volume of water, until the pump is physically unable to lift the water the height required, causing the pumpstation to need rebuilding.

### Floodgates

Floodgate height, when designed, is set based on both water levels upstream of the floodgate location and expected heights of the receiving water body in both normal and flood conditions.

Subsidence of the land behind the floodgate results in it not operating as often as designed. In many cases we see landowners digging out their drains further, to get the water to the floodgate, however if the land height drops too much then ponding zones may occur behind the floodgate reducing its functionality and effective life.

There have been several occasions of landowners requesting that a floodgate be rebuilt to a lower height. However, if the height of the floodgate is too low, then the receiving water body will flow back through the floodgate or through ground seepage back into the drain.

Rates are not currently collected to correct the performance of assets, only for general maintenance work and capital renewals from asset failures. When the work does go ahead, it can result in significant rates increases for those in the catchments.

### **Gaps in Knowledge or strategies**

Comparisons of LIDAR data from 10 years ago versus today are being used to determine where there has been subsidence. Data from further back from when the original infrastructure was built is difficult to obtain, and in many cases does not exist. The level of subsidence at a local level is therefore hard to measure and then apply to depreciation rates and discuss as part of funding policies.

The Council has been gathering information to understand the effect of rain events on ground water levels and subsidence. The research is still several years away from providing definitive results.

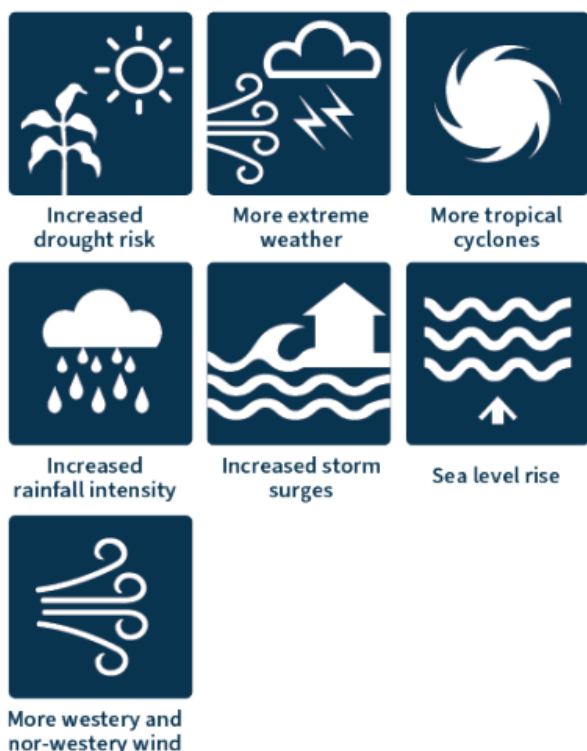
The inverts of drains need to match the receiving water body. Presently, we do not have records of these, nor comprehensive surveys across the region, showing what these were originally designed to be. The council has no in-house ability to survey the region and needs to rely on contractors when specific areas are under investigation.

Currently rates are not collected and there are no reserves available for fixing performance issues caused by land subsidence issues.

There will be a point at which, with subsidence and climate change, the drainage systems and built infrastructure will become ineffective. We currently do not know what this point will be. Any improvements to regrade drains or make them deeper is a “new capital” works, and would need to be funded by targeted rates, when the request is made. There are no regional or national funds to rectify this.

The life of the schemes needs to be reviewed, identifying investment within them, land use, what the problem areas are facing each scheme, and what the council can and cannot fix. Discussions could then occur with those living and working in that area around what the future potentially looks like, and what options could be undertaken.

## 4.5 Challenge 4: Climate Change



The Waikato region is already feeling the impacts of our changing climate – hotter temperatures, longer droughts, bigger storm surges etc. The region’s exposure to these changes means increased risks for our communities, infrastructure, environment, and economy and will have an impact across all challenges identified in Section 4 of this report. Cyclone Gabrielle in February 2023 followed hard on the heels of Cyclone Hale and the Auckland Anniversary weekend flooding events. They exposed vulnerabilities in our region, and impacted our critical infrastructure, highlighting the need for our response to be proactive, rather than responsive. The cost of the adverse weather events in 2023 across New Zealand is estimated to be more than \$9Bn<sup>12</sup>, raising affordability issues including cost of future resilience measures as well as insurability of assets, schemes, and flood damage.

Unlike flooding, where the problem is too much water, droughts are prolonged and can impact our region in several ways, particularly our economy. While droughts typically do less damage to our infrastructure

than floods, reduced incomes and associated higher costs mean they can have severe impacts on our primary industries and economy overall. The 2007/08 drought is estimated to have cost the New Zealand economy around \$3 billion, with the Waikato region being the worst affected and it is not beyond the realms of possibility that this will happen again soon. This is especially the case given predictions for the latter end of 2023 and into 2024 of an El Nino weather pattern that will potentially bring drought like conditions with it.

In our coastal marine environments, an increase in severity and intensity of coastal erosion and coastal inundation is expected due to sea level rise, such as events like the January 5, 2018, coastal storm surge event that impacted the Firth of Thames.

### Areas affected

Community, lakes, arterial rivers, tributaries, forestry blocks, flood protection, drainage networks, catchments and hill country impacting downstream areas.

### Effects

Reduced consistent rain fall means the effects of run off roads & paddocks become more pronounced. Water stagnates in drains and lakes leading to reduced oxygen levels and increased fish & animal / plant death. This can be further compounded on intense rainfall where anoxic water can be transferred elsewhere, extending the area affected.

Long dry summers can lead to soils shrinking in volume by 25%. This is seen in longitudinal cracking in earthen stopbanks, which is made worse if there is no grass cover to keep moisture in the soil. Soil shrinkage and cracking can affect the structural integrity of the bank. If several severe storms come through in a short period of time, there is the possibility of the floodgate or pumpstation pipes or culvert incurring piping (tracking of water on the outside of the pipe / structure) allowing water in and then the soils above eroding away and collapsing. In severe cases the stopbank could fail.

<sup>12</sup> [www.beehive.govt.nz/release/flood-and-cyclone-recovery-package-covers-basics](http://www.beehive.govt.nz/release/flood-and-cyclone-recovery-package-covers-basics)

When a storm event does occur, the soil is unable to soak up as much water, causing increased runoff for drainage pumps, and the river system to handle, increasing the probability of stopbanks over topping, and / or protected land flooding. Added to this is the increased potential for erosion, sediment deposition and landslides, blocking rivers and streams as well as impacting on other infrastructure such as roads and access tracks.

### Gaps in knowledge or strategies

Community adaptation plans are an effective strategic approach being adopted by territorial authorities across the Waikato region in collaboration with local communities, iwi and regional council, planning for more resilient communities now and into the future to manage the risks of severe weather events. Community adaptation plans follow a process called Dynamic Adaptive Pathways Planning, which is a framework for proactively identifying a series of decisions and linking that to potential strategies to mitigate risk to natural hazards.

A crucial step in adaptation planning is identifying communities risk threshold (level of service) in which drivers decision making and option analysis to reduce risk, where options and pathways should be implemented prior to risk threshold being met. This approach maintains a certain degree of flexibility so as conditions change, multiple other options a pre-determined to meet the changing risk scape but maintain a level of flexibility and management for as long as you possibly can.

These plans are community focused and are currently being developed across the region in highly vulnerable communities, however regional alignment is required to provide a cohesive and consistent approach. This work is being spearheaded by the Regional Resilience Team working alongside Territorial Authorities (TA's) to inform and develop adaptation plans.

Knowledge of where communities would be open to change in Level of Service or be open to consideration of retreat or retirement.

Telemetry across the region to collect rainfall and river height and flow data has gaps in coverage. Especially in the Port Waikato and Tuakau areas, and along the Coromandel and Kaimai Mamaku ranges.

Designs for walkways and cycleways have not been stress tested to see how they will protect / damage the stopbanks over 40 – 60 years of increased adverse weather events.

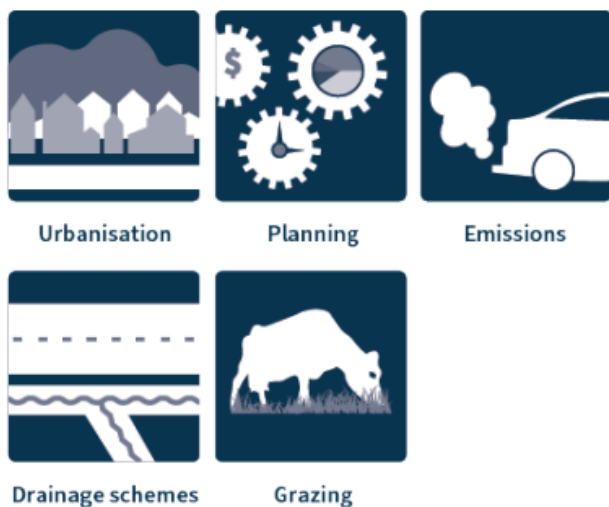
Floodgates and Pumpstations: Still need to investigate alternate building methodologies to reduce impact of these structures.

The council does not have a view on what other countries, with similar situations are doing. There may be work occurring looking at how natural resilience can be built into land and river systems, but that knowledge is currently not held within the staff at the council.

There may be a need to purchase land to allow retirement in peat areas, followed by development of constructed wetlands, so they can act as natural sponges when storms are passing through. However, there is no funding path currently available for either the research or to purchase land for this purpose.

We do not have piezometers installed across the flood defences to measure soil dryness, so cannot correlate dryness with stopbank cracking.

## 4.6 Challenge 5: Land use change



Land use, much like morphological aspects are ever changing and cyclical in terms of boom-and-bust periods. That said, most of the region is experiencing a persistent increase in population and an expansion of urbanisation. This combined with changing agricultural practices is leading to intensification of land use.

Intensification affects storm water runoff, altering the speed of water entering the lower areas of the catchment, and has the potential to overwhelm existing infrastructure designed to handle lesser flows. Land intensification may be caused by changes in land use, for example, areas being deforested, changes in farming use (grass to crops), the building of chicken or pig farms, and movement of rural

farming areas to lifestyle blocks. Each of these scenarios changes the land's ability to absorb water. Where this occurs, water settles until the land can absorb it or finds pathways to flow away. Slips occur when land gets too wet, and erosion occurs when the velocity of water is too great.

Urban sprawl and higher density housing within towns and cities are primary intensification drivers impacting on our assets particularly on the urban rural boundaries. Our flood and drainage networks were designed primarily during the 1950s and 1970s to enable increased revenue in the regions to support the economy. The infrastructure was built with this in mind, leading to there being 2 standards for stopbanks. In rural areas where stock can be moved out of flood paths, stopbank soil and substrate levels could allow low levels of water movement. Stopbanks built in the then urban areas were built to allow no seepage from the waterways back into defended areas as moving buildings is much more difficult.

The drainage network is there to assist primary production growth. Any activities occurring due to urban or mixed residential growth that increases volumes will cause an increase in the surface flow and concentration into the drainage network. This can result in a perception that it is taking longer to clear the water, as the water reaches the pump faster than if it was moving underground.

Use of the drainage network in an urban setting generates different expectations, for example, that higher performance standards should be met. We maintain drainage channels, not the pipes going under roads or in subdivisions etc creating volume and flow issues were urban boundary and rural systems connect.

### Areas affected

Intensification of land use is being experienced in all catchments to some degree. This impacting on Flood protection Floodgates, Pumpstations, and Drainage Networks.

### Effect

#### Non flood protection schemes areas:

Land intensification can have the same effect as increased severity of weather events as, in both cases, water entering a catchment is increased in rate and or volume causing erosion in tributaries and rivers. This eroded material either builds up in the streams, causing the water to change direction, velocity and depth or settles out when it moves into slower moving waters further downstream. Examples of these areas are the Waipā, Northern Coromandel, and West Coast catchments.

#### Flood protection scheme areas:

Increased:

Runoff – leading to increased flooding and pumping requirements.



Sediment mobilisation and deposition downstream leading to increased maintenance costs and anoxic conditions in waterways.

Brush and debris clogging our drains and blocking our pump stations.

### Gaps in Knowledge or strategies

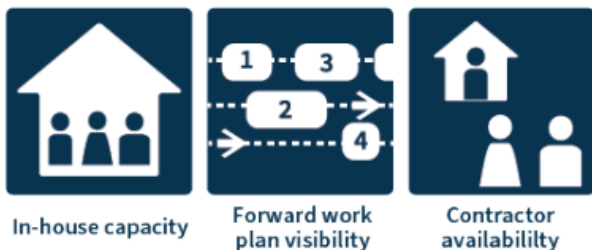
Land use change and cumulative effects.

- Developing policy around handing drainage networks over between local and regional authorities.
- No oversight of where land development is occurring especially when it's an area smaller than 1 hectare.

Developers are having to meet the 10% ARI flow constraints. Once they are over that the type of attenuation the system becomes overwhelmed. More secondary attenuation as part of development is desirable.

We do not have good mapping of what areas would be flood and erosion prone if the current infrastructure failed. Neither do we understand where other regional councils are at in this aspect and whether there are lessons learned that can be shared for the benefit of all.

## 4.7 Challenge 6: Business Knowledge and Capability



There are concerns nationally and within the council regarding the availability and retention of skilled and experienced staff. Experienced and skilled personnel are required to enable a high standard of service to be provided to the regional community into the future. For infrastructure management staff need to possess the necessary skills to carry out core business activities and have the capability and capacity to function effectively

in emergency situations such as Cyclone Gabrielle without compromising critical business as usual activities.

### Areas affected

Flood protection infrastructure, Drainage Networks, River, and Lake Management.

### Effect

Skills, knowledge, and experience lost to the organisation alongside a reduced capability to train and develop new staff.

### Gaps in Knowledge or strategies

Nationally there is a lack of skilled and experienced personnel in flood and catchment management practices. Each regional council has its own approach to operations and management activities and may face differing environments and challenges to ours. Attracting the right new staff is increasingly difficult, particularly for specialist roles, where in house development over time is the only way to gain knowledge and experience of our asset base.

We don't have a policy in place for cadetships and or recruiting ahead of staff formerly notifying us of their intention to leave on a given date removing the ability to undertake knowledge transfer and develop staff in advance.

We don't have a view on key and critical roles in other councils that would be of benefit to us if they became available. Equally attracting international talent has become more difficult since COVID 19 and the globally high demand for skilled resources.

## 4.8 Other Demand Drivers related to key challenges.

### 4.8.1 Aging Assets

Different schemes managed by the Waikato Regional Council were built during the 20<sup>th</sup> century and according to the standards of the day. The materials used to build these assets all have different lives before they have corroded / eroded / crumbled away and need replacing. Early in an asset's life regular routine maintenance can keep the assets functional and reduce the risk of failure and reduced life span. However, as its condition degrades, the cost for rehabilitation grows until its more cost effective to replace the assets or entire structure.

Assets made of concrete, wood, steel, plastic can last for different periods time, and this can be affected by environmental factors and frequency of use.

#### Areas affected

Floodgates, Pumpstations, Dams, Culverts, Bridges, Weirs.

#### Effect

The aged and variable asset stock adds to operational complexity, the range of spares we need to carry and the level of risk exposure we are carrying. Cost to repair may require one off manufacture rather than off the shelf items leading to increased costs, downtime, and risk.

#### Gaps in Knowledge or strategies

We do not have good mapping of relevant areas that have issues due to ageing assets.

We do not have condition deterioration curves for assets under differing environmental conditions and do not do predictive modelling of failure.

Our Failure modes, effects, and criticality assessments (FMECA) are in their infancy and not well accepted across the business.

We need to have a plan in place to understand what needs to be replaced, the timescale, and community affordability of works.

### 4.8.2 Market factors

The Waikato has a unique position in terms of its location between Tauranga, Auckland, and Hamilton. This is often referred to as the Golden Triangle, where economic productivity is high and large infrastructure projects tend to focus. This was seen in the heyday of the Roads of National Significance (RONS) in the 2010's and is still likely to be the case as we move into cyclone damage recovery of major infrastructure and local roads / slip areas. This high level of market activity can reduce availability of contractors to undertake our work programmes and equally leads to increased costs for labour, goods, and services.

#### Areas affected

Floodgates, Pumpstations, Dams, Culverts, Bridges, Weirs.

#### Effect

The effects are primarily twofold: one being an increased cost of capital and maintenance activities and the second being a delay in programme delivery due to a lack of contractors.

#### Gaps in Knowledge or strategies

We do not have information on other authorities and agency programmes of work across the Waikato and boundary areas.

Capability and capacity including building resources in our contracted resources is unknown.

Market acceptance of the proposed approaches may not be welcomed / well supported.

### 4.8.3 Biodiversity and Biosecurity

Increasingly biodiversity and biosecurity considerations are being brought to the fore when developing new assets and compliance with new regulatory requirements and community expectations. This can be seen in the implementation of fish friendly pumps at Mangawhero, and the works undertaken on asset rationalisation and Pathways to the Sea. These works require a different approach from pure hydrodynamics and moving water around with infrastructure. Wider thinking around green / soft engineering and balanced outcomes is required. This can add cost and complexity to our infrastructure, but equally pays dividends for the environment.

#### Areas affected

Floodgates, Pumpstations, Dams, Culverts, Bridges, Weirs.

#### Effect

The effects are primarily increased cost of capital and maintenance activities, potential delays to programmes of work as some assets need to be internationally sourced.

#### Gaps in Knowledge or strategies

We do not fully integrate between our directorates and specialist teams and sometimes miss opportunities to change the way we work based on the most recent research or solutions available.

### 4.8.4 Variables and Inconsistencies

There are several operating and asset inconsistencies across the region. Most of these are due to historic practices and inherited assets and designs for precursor entities to the WRC. Examples include:

The Lower Waikato is different to Hauraki, and has individual rated areas, so the economic impact is so much greater to the local farmer for any infrastructure work. Farmers now must develop farm environment plans, follow land intensification rules, pay greenhouse tax, so their costs are increasing, making certain types of farming in region marginal.

Many of our assets are on private land, impacting access and acceptance of activities we need to undertake. Similarly, some of our assets are partially maintained by the landowner, for example cleaning of screens and checking on pumps running etc. There is no clear delineation in some instances between the landowner's responsibility and that of WRC and we have no bylaw in place to assist us in controlling what can / cannot happen near our assets.

We do not have asset standards and a full range of technical specifications that help guide our infrastructure projects and decisions. This results in a lot of one off and bespoke design solutions that are both expensive to construct, operate and maintain.

We do not fully understand the resilience of our communities and the roles and responsibilities that are required of different entities such as other local councils, Department of Conservation, and the Emergency Management Authority. This leads to mixed messages for our communities and an inconsistent approach to investment decisions and solutions.

#### Areas affected

Floodgates, Pumpstations, Dams, Culverts, Bridges, Weirs.

#### Effect

A lack of clear direction and focus for WRC staff and our communities at large.

#### Gaps in Knowledge or strategies

We do not have a complete regional picture of external entity roles and responsibilities. This is particularly the case when it comes to post event (drought, flood etc) remediation activities.

We lack bylaws and other regulatory instruments to guide our activities and that of our key stakeholders and communities.

## 4.9 Sensitivity Analysis

The current levels of service are assessed as generally appropriate and largely meet the current community needs and expectations.

There is, however, demand for upgrading the level of service in some areas and providing new works in others. These will be managed in accordance with the demand management plan.

Climate change affects are being seen across the region are very variable and seasonal in nature. We are seeing extended periods of wet weather followed by drought conditions. This type of scenario is very difficult to plan for and remediate in the longer term.

Similarly, land use and morphological change and being experienced in a nonlinear manner with locational variables being difficult to predict. Added to this is the lack of community understanding of risks and acceptance that things will have to change – the status quo is not always an option.

The current risk level of our key challenges and WRC ability to influence are detailed in table 5 below.

**Table 5: Waikato Regional Council ability to manage long term infrastructure challenges and demand drivers.**

Issue	Current Risk Level	Council's Ability to Influence
Affordability	High	Low
Climate change	Medium	Low
Morphological Change	High	Medium
Land Use Change	High	Low
Environmental and regulatory change.	Medium	Medium
Business Capability	Medium	High
Aging Assets	Medium	High
Market factors	Medium	Low
Biodiversity / Biosecurity	Medium	High
Assets on private land	High	High
Variables and Inconsistencies	Medium	High – for some aspects.

Assumption: Where possible we will seek to modify customer demand for services to maximise the use of existing assets and to avoid or defer the need for new assets or services.

Non-asset solutions can include insurance, green engineering and change of land use. It is considered that the most effective way of managing future demand for both new services and changes to levels of service is via a multi-faceted approach. Key issues and future demand areas are captured in WRC's Infrastructure Strategy (IS)<sup>13</sup>.

<sup>13</sup> [Document Overview: Jan 18 Draft 3 WRC Infrastructure Strategy for Council Consideration.docx \(wairc.govt.nz\)](#)

# 5 ASSET HEALTH

## 5.1 Asset Overview

Below is a breakdown of the major asset types monitored and maintained by the Waikato Regional Council.

**Table 6: Flood control and drainage assets owned and managed by council.**

Service Area	Quantity	Service Area	Quantity
<b>Flood Protection</b>		<b>River Management</b>	
Bridges	10	Artificial Channels	80 Km
Control Gates	3	Culverts	35
Culverts	3	Erosion Control Structures	284
Detention Dams	10	River and Channel Structures	2
Vessel mooring and dry docking	1	River and Streams	952 Km
Floodgates	436	Weirs	19
Floodwall	3 Km	<b>Lake Level Management</b>	
Pump Stations	113	Weirs	18
Spillways	61 Km		
Stopbank	590 KM		
<b>Land Drainage</b>			
Artificial Channel	245 Km		
Bridges	3		
Culverts	17		
Detention Dams	4		
Erosion Control Structures	53		
Floodgates	32		
Pump Stations	3		
Stopbanks	11 Km		

A detailed breakdown of asset types by zone is available in the RAMP Operational Manual February 2024<sup>14</sup>.

### 5.1.1 Overview of assets not owned by Waikato Regional Council

WRC is partially responsible for the management and maintenance of some assets which are on private land but instrumental in the flood protection or drainage network functioning correctly. This is due to the public good or protection they provide (as opposed to a singular individual).

These assets include:

- Over 24,800 ha of riparian and indigenous retirements adjacent to watercourses.
- 716 ha of wetlands and 2000 ha of forests.
- Low voltage powerlines and power poles feeding land drainage pump stations<sup>15</sup>.

<sup>14</sup> [RAMP Operational Manual February 2024](#)

<sup>15</sup> In some instances, the low voltage powerlines are owned by WRC dependant on the ownership definitions of the lines network providers.

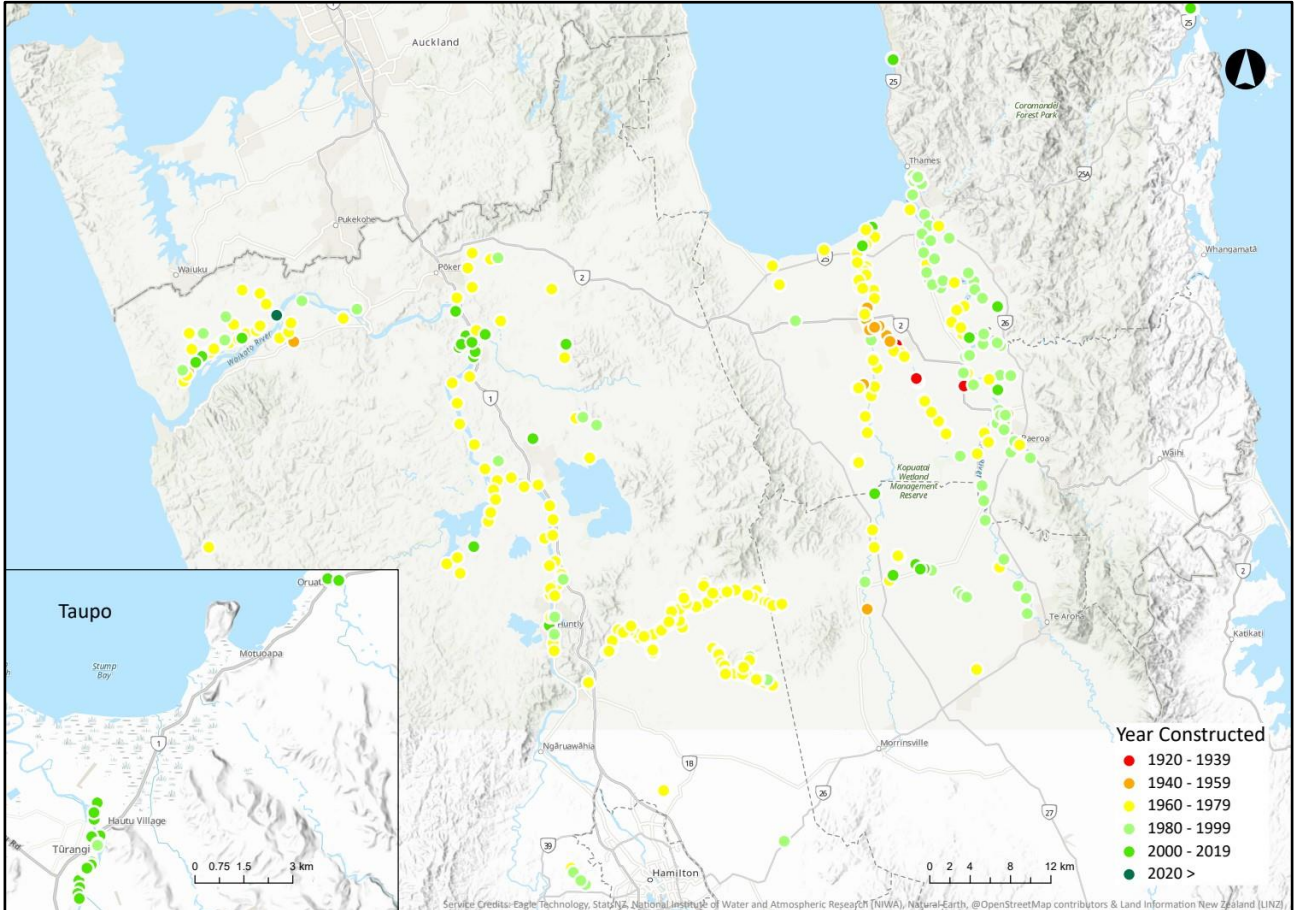
- 5,680 km fences and 8.4 km stopbanks in private ownership.

## 5.2 Asset Summary: owned and managed assets

### 5.2.1 Asset Age

The major flood protection schemes were constructed between the 1960s and 1980s.

Many rivers and catchment assets are well within their expected lifespans and have significant life remaining. However, there are a small number of ‘pre-scheme’ floodgates and pump stations in the Waihou Piako Zone that were constructed in the 1920 - 1930’s.



**Figure 8: Age Distribution of Flood Protection Assets**

The map above shows when flood protection assets within the major schemes were originally constructed. It does not show asset replacement dates when an asset was completely rebuilt.

## Performance against LTP Levels of Service

**Table 7: Historical and Current Flood Protection Performance against targets.**

Year	% Planned mandatory Maintenance	% At or above design height – rural	% At or above design height – urban	Flood damage identified & works done	Flood recovery plans implemented after all major events
<b>Target</b>	<b>85%</b>	<b>93%</b>	<b>95%</b>	<b>Achieved</b>	<b>100% compliant</b>
2015/16	<b>56%</b>	<b>91.6%</b>	n/a	<b>Achieved</b>	
2016/17	<b>84.2%</b>	<b>92.1%</b>	n/a	<b>Achieved</b>	
2017/18	<b>89%</b>	<b>92.5%</b>	n/a	<b>Achieved</b>	
2018/19	<b>92.4%</b>	<b>93.7%</b>	<b>93.6%</b>	<b>Achieved</b>	<b>50% compliant</b>
2019/20	<b>90%</b>	<b>93.6%</b>	<b>93.2%</b>	<b>Achieved</b>	<b>100% compliant</b>
2020/21	<b>100%</b>	<b>92.79%</b>	<b>93.55%</b>	<b>Achieved</b>	<b>100% compliant</b>
2021/22	<b>93.8%</b>	<b>92.79%</b>	<b>95.18%</b>	<b>Achieved</b>	<b>100% compliant</b>
2022/23	<b>100%</b>	<b>92.64%</b>	<b>95.73%</b>	<b>Not achieved</b>	<b>100% compliant</b>
2023/24	<b>99.1%</b>	<b>92.53%</b>	<b>95.73%</b>	<b>Achieved</b>	<b>100% compliant</b>

\*2022/2023 was a severe weather year with multiple cyclones, extreme floods, and very high cumulative rainfall figures. Considerable damage was done in the events with ongoing active slip sites and new issues being discovered as we get into the more remote catchments. The cost of remedial works is in the \$millions and community affordability is an issue. Funding has been sought from central government for the larger works with more immediately achievable high risk / impact sites being worked on as a priority.

**Table 8: Historical and Current Land Drainage Performance against targets.**

Performance Measure	% Planned mandatory Maintenance	Number of reported incidences where it takes more than three days to remove surface water after the events with up to a 10% annual exceedance probability
<b>Target</b>	<b>85%</b>	<b>≤5</b>
2015/16	<b>56%</b>	n/a
2016/17	<b>84.20%</b>	<b>2</b>
2017/18	<b>89%</b>	<b>3</b>
2018/19	<b>92.40</b>	<b>0</b>
2019/20	<b>90%</b>	<b>0</b>
2020/21	<b>100%</b>	<b>0</b>
2021/22	<b>93.80%</b>	<b>0</b>
2022/23	<b>92.20%</b>	
2023/24		

## 5.2.2 Measuring Compliance to Level of Service measures

This section covers where needed, how we measure specific Levels of service and key performance indicators.

**Table 9: Level of Service Measures**

Measure	Measurement
<b>Flood Protection</b>	
85% of planned maintenance actions achieved each year	Compare number of 'Required' planned flood protection asset maintenance actions in works programme with the number completed via Infor (IPS) using the Resource Planning and Progress reporting spreadsheet. This result is to be presented as a percentage
93% Rural and 95% Urban stopbanks are maintained to above designed flood height, as agreed within each zone	<p>IPS stores the design flood height and the actual height of the stopbanks. This allows a comparison to be made when a survey is done to determine if a stopbank is above the design flood height for individual sections of stopbank.</p> <p>IPS gets its design flood height data from a variety of sources including Service Level Reviews, Design Reports and Original Plans.</p> <p>IPS gets its actual height data from monitoring &amp; as-built surveys carried out by surveyors and from LIDAR. Where actual heights have been sourced from traditional survey methods the stopbanks will be assessed via 100m sections sourcing the data from IPS. Where actual heights are sourced from LiDAR an oracle database has been used to store these results against 1m to 10m sections of stopbank.</p>
100% of flood recovery plans implemented after all major events	<p>When event triggers use of disaster reserve funding:</p> <p>Manual check that project scope for flood response actions exists in Discover, and actions are being monitored through Capital Project or Asset Management System</p> <p>Note: Disaster reserve funding can only be triggered by a Zone Manager making a request to use it based on the return period of a flood event. These types of events are not predictable and there may be years in which there are no events that trigger disaster reserve funding. In these years this aspect of the measure will be considered non applicable.</p>
<b>River Management</b>	
85% of planned maintenance actions achieved each year	Same method for measuring as Flood protection measure above.
<b>Land Drainage</b>	
Surface water ponding in a 24 Hour, 10%AEP rainfall event, is removed within a 3-day period	Reviewing quarterly drainage reports to drainage committees for reported incidents from each scheme.
85% of planned maintenance actions achieved each year agreed within each scheme	Same method for measuring as Flood protection measure above. Specifically looking if drainage inspections have been completed, and remedial action (e.g. spraying) done.



## 5.3 Typical Asset Issues

The following table contains most of the issues found across the flood protection, lakes level management and drainage networks. These issues form the basis of condition inspections and structural survey programmes.

Table 5: Typical Asset Issues

Asset	Key Issues
<p><b>General across all asset types</b></p>	<p><b>Access</b></p> <ul style="list-style-type: none"> <li>• Many of our assets are in remote areas with poor / restricted access. Some of our assets are located on private land with no formal easements or rights of way. We rely on the goodwill of landowners for access to these assets and utilise existing tracks that cross infrastructure that may not align with our own standards i.e. bridge and culvert loading rates and inspection frequencies.</li> <li>• Some of our assets are located on cycleways and have public access rights that can impeded our operations and works programmes including heightened health and safety considerations.</li> </ul> <p><b>Contractor availability</b></p> <ul style="list-style-type: none"> <li>• We sometimes struggle to get a healthy range of contractors to bid on our works programmes.</li> <li>• Capability and capacity of our contracted services suppliers does not always match our needs.</li> </ul> <p><b>Assets on private Land</b></p> <ul style="list-style-type: none"> <li>• We have limited scope to control activities that may adversely impact on our assets on private land.</li> </ul> <p><b>Old Design Standards</b></p> <ul style="list-style-type: none"> <li>• Our asset base is aged and designed for flood protection and land drainage and may not comply with current regulatory requirements.</li> <li>• The asset base is manually intensive and difficult to automate without major component replacement and or upgrade.</li> <li>• Remote monitoring and control of assets is currently limited.</li> <li>• Capability and capacity is based on AEP and ARI, both of these parameters are moving goal posts and could affect our level of service attainment.</li> </ul>
<p><b>Channels</b></p>	<ul style="list-style-type: none"> <li>• Excessive weed growth</li> <li>• Bank erosion from carp damage</li> <li>• Environmental issues e.g. timing of maintenance</li> <li>• Pollution and contaminated sites</li> <li>• Pest and weed control e.g. invasive exotic species</li> </ul> <p>Regular maintenance is required to ensure design capacity is maintained</p>
<p><b>Dams</b> (Earthen detention dams)</p>	<p><b>Design</b></p> <ul style="list-style-type: none"> <li>• Water seepage and internal erosion through foundation or wall of dam</li> <li>• Culvert design, and lack of compaction</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Spillway blockage leading to overtopping</li> <li>• Flood induced overtopping</li> <li>• Earthquake induced embankment cracking or deformation</li> <li>• Large trees compromising structural integrity</li> </ul> <p><b>Change in Functionality</b></p> <p>Dam instability from using as detention rather than detention dam</p>

Asset	Key Issues
<p><b>Embankments</b> (Stopbanks, levees, earth walls etc.)</p>	<p><b>Design</b></p> <ul style="list-style-type: none"> <li>• Stopbank narrowness in some rural locations</li> <li>• Stopbank alignment being too close to the river channel increasing the risk of undermining</li> <li>• Settlement of stopbanks requiring top-up</li> <li>• Foundation stability due to geotechnical conditions</li> </ul> <p><b>Land Use</b></p> <ul style="list-style-type: none"> <li>• Stock damage</li> <li>• Toe erosion</li> <li>• Old large trees, blackberry, or gorse compromising structural integrity.</li> <li>• Keeping up with changes in stopbank height (i.e. channel capacity) to maintain existing levels of service and taking into account silting and/or aggradation of river beds, climate change and increased rainfall intensity</li> <li>• Land ownership and access issues</li> <li>• 3<sup>rd</sup> party structures affecting stopbank</li> </ul> <p><b>Changes in functionality required</b></p> <ul style="list-style-type: none"> <li>• Urban development in rural areas</li> <li>• Berm erosion / damage</li> <li>• Scheme review on hydraulic and</li> </ul>
<p><b>Structures</b> (Pump stations, flood gates, weirs, dams and bridges etc.)</p>	<p><b>Design</b></p> <ul style="list-style-type: none"> <li>• Electricity supply failures to pump stations</li> <li>• Pump failures</li> <li>• Earthquake damage to structures</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Weed control – causing pumps not running to capacity</li> <li>• Land ownership and access issues</li> <li>• Geothermal activity causing corrosion and undermining foundations</li> <li>• Tidal and saline erosion of floodgates and other structures</li> <li>• Vandalism</li> <li>• Scouring</li> <li>• Blockages due to debris in floodgates etc. and consequential backflow</li> <li>• Leakage around weirs as surrounding peat shrinks</li> </ul> <p><b>Changes in Functionality required</b></p> <ul style="list-style-type: none"> <li>• Insufficient capacity due to increasing required performance standards e.g. community expectations, climate change, land / sea and water level rise and fall.</li> <li>• Provision of fish passage when new assets are built/existing structures are replaced and after consideration of other environmental requirements</li> </ul>
<p><b>Drains</b></p>	<p><b>Operations</b></p> <ul style="list-style-type: none"> <li>• Weed control – causing less capacity or slower water flows than designed.</li> <li>• Bank Erosion</li> <li>• Silt Build up</li> </ul> <p><b>Changes in Functionality required</b></p> <ul style="list-style-type: none"> <li>• Insufficient capacity due to increasing population base within area or change in land use.</li> <li>• Peat Shrinkage: Surrounding land dropping in height, so drain no longer deep enough for existing needs</li> </ul>

Asset	Key Issues
In River Structures	<ul style="list-style-type: none"> <li>• Damage from high river flows</li> </ul> Pest infestation
Lake levels	<ul style="list-style-type: none"> <li>• Blockages</li> <li>• Wash out of rock weirs</li> <li>• Vandalism of weirs</li> <li>• Settlement of weirs and culverts</li> <li>• Alteration of culverts for drainage management</li> <li>• Pest Infestation</li> </ul>

## 5.4 Condition monitoring results

WRC has been on a condition monitoring journey, deploying increasingly advanced and standardised approaches to the assessments. This includes the use of acoustic monitoring, thermography, and optimised maintenance scheduling amongst other initiatives. We are now in the third year of this approach and are gaining better understanding of the key issues on our asset base and employing more cost effective and risk-based solutions<sup>16</sup>.

Council is tracking and trending condition over time across the various asset groups<sup>17</sup> which gives us a better picture of our asset base and changes to it. Currently this is a retrospective look back in time, as we gather more information, the plan is to look to develop predictive modelling and deterioration curves. This will enable better targeting of investment and reduce the incidence of unplanned asset failure.

The charts below show a snapshot of our current major asset type condition on a regional basis. This can be broken down to a more granular zonal level to give us focus areas for the future. Unsurprisingly, pump stations and floodgates carry the highest levels of poor condition ratings. This in part is due to the mechanical nature of their operation, the environment that they operate in and the installation date of the assets<sup>18</sup>.

The maps over the next few pages show the location and current condition of various key asset types, ranging from green for good, orange for average, and through to red for assets in very poor condition. The current condition of the asset is used to prioritise both maintenance and renewals work.

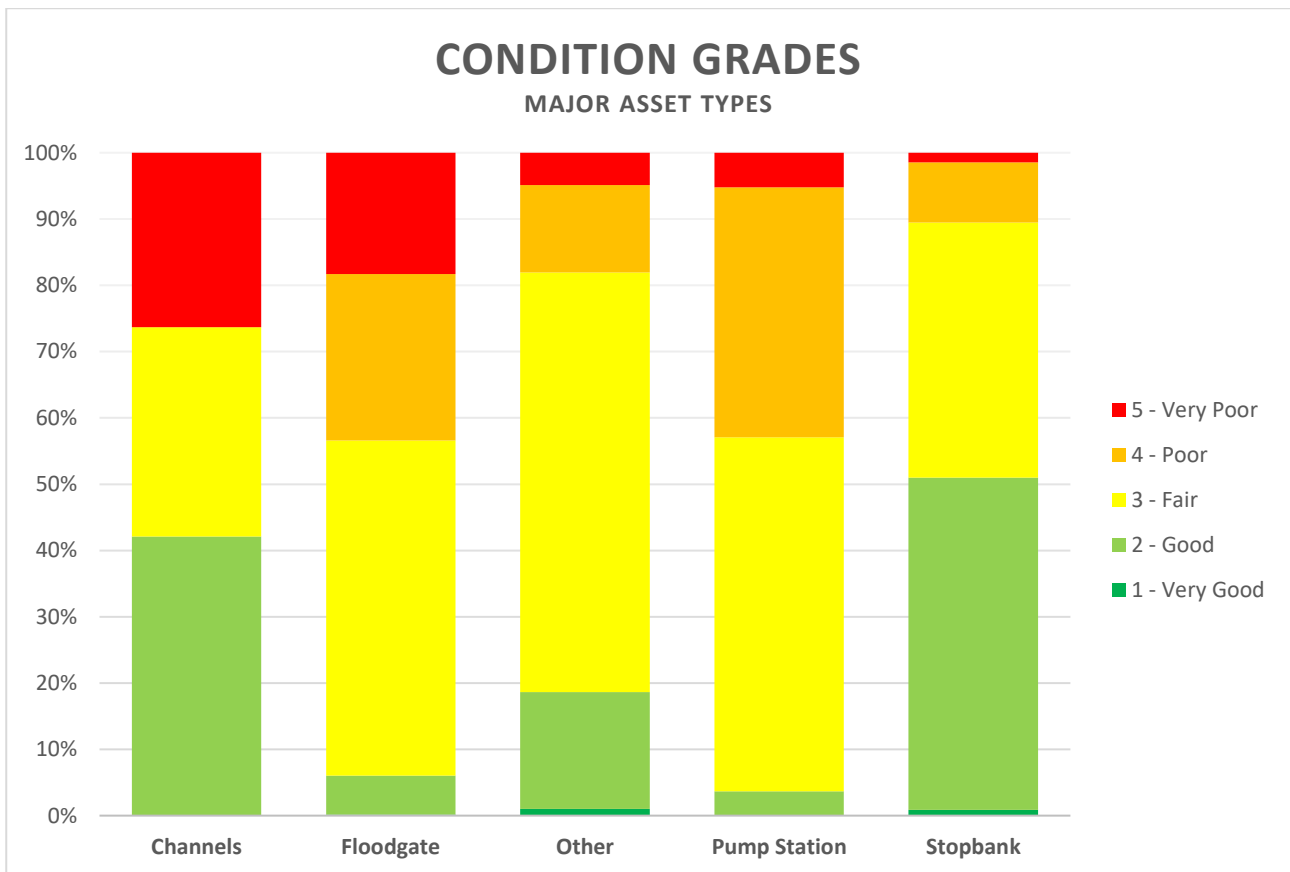
The rate of deterioration is used for future planning & budget creation purposes. Using at a minimum the last three data points collected, condition data for each floodgate, stopbank and pump station can be trended, and used to:

- Review condition monitoring inspection frequencies.
- Renewals timetable.
- Confirm effectiveness of Maintenance programme.

<sup>16</sup> [Document # 2119212: Condition Manual 2021](#)

<sup>17</sup> Condition assessments on assets include those maintained, but not owned by WRC i.e., Ōtorohanga Pump Station, hence numbers quoted in this section may vary to table 6 assets owned and managed by WRC.

<sup>18</sup> [Document # 27260739: IS23-23 - Condition Report for Flood Protection and Land Drainage Assets 2022-23](#)



**Figure 9: Condition grades of major asset types.**

In general, most of the council managed flood protection, land drainage, river and catchment management assets are in a good condition. 85% were rated between condition one and three (very good to fair), with the remaining 15% rated condition four or five (poor or very poor) compared to 13% the year before. However, simple assets like fences and weirs make up a large proportion of this 85%.

The more complicated assets like Pump Stations and Floodgates have a lower percentage (<70%) of assets in good condition. The assets in poor condition may only require minor works to bring them back up to an acceptable condition grade whilst others will need major investment with full project management processes being required for defect resolution. It should be noted that embankments were excluded from the above graph as the data set is incomplete due to severe weather events in 2023 restricting access, and or diverting resources onto more urgent works.

There are many assets in Condition 3, which could deteriorate to Condition 4 in the next few years. There are some critical assets in this situation, which could cause resilience problems in an event. Similarly, there are many places where a simple, low-cost fix (i.e., clean and paint a flap) could avoid a more expensive intervention in a few years' time (i.e., replace a rusted flap). These "low hanging fruit" should be dealt with early, to prevent the problem from becoming bigger, more disruptive, and more expensive in the future.

**Floodgates current condition:**

Items that may impact on a floodgates condition are structural defects, not operating correctly, and worn or damaged components. Of the regions 454 floodgates, 296 (68%) are in an average to good condition. 152 floodgates are in a poor to very poor condition. As many of the floodgate gates are made from wood, this is not unexpected. with plans either in place or being scoped to prioritise remedial works.

No new floodgates for new drainage or flood zones are planned to be built.

Investigation work in the Hauraki has identified an optimisation opportunity, with the 3 floodgates at the mouth of the Piako river (Mouth to Pipiroa Reach) are being reduced to 2 to optimise land water removal. This work is partially funded through the governments Shovel Ready initiative.

Several investigations previously completed at the request of landowners to lower the floodgate height have identified that lack of drain maintenance and incorrect drain slopes have caused ponding on farmland, not floodgate design issues.

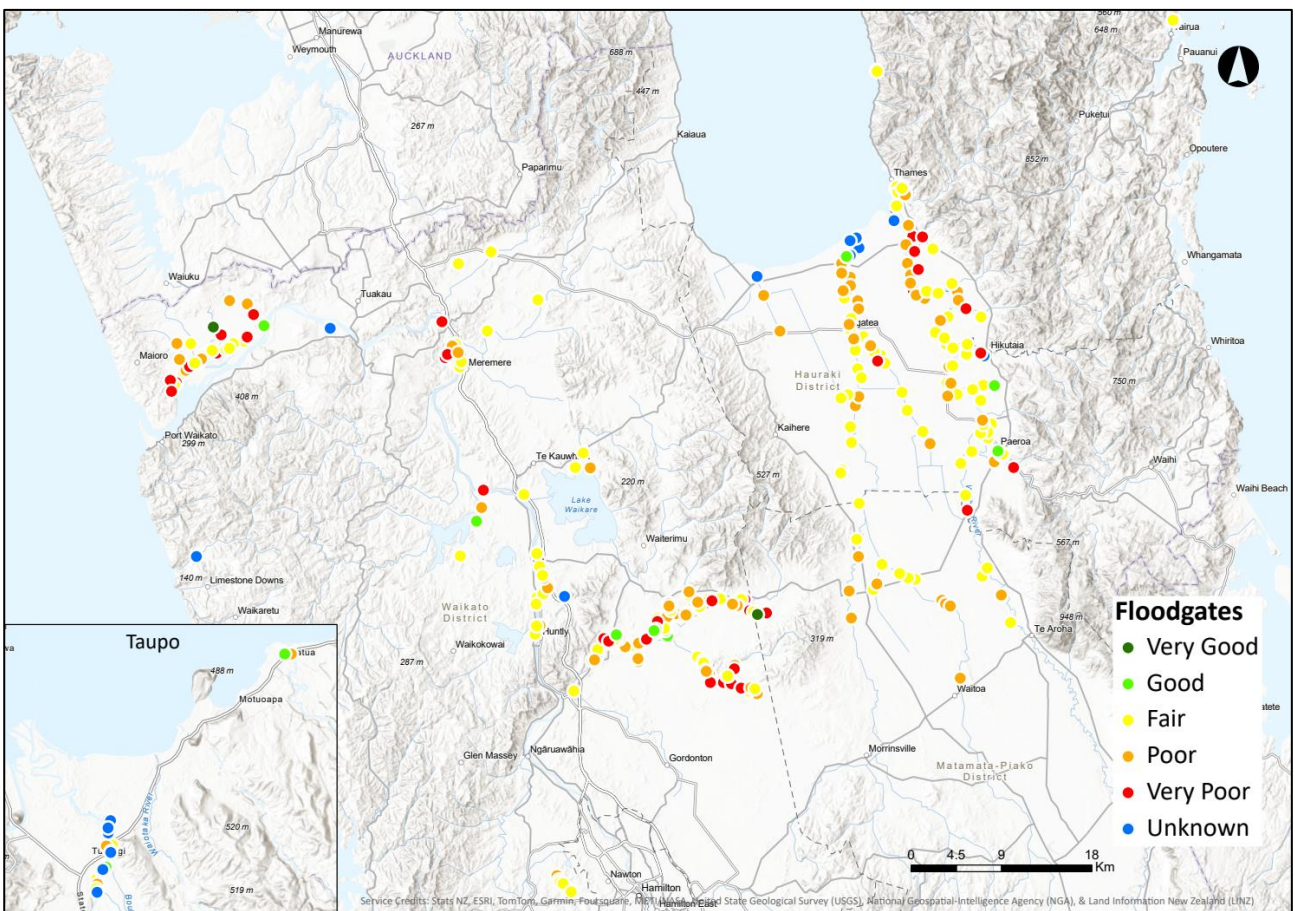


Figure 10: Flood gate condition 2023/2024.

### Floodgates change in condition:

The map shown below shows the change in condition between 2021/2022 and 2022/2023 for Floodgates. This is not to be confused with poor condition grade ratings. It reflects a change in grade, and this could be from very good to good.

The deterioration of assets is dispersed across the region, with an almost equitable number of improved condition grades as maintenance and renewals works are delivered. Floodgates tend to deteriorate over an 8 to 20-year period, the rate dependant on the type of environment they are operating in. The criticality of the asset is considered to determine when corrective maintenance or renewal is required, and its priority to ensure minimal risks to human and animal life.

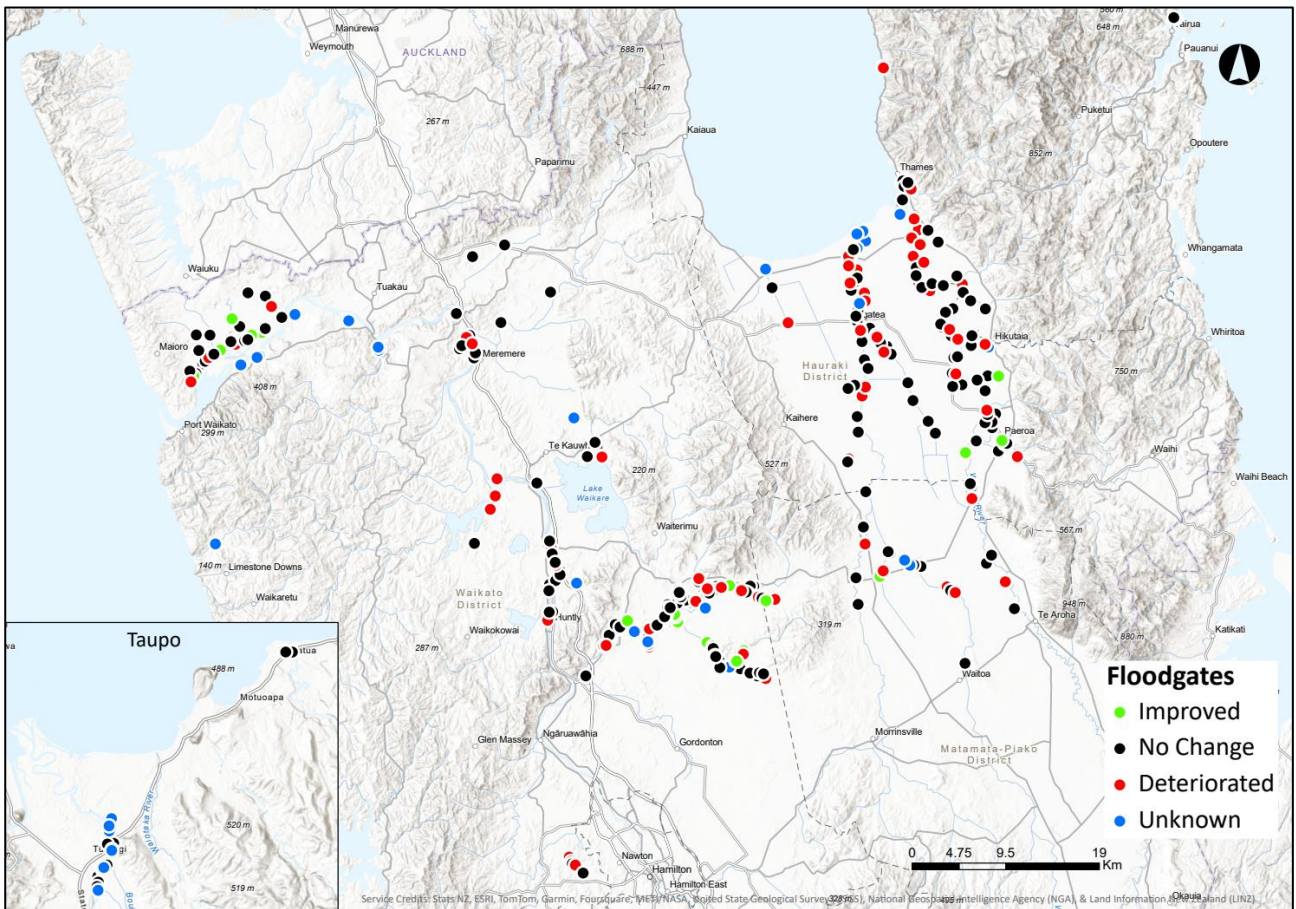


Figure 11: Flood gate change in condition over last year.

### Pumpstations current condition:

Pumpstation components are checked for structural integrity, cracking concrete, any damage, or corrosion that may affect their operability, and electrical safety. Pumpstations that are in a good condition are shown as green, orange if average, and red when in a poor condition. 41 Pumpstations (out of 120, or 34%) are in a poor or very poor condition. This is concerning as some catchments have multiple poor condition pump stations that may lead to issues of resilience in major storm events.

To address these issues and funding we are utilising more advanced condition monitoring programmes for our pump station assets to optimise maintenance and renewals regimes as part of our maintenance strategies<sup>19</sup>.

Across the region two to four pumpstations are rebuilt annually to continue to deal with damage, pump obsolescence (unable to buy spare parts to maintain the pumps) and land sinkage. And approximately 10 pump stations a year are overhauled to ensure they will operate optimally during storm events.

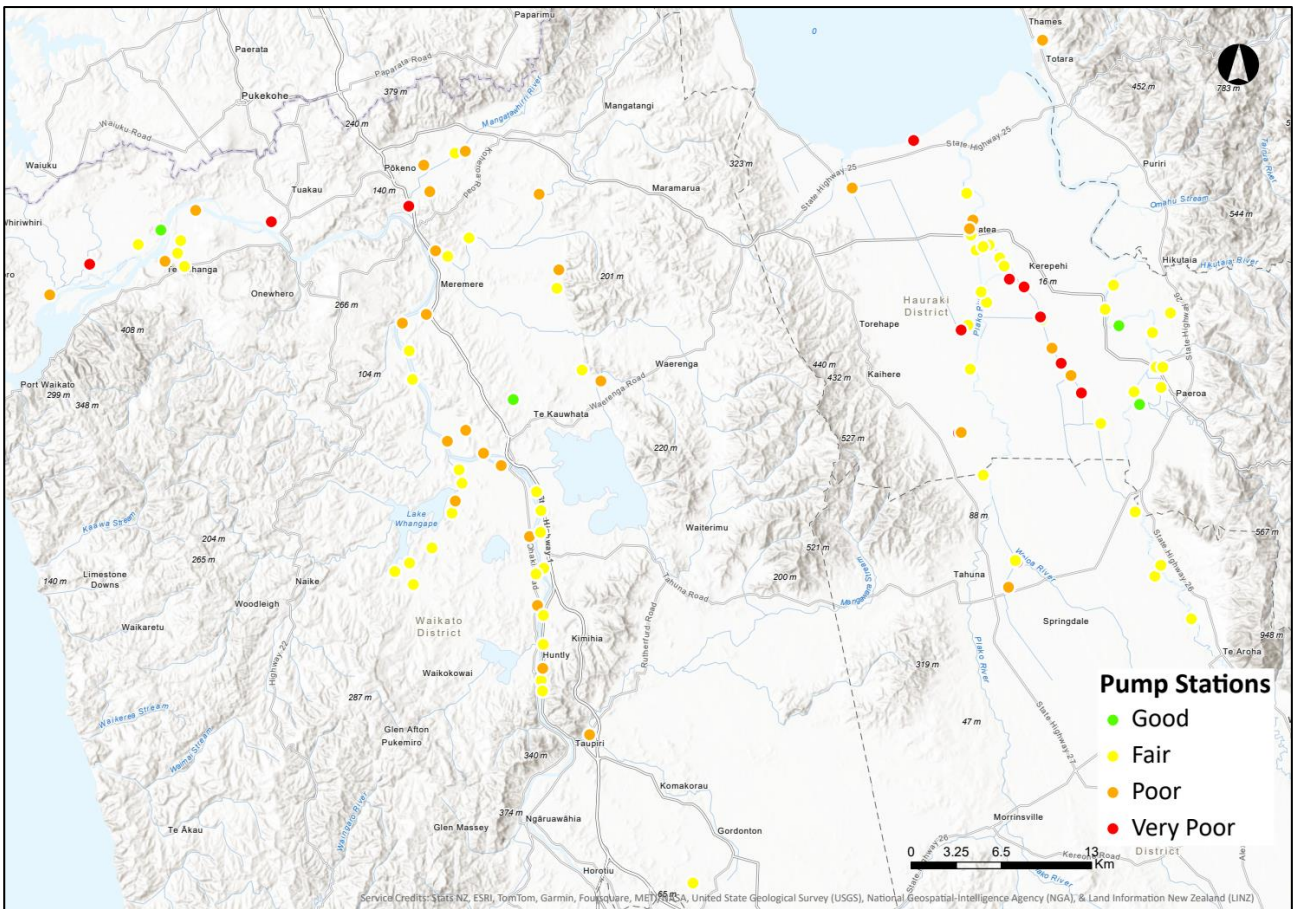


Figure 12: Pumpstations condition 2023/2024.

<sup>19</sup> [Maintenance Strategy - Pump station \(4 variants\).xlsx - Extended ECM CE 23.2 \(wairc.govt.nz\)](#)

### Pump Stations change in condition:

The map above shows the change in condition between 2021/2022 and 2022/2023 for all pumpstations. The increased change in condition is being monitored, with action plans being put in place. Reasons for such a rapid change could be the vintage of the asset base, increased obsolescence, and an inability to undertake maintenance work during an extremely wet year.

Where a pumpstations condition is noted as deteriorating it results in those pumpstations being investigated to see if a change in the timing of maintenance and renewal works is needed, or if there are any new remedial works required to keep the pumpstations operational.

Where the pumpstations are also close to the end of their financial life an engineer has been out to assess the priority of any repairs or renewals to help inform the 10-year capital plan.

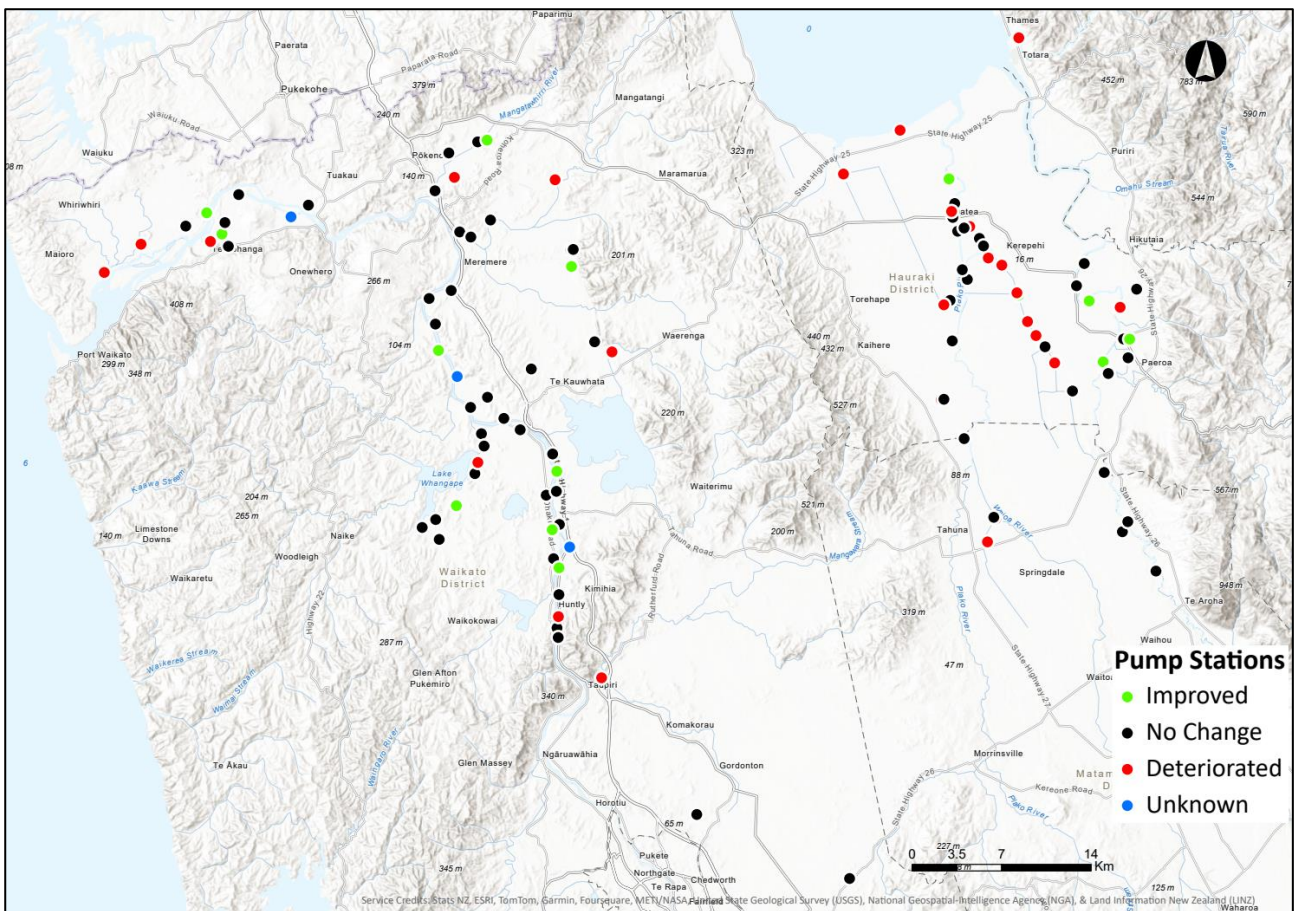


Figure 13: Pump stations change in condition over last year.



## Scheme land & Stopbanks current condition:

There are approximately 16km of stopbanks and embankments in poor condition.

Approximately 1/5<sup>th</sup> of the embankments and the land they sit on is owned by WRC and leased out for use of local landowners (known as scheme land). The others are located on privately owned land.

For assets located on scheme land, a license agreement is in place and council can directly influence the management of this scheme land and the associated flood scheme assets. For council managed Embankments on private land, and an agreement is not in place, council relies on legislative provisions, such as the Soil and Rivers Control Act 1941 and the Land Drainage Act 1908.

WRC staff assess scheme land and the embankments condition annually checking for the following:

- Damage caused by stock and human impact.
- Erosion.
- Instability.
- Grass cover and presence of weeds.
- Fencing.

It is important to recognise that the condition grade for an embankment is not a measure of whether the stopbank is at the required design height. That is assessed via the embankment performance grade discussed in the RAMP Operational Manual February 2024<sup>20</sup>.

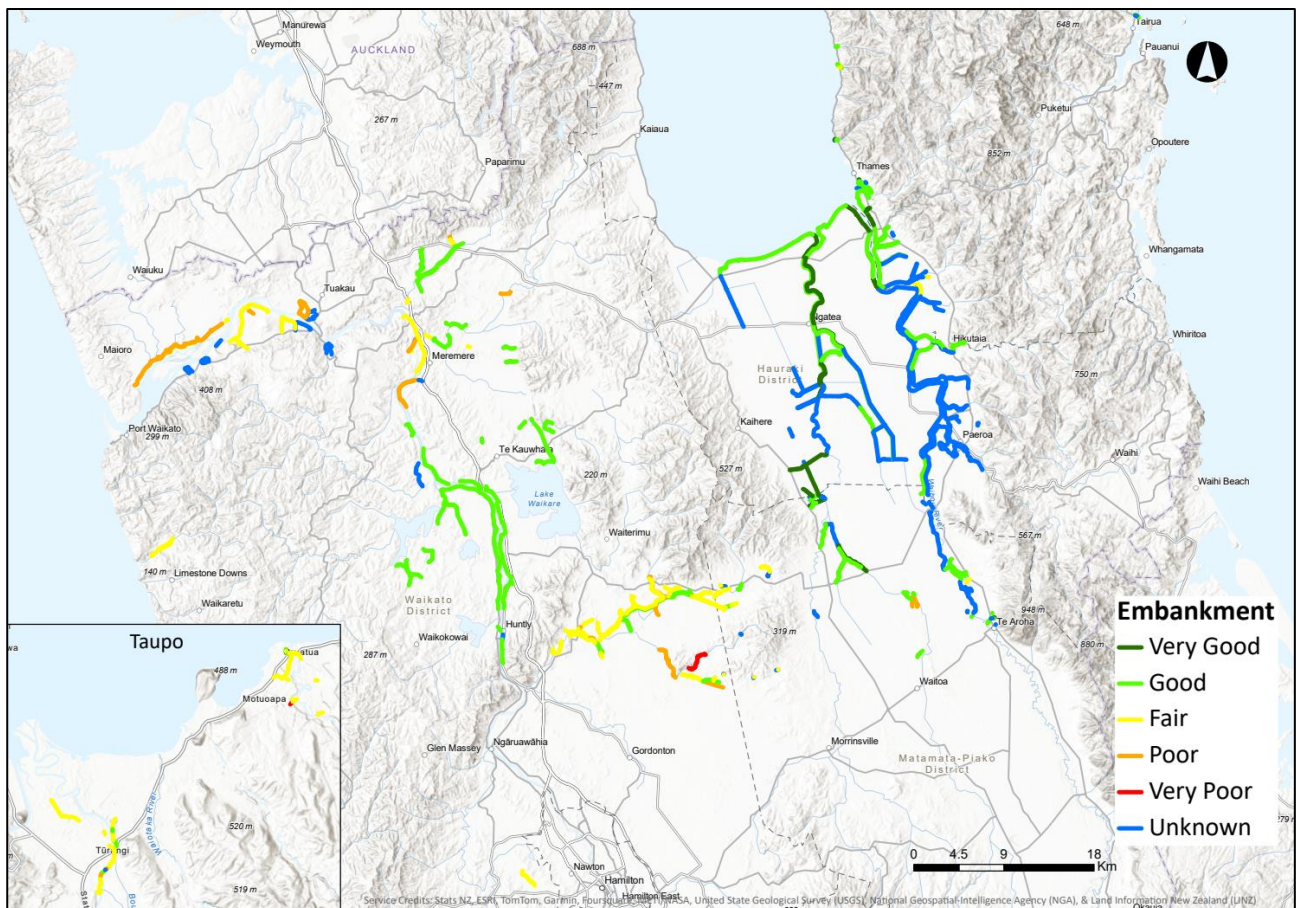


Figure 14: Stopbank current condition 2023/2024.

<sup>20</sup> [RAMP Operational Manual February 2024](#)

### Stopbank and Scheme Land change in condition:

Over the last three years, there was an increase in the overall number of defects found on scheme land. Many of the new defects were related to stock damage and fencing issues and are easily rectified. The main causes of defects include inadequate or damaged fencing, stock damage, undesirable vegetation (including plant pests and trees on stopbanks), vehicle damage, rubbish, and various other damages.

There are several historical issues (e.g. vegetation, rubbish, and embankment damage) found on scheme land that had been licenced out, where the land is no longer leased by the licensee who caused the defects. These cases are rectified as funding in each catchment is made available.

In addition, two significant issues have been found during 2023 that could seriously impact on the structural integrity of our stopbanks. These were assets on private land where a power cable had been directionally drilled through the embankment and part of an embankment cut away on another site. This has raised the issue of stopbank protection and the need to implement systems such as B4 U Dig around our critical assets and infrastructure.

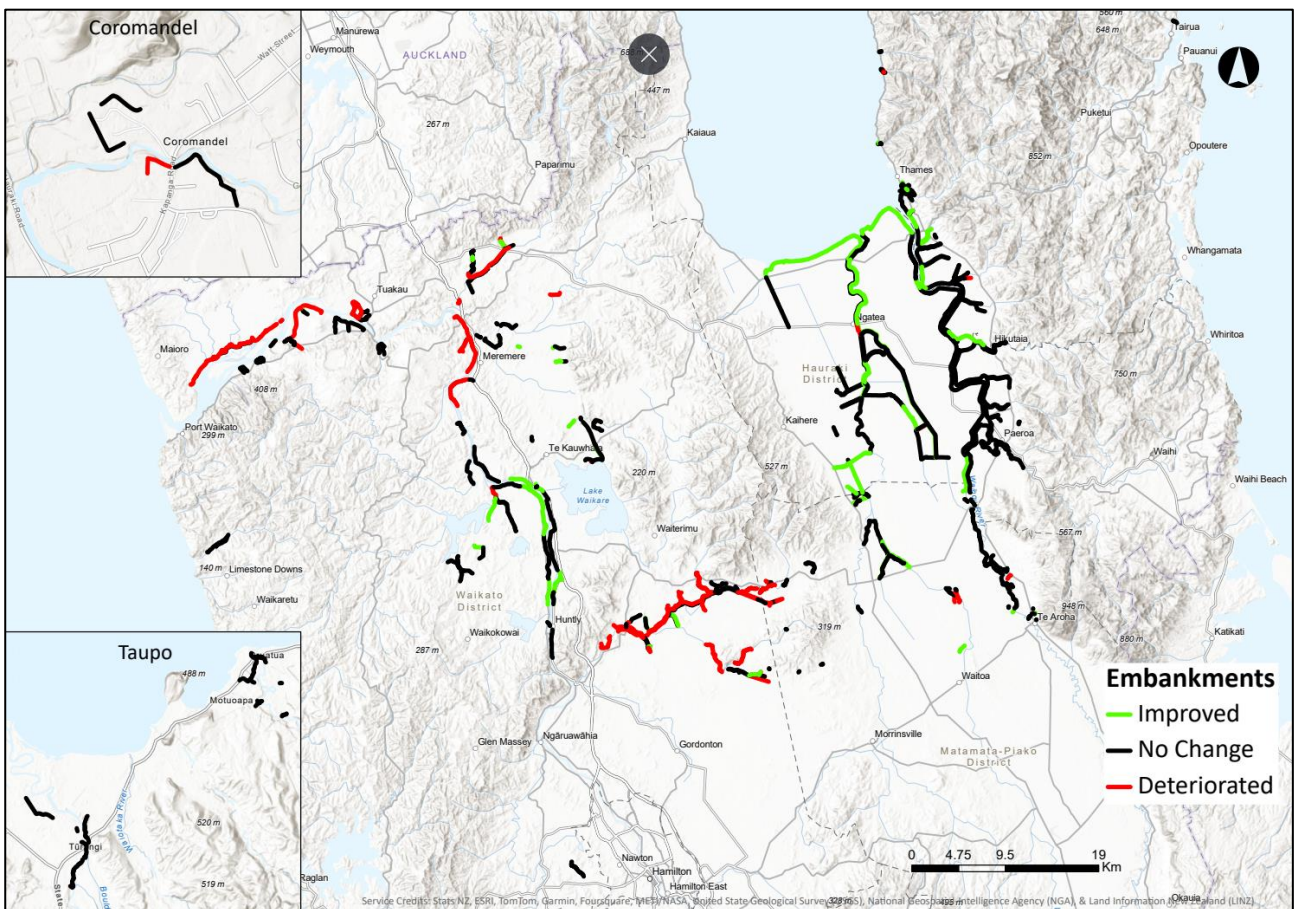


Figure 15: Stopbanks change in condition over last year.

### 5.4.1 Stopbank and Ponding / Spillway Bank Performance

Due to the nature of the underlying soils that are present throughout the Waikato Region our stopbanks experience settlement over time. This is particularly prevalent for stopbanks built on peat or marine mud. This settlement reduces the height (crest level) of the stopbank and can lead to the crest level falling below the level required to protect against the design flood level.

The performance of the stopbanks in each of the relevant zones is shown in Figure 16 below. Stopbanks that are shown in green above the design crest level height. Stopbanks that have an identified area of any length within 10% of the crest level height are in yellow, or outside the designed flood level are shown in red.

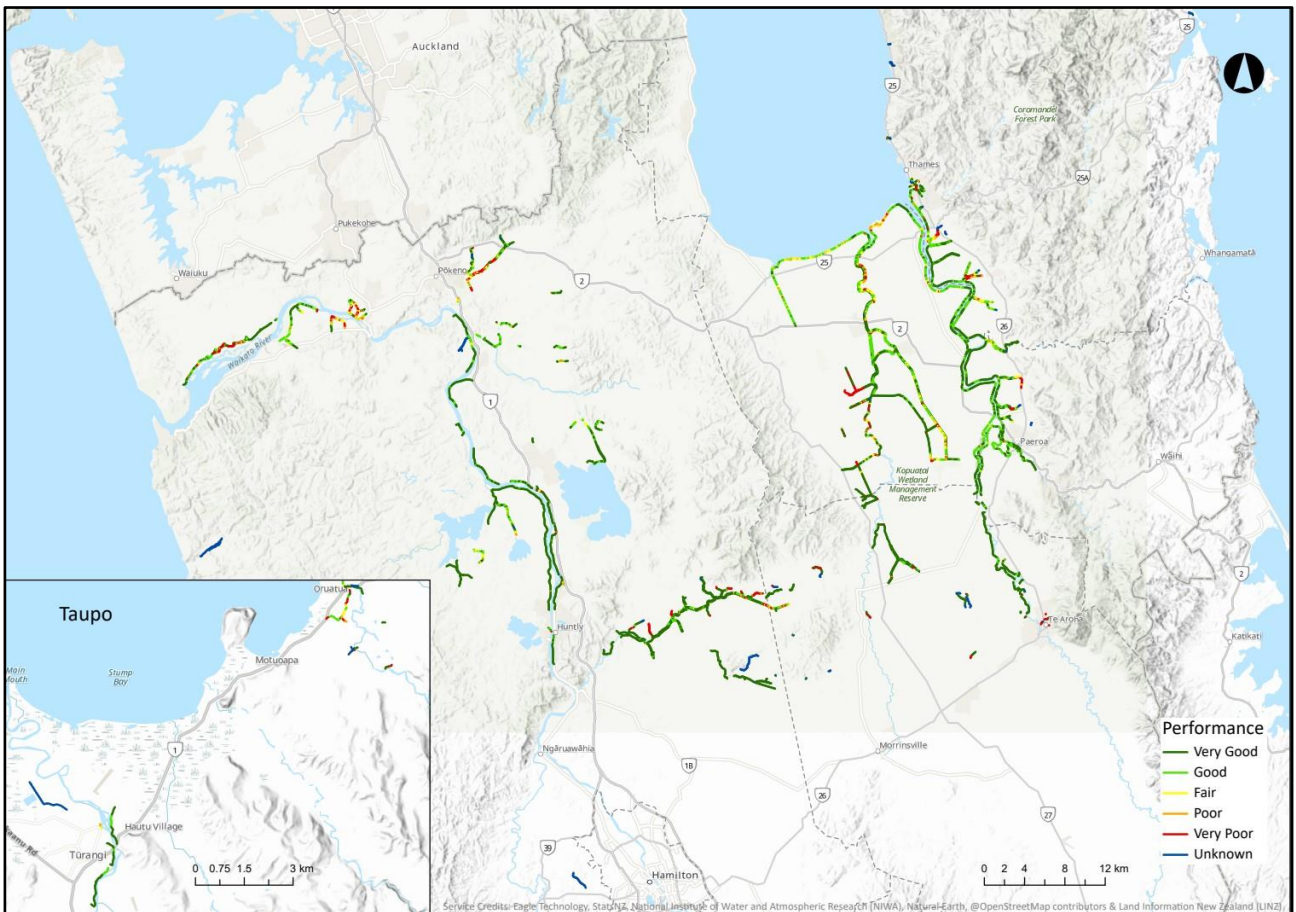


Figure 16: Stopbank current performance, by location.

## 5.4.2 Other asset types

### Dams

Dams require external assessments by certified and suitably qualified personnel. During 2022/23, special inspections were held after the major events at the start of the calendar year 2023 including the Te Aroha earthquake, Cyclone Hale, and Cyclone Gabrielle. These inspections led to early identification of following critical defects:

- Increased water levels in Kapukapu Dam main embankment.
- Pronounced slumping in Jordans Dam embankment.
- Potential erosion to right abutment of Māori Affairs Dam.

Temporary measures were taken immediately after Cyclone Gabrielle and further permanent works are being planned for delivery.

### Bridges:

Council has implemented improved condition inspections for bridges. The assessments identified several issues that had been missed previously including condition deterioration to grade 5 well in advance of the expected lifespan of the assets. Also noted for some bridges were incorrectly posted / missing loading limits signage.

### Lake Weirs:

No formal condition information was collected.

# 6 RISK MANAGEMENT

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## 6.1 Overview

For this document risks can be considered in two categories – those that affect a specific catchment or the region, and those that are specific to the operation and management of infrastructure assets either in a catchment or across the region.

Those in the first category are discussed in the demand management section of the regional asset management plan. Those related to the maintenance and operation of existing infrastructure assets are discussed in this section, and further in the RAMP Operations Manual.

The WRC has a responsibility to assess the risks associated with the management and ownership of ICM assets and to best manage the activity with the resources available to avoid, mitigate or transfer the effects of any event.

Risks have been grouped into the following activity areas:

- General risks<sup>21</sup>
- Natural Hazards<sup>22</sup>
- Work or Task specific risks
- Asset failure specific risks

## 6.2 Management of general risks

Risk management practises are aligned with ISO31000:2018.

Risk identification and management is the responsibility of all WRC staff, however the primary responsibility for the management of general risks fall to the Directors and Chief Executive.

Any risk identified must be assessed for its impact upon operations, the environment, life cycle costs, social economic effect, the health & safety of our staff and the wider community, council reputation, legislative compliance, and resource consent compliance.

The most significant risks faced by council activities are evaluated in consultation with key Council officers. These risks relate to Health and Safety, ineffective business continuity planning, the impacts of climate change, conflicting objectives/aspirations, stopbank failure and environmental compliance failure.

## 6.3 Natural Hazard risks

Natural hazards should be assessed when undertaking any aspect of Planning and decision making required for Resource Management Act RPS provisions.

This ensures that natural hazard risks are identified, analysed, and evaluated, so the correct treatment can be applied for major scheme rebuilds.

## 6.4 Work task specific risks

Work specific risks are managed through standard operating procedures and permit to work procedures for more complex tasks.

## 6.5 Asset specific risks

The key risks the infrastructure asset management programme is managing are:

- Failure of stopbank protecting an agreed area to an agreed Level of Service.

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<sup>21</sup> [Document # 3375577: WRC Risk Management Framework \(3375577\) \(waic.govt.nz\)](#)

<sup>22</sup> [WRC-Risk Assessment Framework to support the implementation of the Natural hazard-framework \(waikatoregion.govt.nz\)](#)

- Failure to pump water from agreed area within an agreed time frequency.
- Failure to keep agreed river systems flowing at the agreed rate and or agreed height.
- Failure to maintain agreed lake level
- Failure to achieve new legislative requirements when undertaking work.

These are managed on a case by case basis for each programme of works.

**Decision making factors:**

One or more factors may be taken into consideration when determining if maintenance or replacement of an asset type is required:

**Table 11: How WRC is applying asset information category options**

Category	Details
Age of asset	Has the asset reached the end of its designed life and subject to other issues?
Condition of asset	Condition Monitoring Information: Is the condition degrading at an unacceptable rate?
Location of asset	Is the asset protecting an urban environment, rural community, farming community, or some other item of regional or national significance?
Performance	Is the asset delivering its Level of service requirements, or alternatively has broken and requires fixing?
Efficiency of asset	Is asset delivering expected Life Cycle Costs? Or are we reviewing a need for improvements to energy, reliability, waste, etc.?
Asset Criticality	When the asset fails what impact will it have on the financial, environment and social viability of the catchment’s community and other communities further down river?
Risk	Identifying if there is an H&S or Environmental risk to the public, the flora and fauna, the land, or our staff we cannot mitigate to an acceptable level?
Life cycle costing	Over the assets designed useful life are the ongoing costs to maintain higher than if we replaced or regenerated them?
Affordability	Are the available hard and soft infrastructure options economical for the catchment to support over the long-term repayment of works and ongoing operational costs?
Environmental Requirements	Are there any carbon neutral or negative options available to mitigate the issue?
Natural Hazards	Are there any morphological considerations that will affect the resilience of the works proposed?
Alternative Green solutions	Do any of the the options provide to flora, fauna, and waterway health within the catchment?

# 7 LIFECYCLE MANAGEMENT PROGRAMMES

Overarching responsibility for the assets across the region lays with the Director Integrated Catchment Management, whom has different managers reporting to them on delivery of various programmes of work.

The overarching management programme is focussed on the long-term sustainability of the infrastructure, to ensure they deliver the level of service that was agreed when initially funded.

Council has an obligation to ensure there is visibility of where community rates are being spent, and to show that works carried out are effective in delivering the agreed levels of service. As such there is a need to monitor and report on the condition and performance of the assets, and improvements being made to make planning, investigation, capital, and operational works more efficient in how they are conducted.

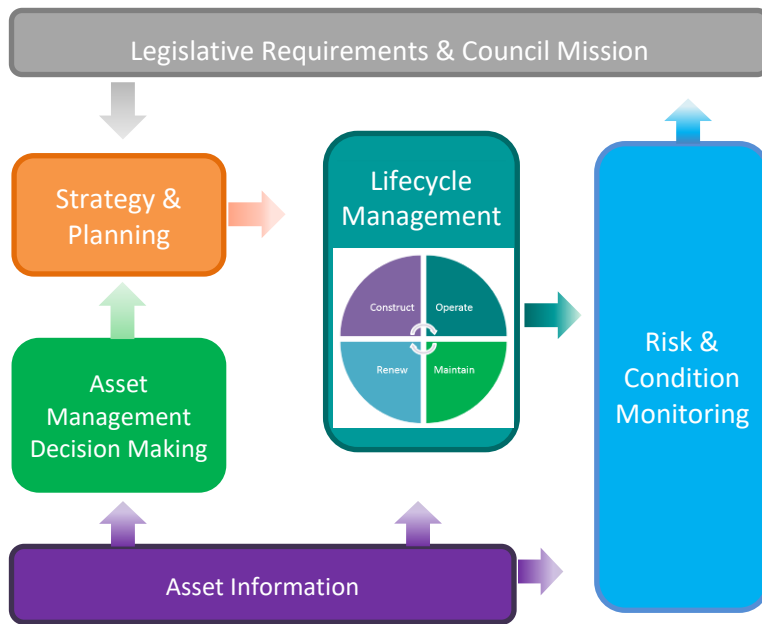


Figure 17: Key infrastructure lifecycle management programmes

The key programmes, their procedures, links to templates, and reporting requirements are located in the RAMP Operational Manual February 2024<sup>23</sup>.

<sup>23</sup> [RAMP Operational Manual February 2024](#)

## 8 FINANCIALS

For Council to undertake a sustainable, long-term approach to the management of infrastructure assets within the catchment zones it is essential to prepare long-term financial forecasts. This allows a long term view of how the asset will be managed, how much this will cost and when additional funding may be required to meet expected service levels. These financial forecasts are a culmination of the previously discussed aspects of the RAMP.

### 8.1 Work category definitions<sup>24</sup>

All costs incurred through the ownership of infrastructural assets and, that directly relate to the running of those assets fall into three categories, Capital New, Capital Renewal and Operations and Maintenance expenditure. Under the generally accepted accounting practice (GAAP) the following definitions have been applied to the treatment of costs against infrastructure assets.

Table 6: Expenditure Categories

Category	Definition
Operations and maintenance	Operations and Maintenance expenditure is that required for the day-to-day operation of the zone while maintaining the current levels of service.
Capital - New Works	New capital works involves the creation of new assets, or works, which upgrade or improve an existing asset beyond its current capability and capacity to account for future growth or improved performance in response to changes in usage or customer expectations of improved levels of service.
Capital – Renewals	Renewal expenditure includes rehabilitation and replacement of assets. The objective is to restore an asset to its original level of service.  Renewals expenditure forecasts cover the cost of asset renewal through its whole lifecycle through to disposal of the asset.

### 8.2 Policies

The WRC has several key policies that provide guidelines and procedures for dealing with treasury management activities; the determination of the significance of an issue, proposal, decision, or other matter; how to perform in partnerships between WRC and the private sector.

These policies are:

- WRC Treasury risk management policy
- WRC Policy on significance
- WRC Partnership and private sector policy
- WRC Infrastructure assets – accounting policies and guidelines.

<sup>24</sup> [Document # 16970363 - Infrastructure assets accounting guidelines 2020](#)



## 8.3 Funding Mechanisms

### 8.3.1 Funding of operational works

The costs of services are funded through a combination of income sources including:

- Ratepayers
- Internal borrowing
- Investment income
- Participating landowners
- Sale of items E.g. harvested poplar logs, hay, and silt dredging from canals
- Grazing licenses

The budgeted income from the investment fund is treated as an offset to general rate and does not directly fund any work programme. Internal borrowing is used to fund much of the river and catchment management works.

Specific debt repayment plans are in place with each affected catchment zone, funded from targeted rates, to ensure that this debt is repaid over an agreed time period (generally 10 years). Funds generated from the internal debt repayment are added into the WRC's general investment fund.

### 8.3.2 Funding of capital renewals works

With an annual depreciation of approximately \$8 million per annum, this is not sufficient to fund the current renewals programme solely through internal loans. To meet the ongoing costs for the renewal of council's infrastructure assets, capital works are paid for through an external borrowing programme. Depreciation expense is used as a proxy for debt repayment, as this approach ensures that the repayment of debt is aligned with the useful life of the asset that has been constructed / renewed in accordance with principles of intergenerational equity.

## 8.4 Asset Valuation

The value of the flood protection and drainage assets as of 31<sup>st</sup> December 2022 totalled \$1.122 billion NZD, and were split between the three service areas as shown in the table below:

Table 7: Value of WRC owned and managed assets.

Service Area	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)
Catchment Management	\$5,818,120	\$1,702,666
Flood Protection	\$991,380,896	\$781,396,780
Lake Management	\$637,914	\$559,964
Land Drainage	\$66,938,717	\$62,080,361
Licence Management	\$42,062	\$32,385
River Management	\$57,197,658	\$32,079,294
Total	\$1,122,015,367	\$877,851,449

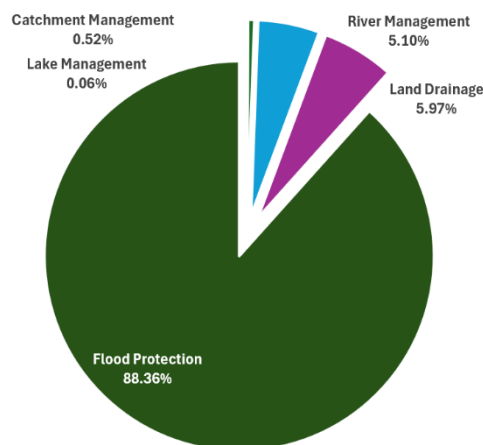


Figure 18: Value of assets by services provided.

A review of asset values is conducted each year (desktop review) and a triannual full revaluation undertaken by registered and certified valuers is undertaken ahead of the LTP.

Between 2013 and 2019 the replacement cost for council's assets increased from \$484 million to \$643 million. Between 2019 and 2022 the valuation increased considerably to \$1.122Bn. This was a significant shift in valuation with some asset types increasing well above the cumulative Capital Good Price Index (CGPI). This was due to a range of factors including addition of new assets, new asset standards being required to meet new regulatory requirements, source material availability and improved data assumptions and averaging techniques. The valuation numbers below are used for asset management to support calculating long term asset renewals projections, identifying loss of service potential, and for financial reporting purposes.

**Table 8: Replacement value by asset class (December 2022)**

Financial Class	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Financial Depreciation (AFD)
Bridges	\$3,575,549	\$1,539,900	\$42,848
Channels	\$81,797,797	\$67,932,407	\$318,475
Control Gates	\$4,161,734	\$941,667	\$69,009
Culverts	\$5,674,713	\$3,687,929	\$73,630
Debris Traps	\$213,298	\$154,543	\$2,133
Detentions	\$16,179,038	\$14,959,354	\$51,341
Drop Structures	\$101,201	\$23,008	\$1,803
Fencing	\$14,069,626	\$2,060,663	\$416,441
Floodgates	\$95,555,165	\$42,016,439	\$1,392,966
Plantings	\$360,421	\$360,421	-
Pump Stations	\$125,145,131	\$57,373,143	\$2,508,727
Retaining Structures	\$9,934,925	\$5,854,506	\$184,033
River Training Works	\$4,165,472	\$3,023,706	\$42,470
Stopbanks	\$752,437,860	\$672,455,777	\$2,649,204
Structures	\$7,497,879	\$4,536,487	\$176,205
Weirs	\$1,145,558	\$931,498	\$11,456
<b>Totals</b>	<b>\$1,122,015,367</b>	<b>\$877,851,449</b>	<b>\$7,940,741</b>

Accumulated depreciation is the total depreciation accumulated for each asset across its lifespan. For the purposes of valuing council assets, it is calculated as the optimised replacement cost minus the optimised depreciated replacement cost.

Council's asset valuations are completed in accordance with:

- Public Benefit Entity International Public Sector Accounting Standard 17, Property Plant & Equipment (PBE IPSAS 17)
- New Zealand Infrastructure Valuation and Depreciation Guidelines (Edition 2), issued by the National Asset Management Steering Group (NAMS).

During the analysis some minor inaccuracies were found in the asset attribute details, understanding useful life of different asset classes, and the unit rates applied to construction work.

For more details of the process followed and detailed findings refer to Waikato Regional Council Financial Valuation Report 2023<sup>25</sup>.

<sup>25</sup> [Waikato Regional Council Financial Valuation Report 2023, valuation date as of 31<sup>st</sup> December 2022 – Doc # 27966079<sup>25</sup>](#)

## 8.5 Historical Financial Performance

### 8.5.1 Operational Funding

Flood protection, river, and drainage assets consumes approximately one third of the council's annual operating budget.

The graph to the right shows the split of operational funding across the three major activities.

These figures include:

- Overheads, such as management and technical services activities.
- Operational and maintenance repair activities.
- Continuous Improvement activities related to the three asset areas.
- Extreme weather event reserves.

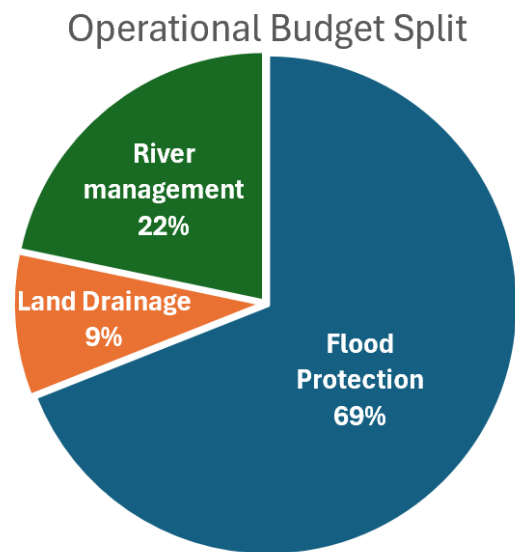


Figure 19: ICM operational task funding by asset related activity.

They do not include:

- Depreciation
- Catchment Management Activities

The funding spread across the zones for each area is shown below:

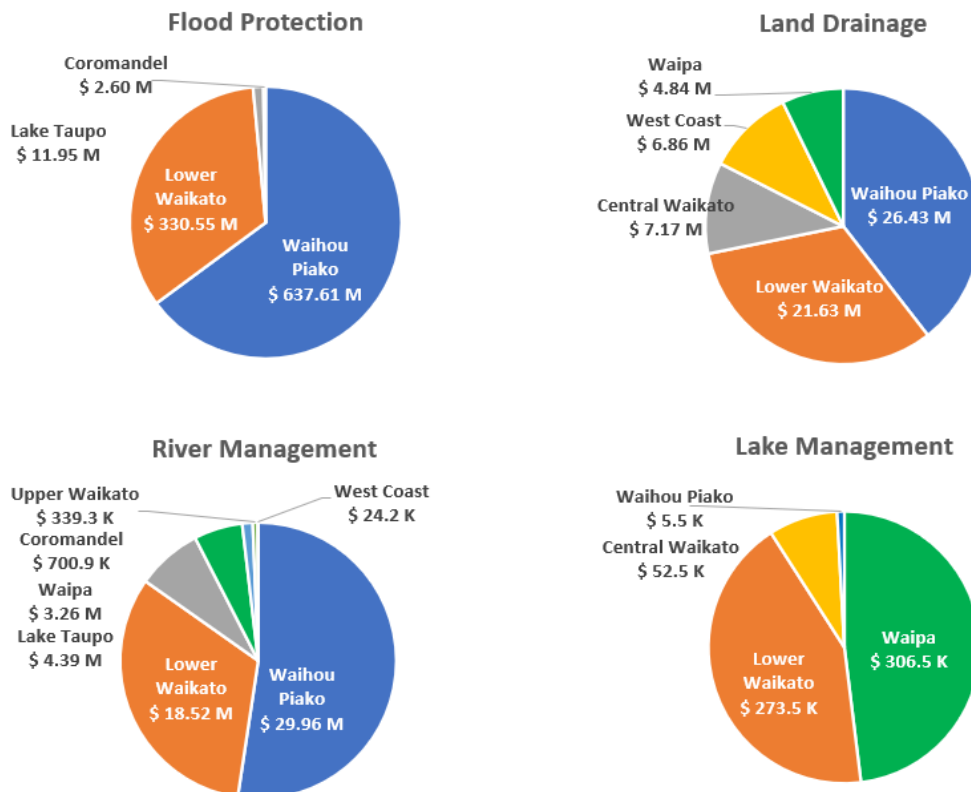


Figure 20: Funding for each activity type, in 2022/23 Financial year, as split across zones.

A majority of the urban and rural flood protection assets are in the lower Waikato, Waihou, and Piako areas. Whereas the Waipā protects mainly Ōtorohanga, Taupō the area of Turangi, and Coromandel several small communities.

### 8.5.2 Operational expenditure performance

Operational expenditure target budgets and spends are tracked annually and within year. Table 14 outlines trends from 2015 / 16 to 2022/23. Values are in Millions.

**Table 14: Historical annual operational budgets and actual spend (\$M rounded to nearest \$10,000)**

Year	Yr. Actual	Annual Plan FY Budget	Revised FY Budget	Yr. Actual / Annual Plan	Yr. Actual / Revised (approved) budget
2015/16	\$23.96	\$22.62	\$21.68	106%	111%
2016/17	\$32.47	\$30.92	\$29.04	105%	112%
2017/18	\$37.72	\$30.59	\$30.49	123%	124%
2018/19	\$35.66	\$35.20	\$35.63	101%	100%
2019/20	\$38.38	\$38.52	\$40.35	100%	95%
2020/21	\$42.41	\$38.68	\$43.44	110%	98%
2021/22	\$42.77	\$43.98	\$43.44	97%	98%
2022/23	\$49.10	\$45.34	\$49.44	108%	99%

Adverse weather events in 2021/22 and the first part of 2023 had a major impact on delivery of operations and maintenance activities.

### 8.5.3 Capital expenditure performance

Capital expenditure budgets and spends are tracked annually and reviewed quarterly.

Table 14 outlines trends from 2015 / 16 to 2022/23. Values are in Millions.

**Table 15: Historical annual capital budgets and actual spend (\$M rounded to nearest \$10,000).**

Year	Renewals			New works		
	Yr. Actual	Annual Plan FY Budget	Revised FY Budget	Yr. Actual	Annual Plan FY Budget	Revised FY Budget
2015/16	\$6.45	\$696	\$6.58	\$1.86	\$1.69	\$1.45
2016/17	\$8.83	\$11.62	\$10.65	\$1.42	\$2.85	\$2.17
2017/18	\$11.58	\$16.15	\$12.52	\$1.38	\$4.93	\$2.07
2018/19	\$9.15	\$11.83	\$11.72	\$2.01	\$0.22	\$2.25
2019/20	\$4.88	\$13.77	\$11.27	\$1.59	\$0.78	\$5.61
2021/22	\$4.05	\$21.82	\$8.86	\$0.38	\$3.33	\$0.43
2022/23	\$3.42	\$6.92	\$6.79	\$0.94	\$1.66	\$3.39

## 8.6 Forecasted spend profile

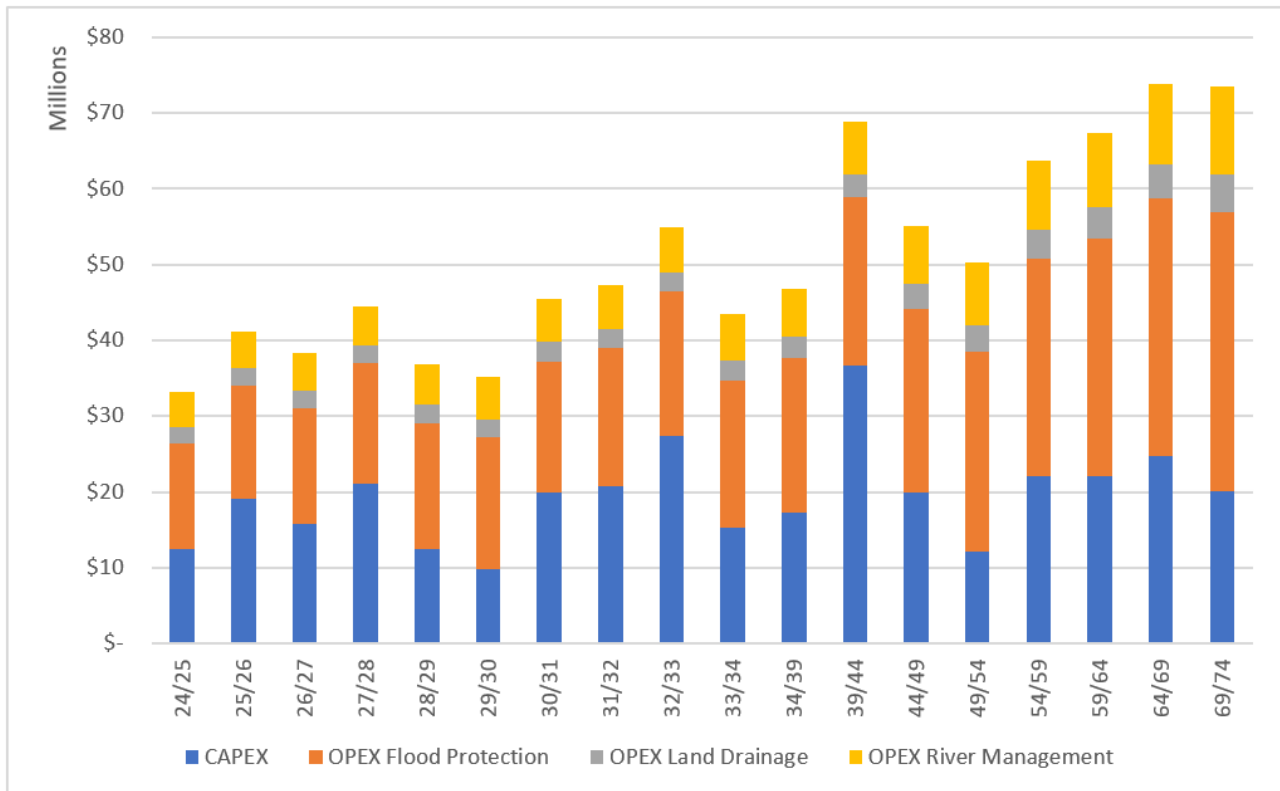


Figure 21: Total 50-year expenditure forecast (includes inflation).

Note: 1st 10 years are shown individually, 11 – 50 years are averaged for the 5-year period.

### 8.6.1 Operational

Forecasted operational expenditure is expected to increase over the next 50 years due to:

- Inflation (accounts for over 130% of the increases forecast from the 2024/25 base year)
- Increasing age of assets therefore reducing performance, so they need to run longer, and require more maintenance.
- Increasing compliance costs.

### 8.6.2 Capital renewals

For the first 10 years, confirmed works programmes and project estimates are the dominant influence on the forecast expenditure associated with asset renewals. Beyond the ten-year horizon, the combination of current asset values (determined through asset revaluation<sup>26</sup>) and remaining asset lives are used to estimate longer term renewal forecasts out to 50 years in the future. Where practical and safe to do so, the council has smoothed planned replacement programmes to ensure effective use of resources and management of risk. Critical assets have a lower threshold for action than non-critical assets.

Refer to Infrastructure strategy in the 2024-34 long term plan ([– Link to be added in JUNE](#)) Renewals profiles for the Flood protection schemes are located in Zone specific summaries in the RAMP Operational Manual February 2024<sup>27</sup>.

<sup>26</sup> Current asset values updated in December 2022

<sup>27</sup> [RAMP Operational Manual February 2024](#)

### 8.6.3 New Capital

Much of the council's work is maintaining the existing infrastructure, there is minimal new capital projects in the pipeline for the next 10 years. Future works to resolve demand issues that are programmed within the next three years are:

**Table 9: Growth-related Asset Solution.**

Asset Solution	Zone	Funding Source(s)
Land Purchase for foreshore stopbanks	Waihou Piako	Capital works funding policy
Land Purchase for ABCD Flax Blocks	Waihou Piako	Capital works funding policy
Climate resilience - Increasing height of stopbanks due to changes in morphology or land subsidence.	Regional	Capital works funding policy
New Telemetry outstations	Central Waikato Lower Waikato Waihou Piako Waipā West Coast	Capital works funding policy
Up and downstream fish passage	Central Waikato Lower Waikato Waipā West Coast	Capital works funding policy
River Management works (installation of groynes, weirs etc.)	Central Waikato Coromandel Lower Waikato Taupō Waihou and Piako Waipā West Coast	Capital works funding policy
Lake level structures (weirs and culverts)	Central Waikato Lower Waikato Waipā Waihou Piako	Capital works funding policy

## 8.6.4 Data Confidence

1 to 3 years projected spend requirements: Reliable

4 to 50 years projected spend requirements: Uncertain

The table below highlights the potential variations that may be seen.

**Table 17: confidence in various inputs used to develop the 10 year and 50 year infrastructure financial forecasts**

Area	Sensitivity	Effect on forecast	Reasoning
Reactive Maintenance	0% to 25%	Low	Reactive maintenance is subject to a range of influences including the weather and river flows etc.
Contingency Funding – Extreme Events	0% to 25%	Low	Major disaster (floods and earthquake) risks are provided for through self-reserving and membership of the LAPP mutual disaster damage fund.
Morphological changes to river	-50% to +300%	High	The unpredictability of changes in river size and location due to changes in the magnitude of frequent events means assets will need to retreat and instances where current scheme land becomes part of the river system and new scheme land needs buying.
Condition of assets	-20% to +20%	Medium	Assets will always degrade but using asset condition in the analysis allows better prioritisation and for some work to be pushed out. If asset condition knowledge is low, then some areas at risk may be incorrectly prioritised.
Degradation rates of assets	0% to +50%	Low	Currently degradation rates are known for stopbanks. Better analysis of other asset classes will allow more robust renewal forecasts in the future.
Demand predictions – Climate change	-20% to +50%	Medium	Climate change has been built into the analysis. Minimal effects are expected in the next 10 years. The sustainable infrastructure strategy signed off by Council in 2020 will influence decisions into the future.
Demand prediction – urban development	0% to +30%	Low	May lead to early renewal of some assets due to changes in level of service requirements.
Demand predictions – asset performance	0% to +200%	High	The effect of building on and draining areas composed of peat and marine mud and understanding associated land settling rates means assets are needing repositioning to continue to perform their function. The research is only at its embryonic stage and will be used in the future to help with future forecasts. Risk: Potentially halving asset life.
Construction costs: Source Material	25% to 50%	Medium	In the past build material has been sourced from nearby farms, future changes in resource management and bio security rules or alternatively all local material being exhausted may lead to a lack of available build material. Current costs to source material are at least doubled if buying and trucking into stopbank works site.
Market Conditions	20% to +50%	Medium	Due to flood events and a national shortage of skilled construction workers, the availability of suitably qualified and experienced contractor resources has diminished. This adds to the cost of construction and impacts on the timeframe for delivery.
Regulatory Change / Impact??	0% to +200%	High	Aspects such as up and downstream fish passage requirements has seen considerable increase in complexity and costs for new assets.

## 8.6.5 Summary 10-Year Forecast Budget by Programme

Table 18: Forecast expenditure by budget type, across all zones, and all flood protection and drainage asset types (includes inflation)

Programme	Year 1 2024/25	Year 2 2025/26	Year 3 2026/27	Year 4 2027/28	Year 5 2028/29	Year 6 2029/30	Year 7 2030/31	Year 8 2031/32	Year 9 2032/33	Year 10 2033/34	Total
<b>Operations and Maintenance Programme</b>											
Flood Protection	13,876,961	14,855,370	15,240,550	15,826,482	16,716,323	17,272,036	17,285,662	18,227,951	18,993,227	19,479,121	167,773,682
River Management	4,672,104	4,855,298	4,989,583	5,160,761	5,372,339	5,533,974	5,694,547	5,852,671	5,979,848	6,103,282	54,214,406
Drainage	2,242,612	2,287,596	2,336,336	2,373,251	2,426,816	2,460,821	2,507,752	2,523,942	2,572,046	2,592,321	24,323,492
<b>Capital Programme – Renewals</b>											
Flood Protection	10,296,615	17,917,077	14,564,624	19,941,629	10,663,937	7,642,461	12,968,605	11,989,308	22,080,761	9,114,335	137,179,351
River Management	-	-	-	-	-	-	-	-	-	-	-
Drainage	-	21,399	-	-	-	-	306,695	103,824	-	-	431,917
<b>Capital Programme – New Works</b>											
Flood Protection	1,380,000	611,400	623,017	528,526	1,080,206	1,590,046	1,618,667	1,646,185	1,674,170	1,995,884	12,748,100
River Management	200,840	-	-	-	-	-	-	96,805	-	15,888	13,533
Drainage	-	-	-	-	-	-	4,424,220	6,268,731	3,040,608	3,469,450	17,203,008
<b>Asset Disposals Programme</b>											
Asset Disposal Programme	-	-	-	-	-	-	-	-	-	-	\$0
<b>OVERALL TOTAL</b>	<b>32,669,132</b>	<b>40,548,140</b>	<b>37,754,110</b>	<b>43,830,649</b>	<b>36,259,621</b>	<b>34,499,338</b>	<b>44,806,148</b>	<b>46,709,417</b>	<b>54,340,660</b>	<b>42,770,281</b>	<b>441,187,496</b>



# 9 SUPPORTING SYSTEMS

## 9.1 Asset Information Systems

The council is in the process of transferring over the next three years to a single enterprise system. This will enable efficiencies between financial, procurement, asset management, human resource management, and reporting.

Table 19: Asset Management Systems

System	Purpose
Infor	The Enterprise Asset Management System: Asset information, condition and performance data, valuation data. And the management of task planning, scheduling, execution, and closeout actions.
Fulcrum	Mobile data collection for collecting scientific data, bespoke auditing
Conquest	System data collection and reporting.
GIS	Geographical asset information, used to show information spatially
Promapp	Process maps detailing business processes for the management of various council processes
Discover	Document management & filing of historic documentation, maps, photos, projects, audits etc.
Integrated Regional Information System (IRIS)	External enquiries logging system, that enables triage, responding to individual requests, and monitoring and reporting
Psoda	Project Management and Reporting system used for capital projects
Ricardo	Telemetric monitoring of outstations.
Damstra	Health and Safety system for capturing risks, near misses, and incidents, and the resulting investigations and actions.

## 9.2 Asset Information Management

WRC has an asset register for inclusion of all assets that contains:

- A definition of assets including description and location.
- Physical dimensions and capacity.
- Asset age and replacement costs.
- An assessment of asset condition.

Asset related data is collected and entered into the asset register. This data is under constant review with increasing accuracy being achieved through data validation by staff and contractors. The asset register and associated asset information is held in the Infor Asset Management System (AMS). Council uses this system as the primary asset management information tool. Categorisation of assets into types and attribute fields are hierarchical and fully customisable.

A spatial representation of the asset information is provided by an ArcGIS based Geographic Information System (GIS) which is linked to the asset database.

# 10 CONTINUOUS IMPROVEMENT

## 10.1 Improvement process overview

WRC has a strategic objective of managing their flood protection and land drainage assets in a way that ensures that the required levels of service are delivered in the most cost-effective manner for present and future customers. To help achieve this, a structured approach to infrastructure asset management, based on the International Infrastructure Management Manual (IIMM), has been adopted.

The vision of what the council wishes to achieve is explained in the table below:

**Table 20: Shared vision on what success looks like when asset management within the council is effective.**

Area	Action Statement
<b>People</b>	I know what is expected of me, and have the tools and knowledge to do the job My people can do the jobs I ask of them
<b>Strategy and Planning</b>	I understand the effect nature and people have on my assets life and health We know and achieve the asset performance required
<b>Condition Monitoring</b>	We know what assets we have, manage, and can easily access them to do works We know the condition of our assets, how to look after them, and when
<b>Capital Delivery (New and Renewals)</b>	For any piece of work I know <ul style="list-style-type: none"> <li>- The objectives and outputs required</li> <li>- The priority of the works</li> <li>- When it's going to occur</li> <li>- Who is managing it</li> <li>- How much it will cost</li> <li>- How it's going</li> <li>- How my risks and issues are being managed</li> </ul>
<b>Operations Work Delivery</b>	I'm able to record issues found as I find them, and know how much they are costing me to fix I have visibility of how operations are progressing their routine maintenance tasks I know how I need to undertake the maintenance tasks to ensure compliance with permitted activities or resource consents
<b>Demand and Risk Planning</b>	I know my risks, what in place to stop them from occurring, and what to do if they do
<b>Systems &amp; Tools</b>	I enter the information only once into the system I can get the information I need to make decisions

### 10.1.1 Current maturity

The level of current practices and procedures is assessed against the 180 criteria split across sixteen of IIMM Maturity Index categories. These same criteria have been used since 2014 to measure progress in improving the council’s asset management maturity. The change in results is shown in the graph below:

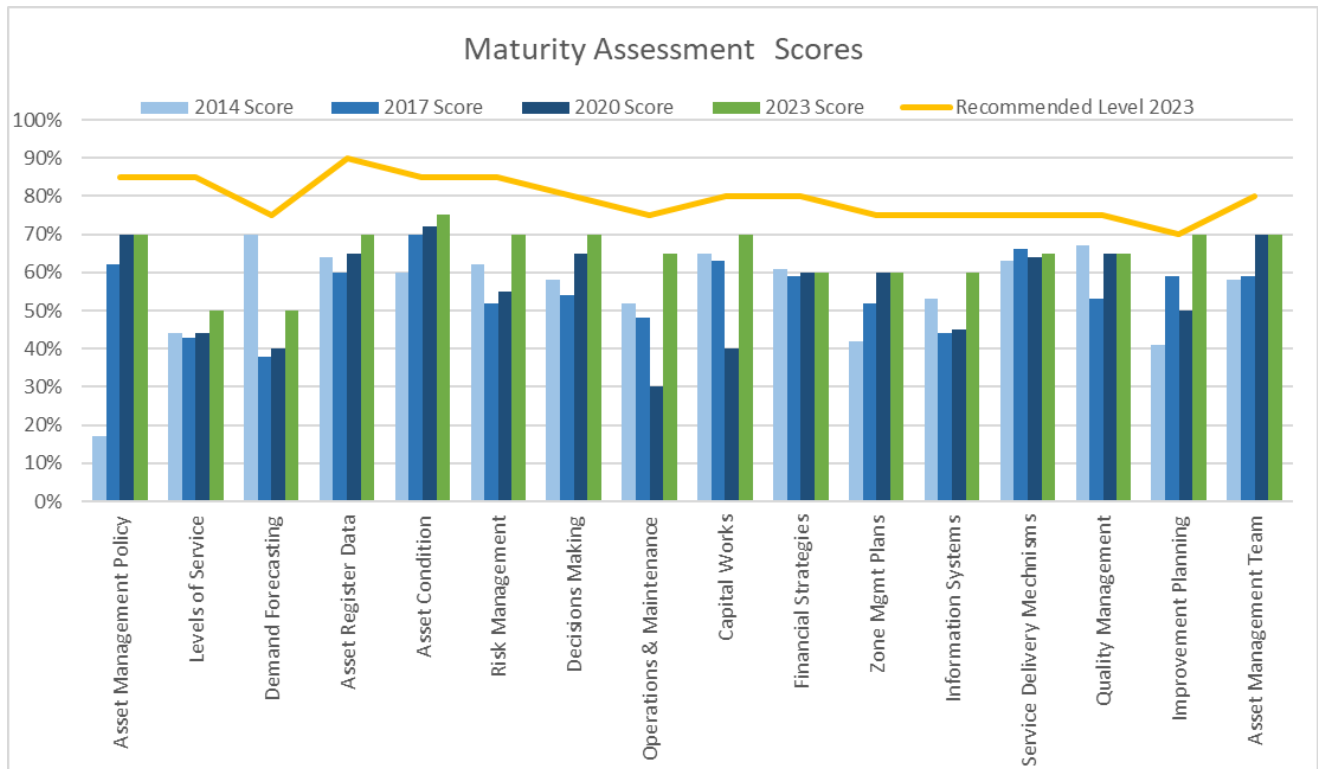


Figure 22: Councils Asset Management Maturity – Flood protection and Drainage asset management.

The blue and green (2023) columns are the measured results every three years. The orange line is the new target set in 2023.

It can be seen across multiple categories that there has been an improvement between 2014 and 2022.

Between 2020 and 2022:

We had improvements in 5 elements, remained static in 9 and reduced score in 3.

Significant improvements have been achieved in maturity aligned with our main effort investment areas. These being implementing Infor and associated good practice workflows adding significantly to our information systems score (45 to 60), undertaking in-house and specialised asset condition inspections, planning, and recording maintenance activities based on risk and need, improving our maintenance planning (55 to 70).

Improvements have also been seen in our risk management, decision making, operational planning and reporting scores each increasing by 5 points.

We have taken a step back in 3 elements, these being: Asset Register Data score (a shift from 70 to 60) impacted by transfer of data from Conquest to Infor, with previously unidentified gaps and errors in data being uncovered. Service delivery models score (65 to 60) has reduced following changes in regulatory requirements, increased workloads and changes in some corporate systems still bedding in. Similarly, our capital investment strategies scores (65 to 60) have decreased following a focussed review of capital planning activities leading to a recalibration of our previous internal score. All 3 elements have improvement plans and are set to improve within a 12–18-month window. Risks related to health, safety, and resilience, following recent flood events are being managed. The asset register and risk areas have longer term

improvement programmes due to the nature of the works required. These will also deliver benefits across the other asset management elements by default.

### 10.1.2 Roles and Responsibilities

Senior management representatives from across the organisation oversee progress of the improvement plan, and ensures the necessary resources are allocated to the improvement tasks.

The Asset Management Team Lead presents an overview of the initiatives and any current issues of potential risks that they pose to the overall delivery of the Asset Management Continuous Improvement Plan.

The designated project manager for each initiative is responsible for ensuring their work will be completed on time, and in the manner appropriate.

## 10.2 Continuous Improvement Plan

There are 5 improvement workstreams underway:

**Table 20: Strategic asset management improvement focus areas.**

Area	Improvement Activities
<i>Health and Safety</i>	Review progress against previous health and safety audits. Develop hazard and operability assessments for critical sites. Develop and deliver prioritised health and safety remedial action plans.
<i>Risk Management</i>	Review criticality matrix. Standardise risk quantification and reporting to align with corporate framework. Develop regional resilience models to inform viability and benefits of flood protection and land drainage schemes.
<i>Level of Service</i>	Develop strategies and plans for review of LoS and affordability of schemes including demand management. Review levels of service (LoS) and further develop key performance indicators (KPI's) including non-technical measures and align them across the zones. Establish soil conservation LoS and complete baseline soil quality data. Agree and implement changes to LoS with landowners, communities, and key stakeholders.
<i>Asset Data</i>	Assess and prioritise key data issues and areas for improvement. Develop a proposal for the 2024 LTP for data improvement. Implement prioritised data cleansing projects.
<i>Finance and Funding Strategies.</i>	Update the Sustainable Infrastructure Decision Framework (SIDF). Integrate criticality and risk into the SIDF modelling.

These are monitored on and reported through to the Continuous Improvement Plan (CIP) Steering Group consisting of the Director and senior leaders within ICM. The CIP representatives, reporting and escalation processes are being reviewed over the course of 2024 with a view to focus more on strategic issues raised in the Infrastructure Strategy and consideration of cross directorate representation in the group.

The Infrastructure Strategy and this RAMP have more detailed project management plans (PMP's) that set key actions, responsibilities, and delivery timeframes. The following are links to the relevant PMP's and folders:

Document Folder: [Infrastructure Strategy Implementation - Doc # 28418866](#)

PMP: [Addressing Infrastructure Sustainability Challenges - Doc # 28154197](#)

**Note a PMP and link is required for the RAMP CIP.**

# 11 APPENDICIES

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A1 LGA Schedule 10 LTP related plan requirements

A2 WRC Community Outcomes

A3 Asset Lives

A4 Community Adaptation Plans

A5 Drainage Networks Summaries

- Franklin Waikato Land Drainage Network
- Thames Valley Land Drainage Network
- Waikato Central Land Drainage Network
- Aka Aka/Otaua Land Drainage Network

A6 Catchment Management Zone Summaries

- Coromandel zone
- Waihou-Piako zone
- Lake Taupō zone
- Waipā zone
- Upper Waikato zone
- Central Waikato zone
- Lower Waikato zone
- West Coast zone

## A1 LGA Schedule 10 LTP related plan requirements

Table 21: LGA Schedule.

LGA 2002 Schedule 10 requirement	LGA 2002 references	Section covered
Identify the rationale for delivery of the group of activities (including the community outcomes to which the group of activities primarily contributes)	LGA 2002 Schedule 10 – 2 (1) (b)	RAMP, Sections 1,2,3
Outline any significant negative effects that any activity within the group of activities may have on the local community	LGA 2002 Schedule 10 – 2 (1) (c)	50-year infrastructure strategy
The amount of capital expenditure that the authority has budgeted to meet additional demand for an activity	LGA 2002 Schedule 10 – 3 (1) (a)	RAMP: Section 8
The amount of capital expenditure that the authority has budgeted to improve the level of service	LGA 2002 Schedule 10 – 3 (1) (b)	RAMP: Section 8,
The amount of capital expenditure that the authority has budgeted to replace existing assets	LGA 2002 Schedule 10 – 3 (1) (c)	RAMP: Section 8,
A statement of the intended levels of service provision that specifies any performance measures specified in a rule made under Section 261B of the Act (Mandatory measures)	LGA 2002 Schedule 10 – 4 (a)	RAMP, Section 3, Appendix B Zone management plans
The performance measures that the local authority considers will enable the public to assess the level of service for major aspects of groups of activities	LGA 2002 Schedule 10 – 4 (b)	2024 LTP, and RAMP section 3
The performance target or targets set by the local authority for each performance measure	LGA 2002 Schedule 10 – 4 (c)	RAMP, Section 3
Any intended changes to the level of service that was provided in the year before the first year covered by the plan and the reasons for the changes	LGA 2002 Schedule 10 – 4 (d)	Zone Management Plans, and RAMP, Section 3
The reason for any material change to the cost of a service	LGA 2002 Schedule 10 – 4 (e)	50-year infrastructure strategy and RAMP, Section 8
A funding impact statement in relation to each group of activities of the local authority	LGA 2002 Schedule 10 – 5 (1) (a)	RAMP, Section 8, LTP documents
The sources of funding to be used by the local authority	LGA 2002 Schedule 10 – 5 (2) (a)	RAMP, Section 8, LTP documents
The amount of funds expected to be produced from each source; and	LGA 2002 Schedule 10 – 5 (2) (b)	Funding Strategy
How the funds are to be applied	LGA 2002 Schedule 10 – 5 (2) (c)	Funding Strategy / Accounting policy

## A2 WRC Community Outcomes

### A2.1 WRC Community Outcomes

Community outcomes are the outcomes that a local authority aims to achieve in meeting the current and future needs of communities for good-quality local infrastructure, local public services, and performance of regulatory functions. The WRC outcomes are connected to one another, so success in one area cannot be at the expense of another. As a result WRC seeks to make decisions that provide multiple benefits for the community now and in the future. The community outcomes are depicted in figure 23 below:

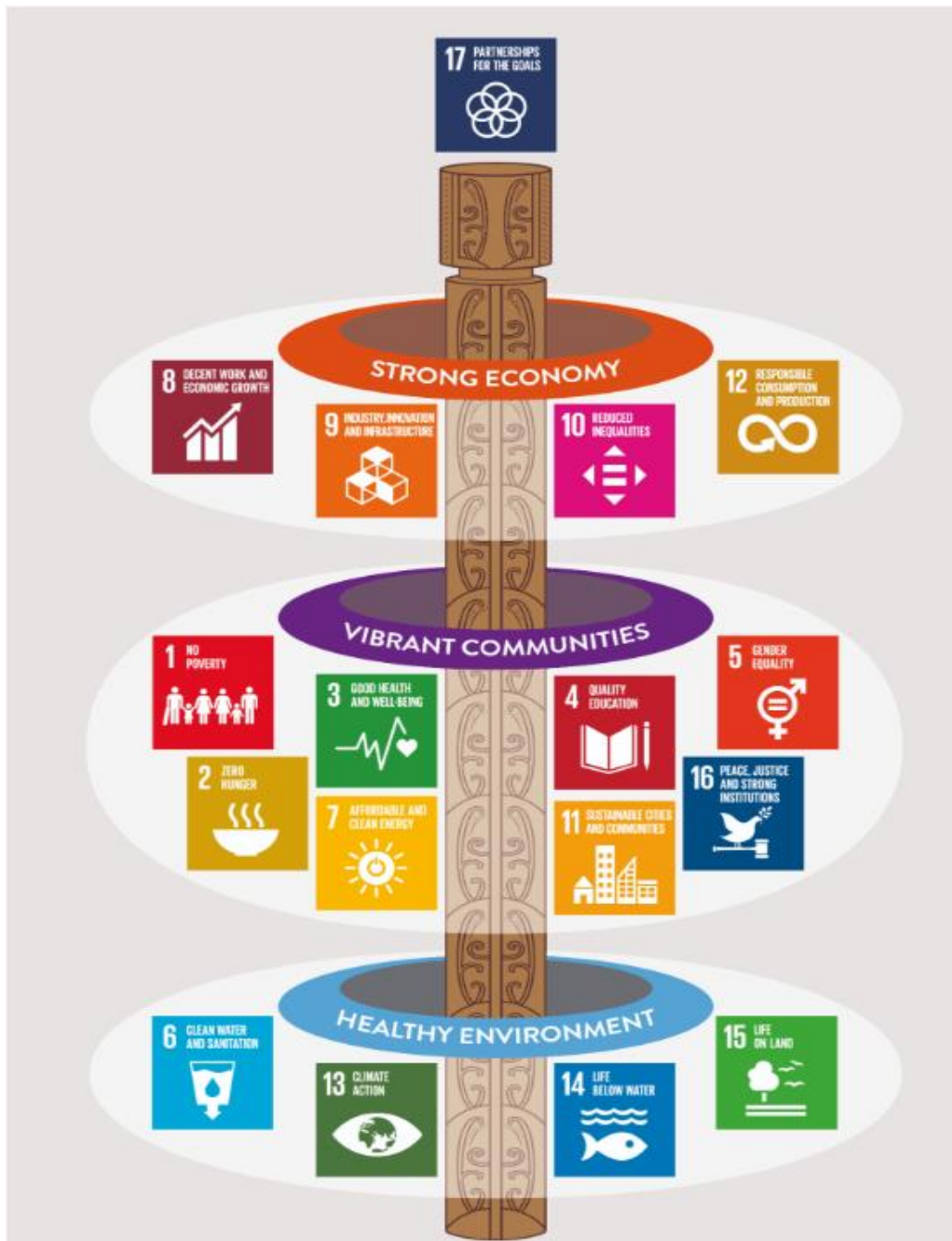


Figure 23: WRC Community Outcomes.

## A2.2 Strategic Alignment

The following diagram demonstrates how the internal and external facing parts of WRC align to provide continuity and a “line-of-sight” between long term outcomes, planning, strategies, plans and performance measures.

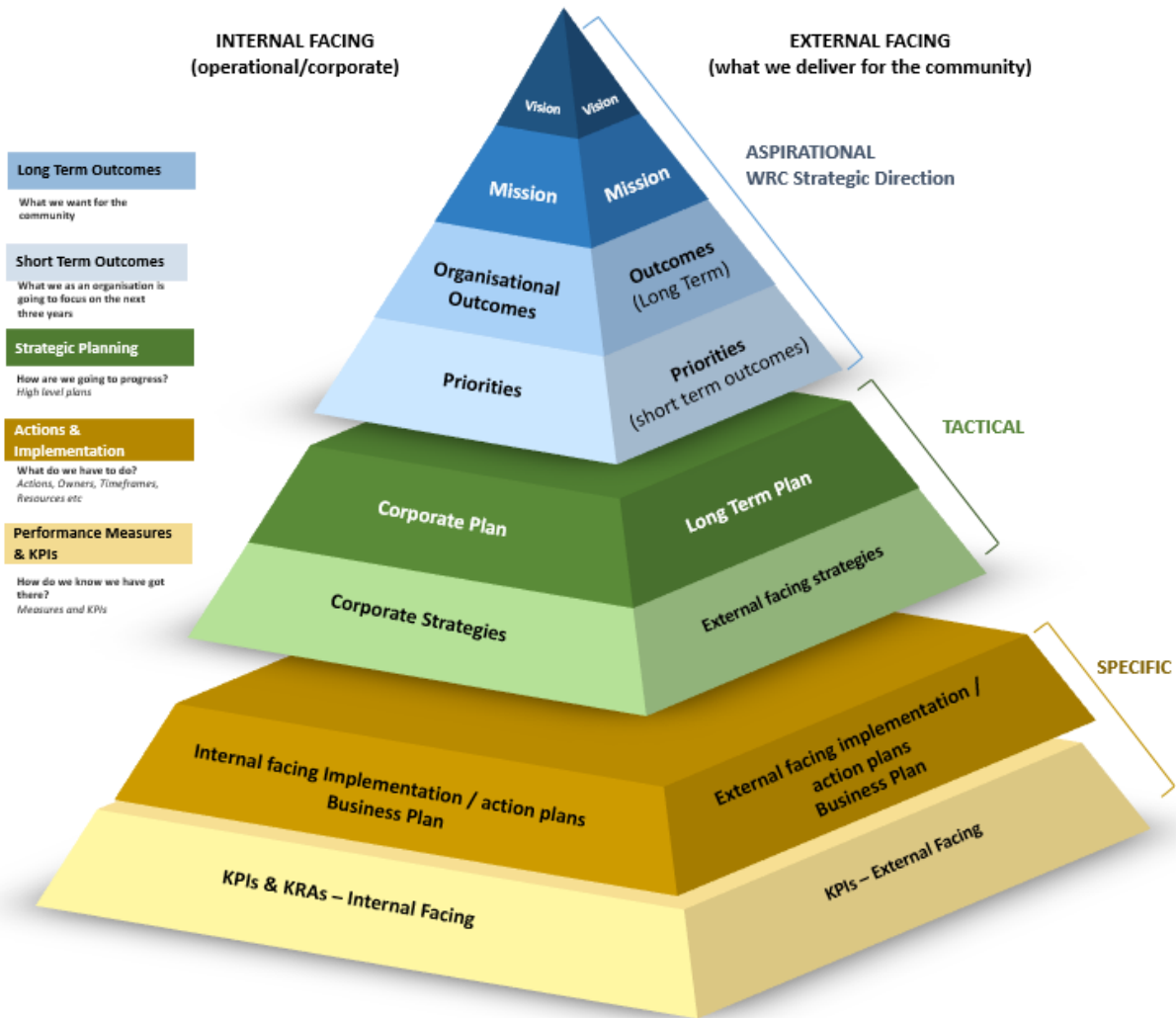


Figure 24: WRC Line of sight

## A2.3 Catchment Oversight

Consultation Includes:

- Advisory committee reporting, and discussions
- Liaison with iwi
- Website, Facebook, and Instagram
- Consultation register



Annual and forward programmes are considered by community representatives in the form of the Integrated Catchment Management Committee, and 2 advisory committees, and reported to the wider community and the Council.

## A2.4 Preparation and Contribution to Strategies and Plans

The following strategic documents and processes require regular review and monitoring:

- LTP Process
- Regional Policy Statement
- Waikato Regional Plan
- Whole of catchment management principals
- District plans etc.
- Local government reform

## A2.5 Asset Management Framework overview

Table 22 outlines the critical workflows within each of the major lifecycle areas. See also RAMP Operational Manual February 2024<sup>28</sup>.

**Table 22: Key Activities occurring within each section of the ICM AM Framework**

Area	Work in each area
Legislative Requirements & Council Mission	Legislative Requirements WRC policies and strategies Long Term Plan,
Asset Management Decision Making	Technical Guidelines National Standards Failure Modes, and Asset Care Strategies
Strategy & Planning	Catchment oversight Regional Asset Management Plan Zone Management and Planning Asset Management Continuous Improvement Plans Drainage management plan Scheme land management plan Waikato River Management Plan
Lifecycle Management	Operations programme Maintenance programme New Asset & Capital Renewals programme
Risk & Condition Monitoring	Reports back to committees & SLT on LOS performance & Asset performance. Risk and Hazard Reviews Scheme Reviews Resilience Reviews Condition monitoring, audits, and asset surveys
Asset Information	Valuation and Work capture from lifecycle delivery programmes Asset attribute capture and improvement Digitisation of historical information

<sup>28</sup> [RAMP Operational Manual February 2024](#)

## A3 Asset Lives<sup>29</sup>

Some specific assets have an individual financial asset life assigned to them, but most fit into the categories below:

**Table 210: Current lifecycle expectations for ICM assets are shown below.**

Asset Type	Asset Life (Years)	Asset Type	Asset Life (Years)
<b>Embankments</b>		<b>Structures</b>	
Stopbanks:		Control gates:	
Firm clay foundation	100	Civil structure	80
Clay foundation	100	Radial/slucice gates	50
Peat foundation	20	Lifting gear	25
Sand foundation	60	Power supply	20
Detention dams:		Switchboard and controls	30
Embankments and spillways	80	Building	60
Pipes	80	Pump stations:	
Headwalls	80	Pumps and motors	25
Bunds	50	Switchboards and controls	30
		Screens	20
<b>In River Structures</b>		Power supply	20
Miscellaneous:		Flap valves	50
Boat ramps	50	Building	60
Weirs (rock/timber)	100	Inlet / outlet structures	80
River training groynes	100	Sump (concrete)	80
Rip Rap (rock protection)	50	Discharge pipes	80
Fish pass:		Floodgates:	
Inlet	50	Barrels	80
Channel	100	Headwalls	80
Pipe	60	Flap valves	50
Valve	50	Culverts:	
Canals	100	Barrels	80
		Headwalls (timber)	50
		Bridges:	
		Concrete	100
		Timber/steel	50

<sup>29</sup> [Document # 16970363: Infrastructure assets accounting guidelines 2020](#)

## A4 Community Adaptation Plans

The 2017 Ministry for the Environment’s Coastal Hazards and Climate Change Guidance for Local Government<sup>30</sup> (MfE Guidance) helps councils work with communities to develop pathways that enable communities to adapt to change. The MfE guidance sets out a recommended 10-step process for councils and community to follow when adapting to coastal hazards. The Waikato Regional Council has been working closely with our territorial authorise and vulnerable communities to undertake these community adaptation plans, however, have also included in additional hazards, such as river flooding and land instability where appropriate.



Community adaptation plans currently in progress include:

**Figure 25: The 10-step decision cycle.**

- Wharekawa Coast 2120 lead by Hauraki District Council and is currently at step seven (Dec 2023) of the 10 step guidance.
- Shorelines Management Pathways lead by Thames Coromandel District Council and is at step eight (Dec 2023) of the 10 step guidance.
- Hauraki Plains Adaptation Project lead by Hauraki District Council and is at step two (Dec 2023) of the 10-step guidance.
- Waikato District Adaptation Project lead by Waikato District Council and is at step one (Dec 2023) of the 10 step guidance.

<sup>30</sup> [Coastal hazards and climate change: Guidance for Local Government.](#)

## A5 Drainage Network Summaries

The 4 main drainage areas are an amalgamation of over 90 smaller subdivisions, each with their own unique challenges and needs. All other drainage networks across the region are managed either privately, or by another territorial authority.

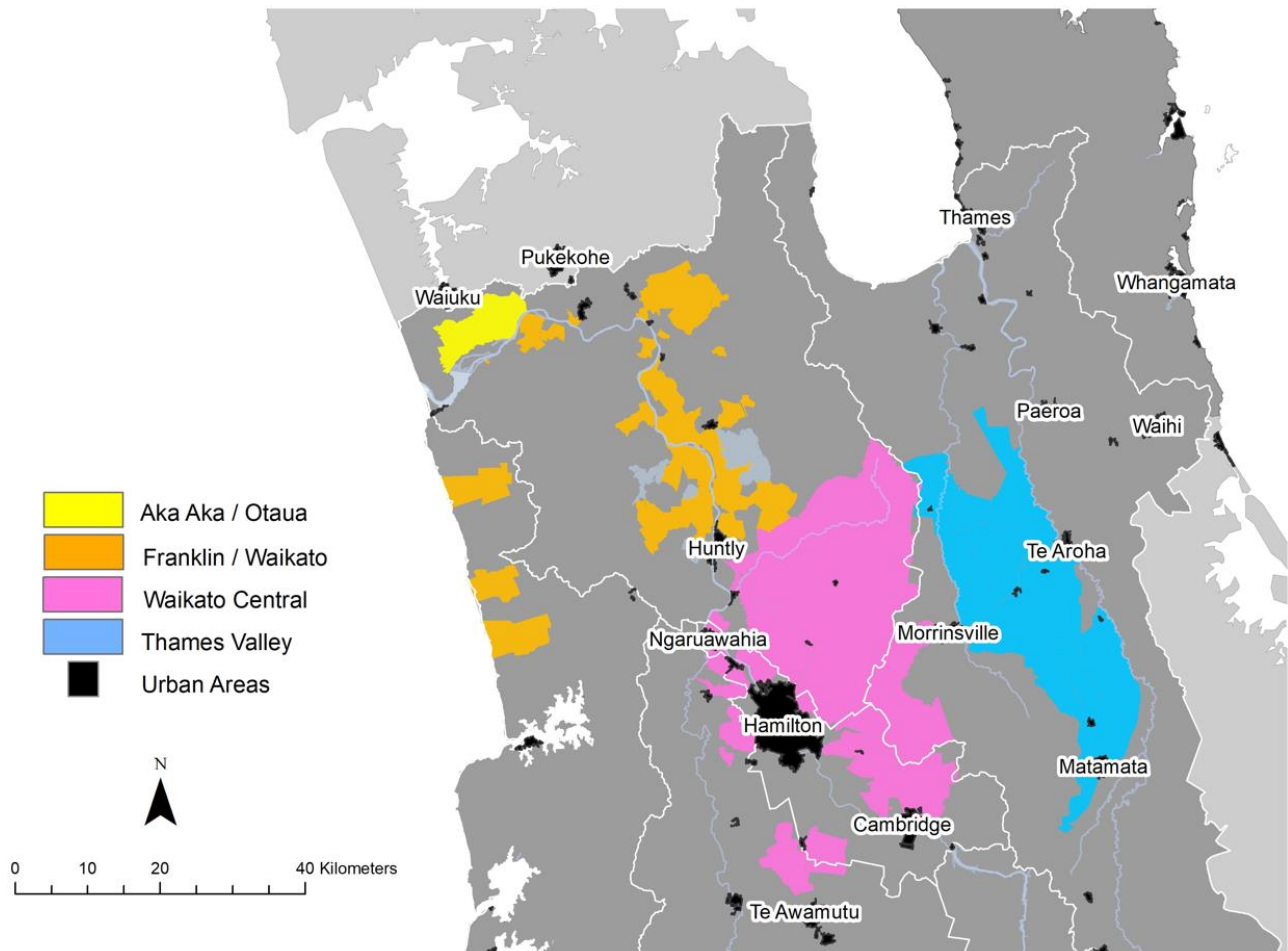


Figure 26: WRC Drainage management boundaries

### Common issues across all drainage networks

#### Issue 1: What is and isn't included in our drainage network

Not all drains within the Waikato and Hauraki areas are managed by the Waikato Regional Council. Where an agreement is in place, an established network is maintained to provide a drainage outlet to each property. The effectiveness of the drainage networks is regularly reviewed, and as a result of this process, where agreed existing private drains or new drains may be added to the council maintained network.

For example, there may be a subdivision where newly created lots require drainage and the council drainage network needs extending to provide that service. Alternatively, the council maintained network may be reduced by the removal of drains or portions of drains. Such instances could include the amalgamation of properties where a current council maintained drain would end within a property and it would be appropriate to shorten the drain to the new property boundary.

The developer of the new subdivision is responsible for the drainage areas in the area they are developing. Through the resource consent process they are usually also responsible for ensuring any additional storm water requirements caused by the change in land use.

To ensure there is detailed community input into the land drainage programmes for each drainage area, WRC works closely the advisory subcommittees comprised mainly of landowner representatives.

#### Issue 2: Excessive peat drainage

Peat drainage has become a major drainage challenge for our council.

As peat land is farmed, the peat oxidises, and shrinks in height. As the land height adjacent to the drain drops the drain becomes too shallow, causing it to not hold enough water during an extreme weather event. To reduce the frequency of needing to re-dig the drain land users have tended to dig the drains deeper than initially needed. Unfortunately, deep drains and cropping can accelerate the rate of shrinkage, making these areas more expensive to maintain. This has been especially seen in the Hauraki area over the last 40 years, where the farming practises employed have meant ground water levels have not been maintained causing further accelerating peat shrinkage.

#### Issue 3: Stock access to drains

Most of the silt that needs to be removed from drains comes from erosion of drain banks caused by stock damage. This damage also results in higher costs to ratepayers as subsidence and slumping of drain banks due to stock pressure often means channels have to be regularly machine cleaned – a method that is expensive, creates more disturbance and leaves more mess on the landowner's paddock. In general drains that are not fenced require cleaning every one or two years while drains that are fenced require cleaning every five or seven years.

#### Issue 4: Access along drains

To enable the drain maintenance work to be completed for as little cost to ratepayers as possible, good access along drains is essential. Within each property it is the land owner's responsibility to provide access along the community drains. Providing access includes:

- Gateways adjacent to drains in lateral fences.
- Culverts for access over side drains.
- No trees or hedges along the drains to allow machines to reach into the drain. (Permission can be granted in some cases)
- Restrictions relating to structures or ponds adjacent to community drains.

The cost difference between areas with good access and those with poor access is significant.

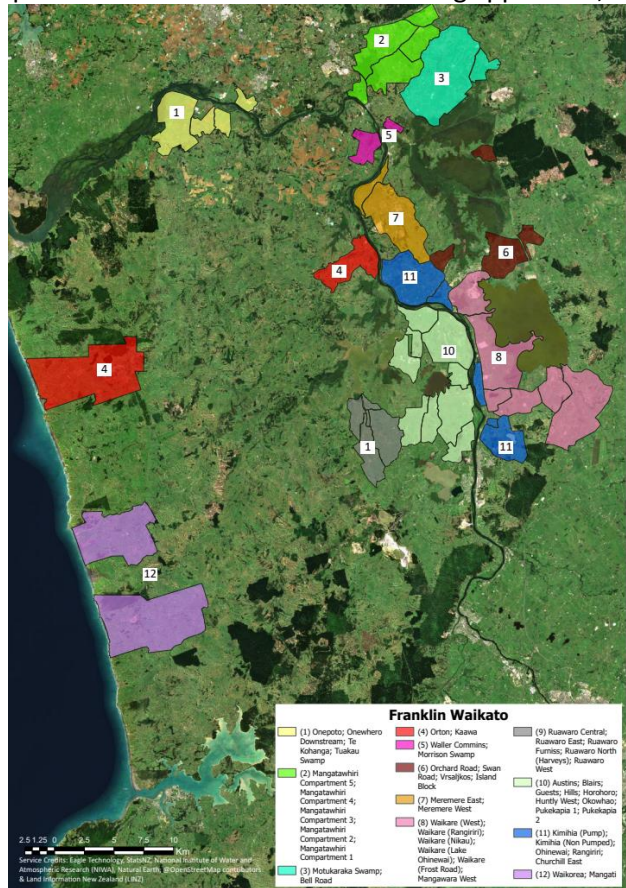
# Franklin Waikato Land Drainage Network

The Franklin Waikato Land Drainage Network is made up of 49 individual subdivisions totalling approx. 42,000 hectares.

This Scheme includes 266km of drain as well as a small amount of stopbank associated with the Kaawa subdivision.

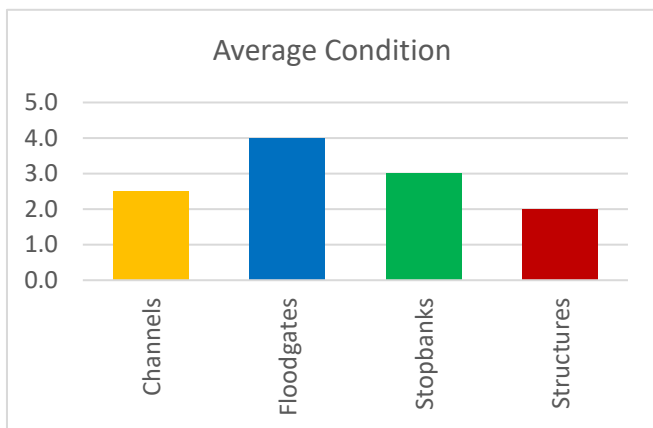
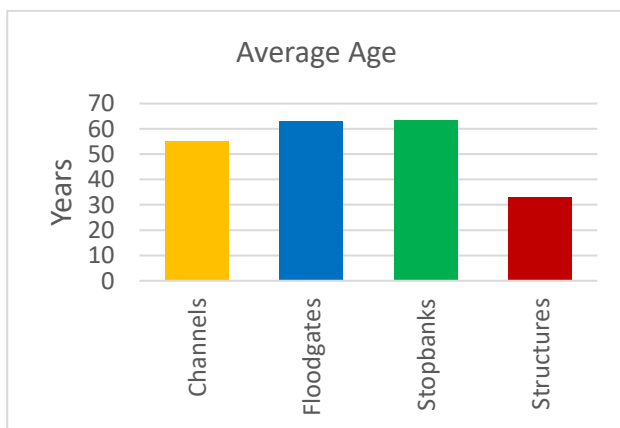
## Key issues

- Land use changes resulting in more surface water runoff into the land drainage network. These changes can also alter the level of service expectations particularly where subdivision results in the creation of smaller rural residential lots.
- Vegetation management – including pest plants such as alligator weed
- Roding network upgrades impact on drainage areas e.g. Waikato Expressway / SH2 realignment.
- Environmental Management – rules relating to work in Artificial channels vs modified natural
- Peat Settlement
- Presence of services such as power cables, water pipes, gas mains etc.
- Numerous small drainage areas. Efficiencies may be gained by amalgamation of some these into larger areas.



## Assets summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Franklin Waikato	\$ 12.76 M	\$ 11.71 M	\$ 17.0 K



## Asset Current Condition

Overall, the Kaawa main right bank stopbank is in fair condition (grade 3), with some surface damages and multiple low spots. The Kaawa main left bank was rated poor (grade 4) due to various defects predominantly stock damage and human activities.

The Kaawa twin box floodgate, only floodgate within the drainage area, was removed by the farmer and replaced with culvert and new headwalls.

Drainage area	Drainage subdivision	No Drains	Drain Length (m)	Additional Assets	Depth of Runoff per day	10% AEP V/d
Bell Road	none	2	2.98		Various but eventually 19mm from flat land and 38mm from hill land.	
Churchill East	none	6	9.67		Various but eventually 19mm from flat land and 38mm from hill land.	
Huntly West	Austins	4	5.16		Various but eventually 19mm from flat land and 38mm from hill land.	
Huntly West	Blairs	3	4.01		Various but eventually 19mm from flat land and 38mm from hill land.	
Huntly West	Golf Course	7	10.2		Various but eventually 19mm from flat land and 38mm from hill land.	
Huntly West	Guests	6	4.09		Various but eventually 19mm from flat land and 38mm from hill land.	
Huntly West	Hills	1	0.49		Various but eventually 19mm from flat land and 38mm from hill land.	
Huntly West	Horahora (Patterson's)	11	16.34		Various but eventually 19mm from flat land and 38mm from hill land.	
Huntly West	Okowhau	8	6.73		Various but eventually 19mm from flat land and 38mm from hill land.	
Island Block	none	5	3.7		Various but eventually 19mm from flat land and 38mm from hill land.	
Kaawa	none	7	8.44	+4.38km stopbanks + 1 floodgate	Various but eventually 19mm from flat land and 38mm from hill land.	
Kimihia	Kimihia drainage	2	3.61		Various but eventually 19mm from flat land and 38mm from hill land.	
Kimihia	Kimihia pumped	1	0.27		Various but eventually 19mm from flat land and 38mm from hill land.	
Mangatawhiri	Mangatawhiri C1	2	2.42		Various but eventually 19mm from flat land and 38mm from hill land.	
Mangatawhiri	Mangatawhiri C2	4	5.12		Various but eventually 19mm from flat land and 38mm from hill land.	
Mangatawhiri	Mangatawhiri C3	3	4.12		Various but eventually 19mm from flat land and 38mm from hill land.	
Mangatawhiri	Mangatawhiri C4	6	11.98		Various but eventually 19mm from flat land and 38mm from hill land.	
Mangatawhiri	Mangatawhiri C5	1	0.72		Various but eventually 19mm from flat land and 38mm from hill land.	
Mangati	none	1	13.03		Various but eventually 19mm from flat land and 38mm from hill land.	
Mangawara	none	6	8.55		Various but eventually 19mm from flat land and 38mm from hill land.	
Meremere East	none	6	9.67		Various but eventually 19mm from flat land and 38mm from hill land.	
Meremere West	none	none	none		Various but eventually 19mm from flat land and 38mm from hill land.	
Morrison Swamp	none	2	2.51		Various but eventually 19mm from flat land and 38mm from hill land.	
Motukaraka	none	13	22.8		Various but eventually 19mm from flat land and 38mm from hill land.	
Ohinewai	none	2	2.22		Various but eventually 19mm from flat land and 38mm from hill land.	

Drainage area	Drainage subdivision	No Drains	Drain Length (m)	Additional Assets	Depth of Runoff per day	10% AEP V/d
Onepoto	none	2	3.7		Various but eventually 19mm from flat land and 38mm from hill land.	
Onewhero Downstream	none	2	1.25		Various but eventually 19mm from flat land and 38mm from hill land.	
Orchard Road	none	2	1.53		Various but eventually 19mm from flat land and 38mm from hill land.	
Orton	none	5	7.48		Various but eventually 19mm from flat land and 38mm from hill land.	
Pukekapia	Pukekapia 1	4	5.95		Various but eventually 19mm from flat land and 38mm from hill land.	
Pukekapia	Pukekapia 2	3	3.68		Various but eventually 19mm from flat land and 38mm from hill land.	
Rangiriri North	none	4	4.49		Various but eventually 19mm from flat land and 38mm from hill land.	
Ruawaro	Ruawaro East	1	3.84		Various but eventually 19mm from flat land and 38mm from hill land.	
Ruawaro	Ruawaro No1, Central	1	0.72		Various but eventually 19mm from flat land and 38mm from hill land.	
Ruawaro	Ruawaro No1, Furniss	2	2.28		Various but eventually 19mm from flat land and 38mm from hill land.	
Ruawaro	Ruawaro North	2	2.84		Various but eventually 19mm from flat land and 38mm from hill land.	
Ruawaro	Ruawaro West	2	5.07		Various but eventually 19mm from flat land and 38mm from hill land.	
Swan Road	none	6	10.94		Various but eventually 19mm from flat land and 38mm from hill land.	
Te Kohanga	none	5	5.06		Various but eventually 19mm from flat land and 38mm from hill land.	
Tickles	none	none	none		Various but eventually 19mm from flat land and 38mm from hill land.	
Tuakau	none	3	3.04		Various but eventually 19mm from flat land and 38mm from hill land.	
Vrsaljkos Road	none	2	1.96		Various but eventually 19mm from flat land and 38mm from hill land.	
Waikare	Waikare Frost	2	2.97		Various but eventually 19mm from flat land and 38mm from hill land.	
Waikare	Waikare Nikau	1	1.97		Various but eventually 19mm from flat land and 38mm from hill land.	
Waikare	Waikare Ohinewai	4	2.31		Various but eventually 19mm from flat land and 38mm from hill land.	
Waikare	Waikare Rangiriri	3	5.23		Various but eventually 19mm from flat land and 38mm from hill land.	
Waikare	Waikare West	10	13.28		Various but eventually 19mm from flat land and 38mm from hill land.	
Waikorea	none	2	6.64		Various but eventually 19mm from flat land and 38mm from hill land.	
Waller Commins	none	1	0.66		Various but eventually 19mm from flat land and 38mm from hill land.	





Eight other assets are in good condition, and only 1 bank revetment (Peria Retaining Wall) is in fair condition which was showing minor deterioration.

Drainage area	Drainage subdivision	No Drains	Drain Length (m)	Additional Assets	Depth of Runoff per day	10% AEP Volume per day
Thames Valley	Ahikope SRA				38 mm. (1 1/2 ")	
Thames Valley	Bancrofts SRA				38 mm. (1 1/2 ")	
Thames Valley	Elstow	37	84.9		38 mm. (1 1/2 ")	
Thames Valley	Hungahunga	60	83.6		38 mm. (1 1/2 ")	
Thames Valley	Manawaru	59	121.5		38 mm. (1 1/2 ")	
Thames Valley	Matamata Urban				38 mm. (1 1/2 ")	
Thames Valley	Rowes East SRA				38 mm. (1 1/2 ")	
Thames Valley	Tahuna	29	36.5		38 mm. (1 1/2 ")	
Thames Valley	Tahuna SRA				38 mm. (1 1/2 ")	
Thames Valley	Tatuanui	64	94.8		38 mm. (1 1/2 ")	
Thames Valley	Waiheka	96	122.1		38 mm. (1 1/2 ")	
Thames Valley	Waihou	51	50.1		38 mm. (1 1/2 ")	
Thames Valley	Waitoa	51	71.5		38 mm. (1 1/2 ")	
Thames Valley	Whakahoro	58	93.3		38 mm. (1 1/2 ")	

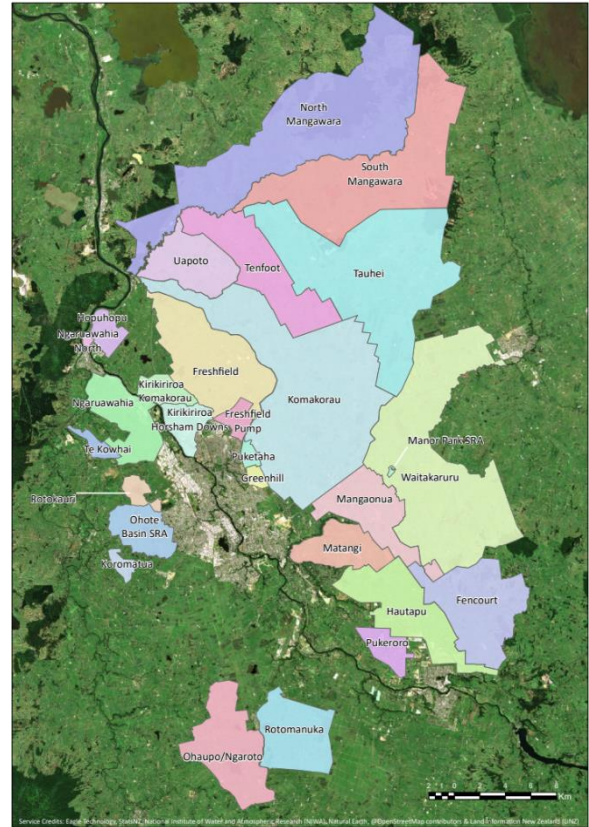
## Waikato Central Land Drainage Network

The Waikato Central Land Drainage Network is made up of 28 individual subdivisions totalling approx. 103,000 hectares.

The Scheme includes 952km of drains.

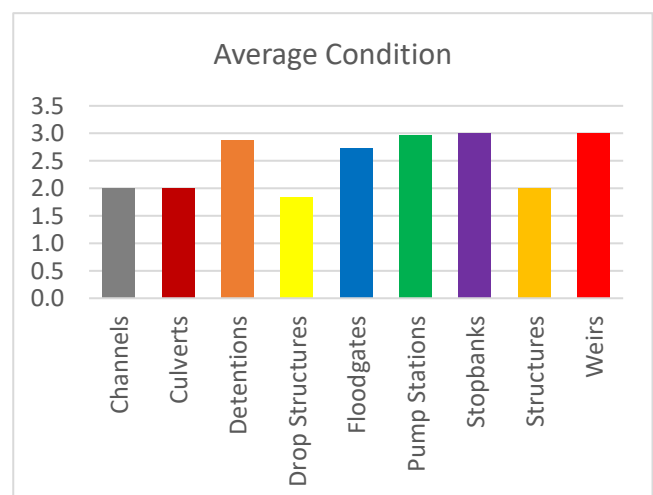
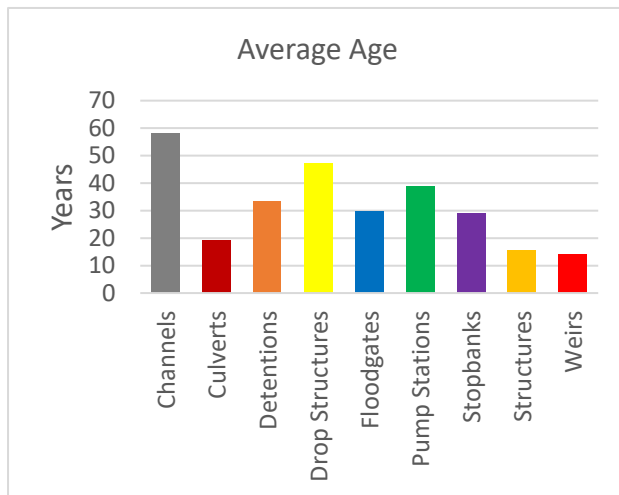
### Key issues

- Land use changes resulting in more surface water runoff into the land drainage network. These changes can also alter the level of service expectations particularly where subdivision results in the creation of smaller rural residential lots.
- Vegetation management – including pest plants such as alligator weed
- Roding network upgrades impact on drainage areas e.g. Waikato Expressway.
- Environmental Management – rules relating to work in Artificial channels vs modified natural
- Peat Settlement
- Presence of services such as power cables, water pipes, gas mains etc.



### Assets summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Waikato Central	\$ 27.49 M	\$ 25.88 M	\$ 52.7 K



### Asset Current Condition

Generally, the twenty drainage network's assets that were inspected and assessed this year are in fair to good condition. No asset was assessed to be in poor or very poor condition.

The Ohote stopbank is in fair condition (grade 3) with some defects such as rutting and some undesirable vegetation. Assets that are in good condition included 8 floodgates, 2 pumpstations and 9 other in-river structures.

Drainage area	Drainage subdivision	No Drains	Drain Length (m)	Additional Assets	Depth of Runoff per day	10% AEP Volume per day
Eureka	Mangaonua	54	47.9		38 mm. (1 1/2 ")	
Eureka	Manor Park	2	1.3		38 mm. (1 1/2 ")	
Eureka	Waitakaruru	100	113.8		38 mm. (1 1/2 ")	
Fencourt	none	47	49.7		25 mm. (1")	
Waikato District	Greenhill	6	2.5		Various but generally 20mm	Needs handing over to HCC
Hautapu	none	84	79.8	+ 1 floodgate	25 mm. (1")	
Waikato District	Hopu	10	9		Various but generally 20mm	
Waikato District	Kirikiroa Horsham Downs	6	7.3		Various but generally 20mm	
Waikato District	Kirikiroa Komakorau	3	4.7		Various but generally 20mm	
Waikato District	Koromatua	1	3.1		Various but generally 20mm	
Waikato District	Matangi	33	31.2		Various but generally 20mm	
Waikato District	Ngāruawāhia North	5	2.2		Various but generally 20mm	
Ohaupo/Ngaroto	none	16	23.6		25 mm. (1")	
Waikato District	Pukeroro	3	4.4		Various but generally 20mm	
Waikato District	Puketaha	9	6.7		Various but generally 20mm	
Rotomanuka	none	14	27.8		25 mm. (1")	
Taupiri	Freshfield	40	59.2		38 mm. (1 1/2 ")	
Taupiri	Freshfield Pump	4	5.2		38 mm. (1 1/2 ")	
Taupiri	Komakorau	87	175.4		38 mm. (1 1/2 ")	
Taupiri	North Mangawara	16	13.8		38 mm. (1 1/2 ")	
Taupiri	South Mangawara	25	33.2		38 mm. (1 1/2 ")	
Taupiri	Tauhei	36	81.3		38 mm. (1 1/2 ")	
Taupiri	Tenfoot	27	48.1		38 mm. (1 1/2 ")	
Taupiri	Uapoto	16	23.8		38 mm. (1 1/2 ")	
Waikato District	Te Kowhai	4	7.7		Various but generally 20mm	
Te Rapa	Ngāruawāhia	59	50.6		38 mm. (1 1/2 ")	
Te Rapa	Ohote Basin	4	9	+ ohote stopbank and 7 floodgates	38 mm. (1 1/2 ")	
Te Rapa	Rotokauri	56	41.4		38 mm. (1 1/2 ")	

## Aka Aka/Otaua Land Drainage Network

The Aka Aka/Otaua Land Drainage Network is made up of 1 subdivision totalling approx. 6,600 hectares.

The Aka Aka/Otaua drainage subcommittee carries out the day to day management of the 86km of drain on a largely voluntary basis. This committee liaises with Council staff on a regular basis.

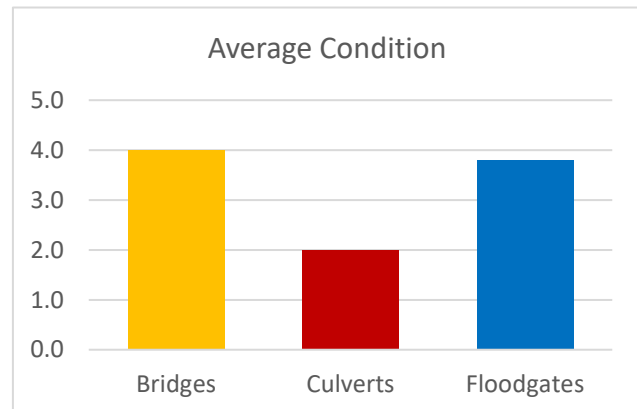
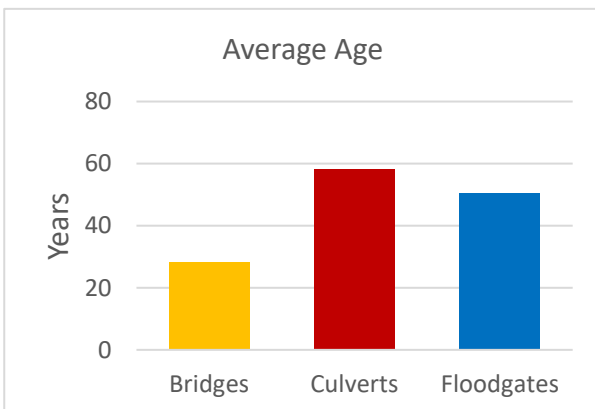


### Key issues

- Vegetation management – including pest plants such as alligator weed
- Environmental Management – rules relating to work in artificial channels vs modified natural channels
- Peat Settlement
- Presence of services such as power cables, water pipes, gas mains etc.

### Assets summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Aka Aka Otaua	\$ 3.48 M	\$ 2.64 M	\$ 18.7 K



### Technical Details

Drainage area	Drainage subdivision	No Drains	Drain Length (m)	Additional Assets	Depth of Runoff per day	10% AEP Volume per day
Aka Aka Otaua	none	46	83	+ 9 floodgates, 1 bridge, 13 culverts	10 mm. (3/8 ")	

## A6 Catchment Management Zone Summaries

The Waikato region has four major river catchments, spanning eleven District and City Councils. The day to day management is split into 8 management zones, who work with the various councils on the management on the flood, river, and drainage assets. The map below shows which District councils are interacting with each zone.



Figure 27: District and ICM Zone management boundaries

# COROMANDEL ZONE

## Zone Overview

The Coromandel zone has an approximate total area of 193,000ha, and covers most of the Coromandel Peninsula. The zone has an estimated 3,900km of rivers and streams. (Coromandel Zone Management Plan (Doc# 1897959 – Coromandel Zone Management Plan).

The total resident population within the zone is estimated at 19,000, while the total number of ratepayers is around 23,000, of which 51 percent are permanently occupied.

## Zone Features

The dominant feature of the Coromandel zone are:

- Coromandel Range, Kaimai and Mamaku ranges
- Indigenous and threatened native flora and fauna

65 percent of the zone area is covered by indigenous vegetation, 22 percent by pasture and 12 percent by production forestry.

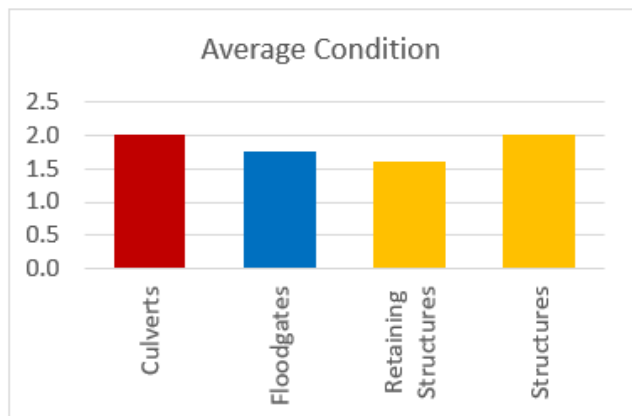
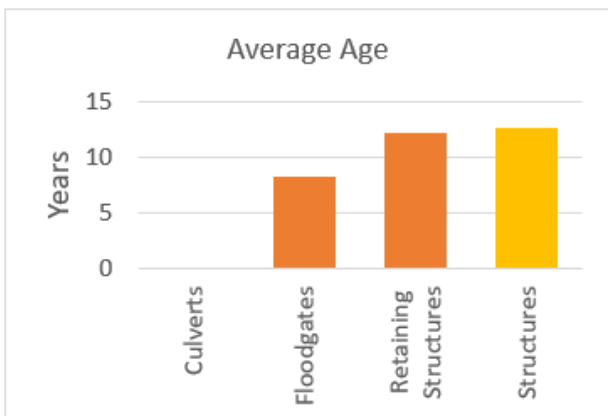
The majority of pasture land is used for dry stock, with a small percentage used for dairy and horticulture.

The main economic activities are primary production (farming, fishing and forestry) and tourism.



## Coromandel River and Flood Protection Assets Summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Coromandel	\$ 3.31 M	\$ 2.70 M	\$ 52.46 K



## Asset Condition

Overall the flood protection assets are in good to excellent condition which is a reflection of the fact that the various flood protection schemes have been recently constructed between 2005 and 2016.

River and stream condition in the Coromandel is subject to significant impact from storm and flood events. This is due to the steep nature of the catchments and dynamic river systems. Inspections are carried out post event and repairs agreed on a prioritised basis.

## Coromandel Levels of Service Summary

Scheme	Level Of Service	Area
Te Puru	1% AEP – 315 m <sup>3</sup> /s – 600mm freeboard	
Waiomu	1% AEP – 157 m <sup>3</sup> /s – 500mm freeboard Spillway upstream of Bridge – 2% AEP – 132 m <sup>3</sup> /s	
Pohui	1% AEP – 67 m <sup>3</sup> /s	River Management only
Tapu	1% AEP – 290 m <sup>3</sup> /s – 500mm freeboard	Only protection to Campground
Coromandel	1% AEP – 99 m <sup>3</sup> /s – 500mm freeboard Spillway upstream of Kupenga Road Bridge	Protection to retirement village and CBD
Grahams Creek	1% AEP – 137 m <sup>3</sup> /s – 500mm freeboard	Protecting Tairua- Ocean Beach Road and Manaia Road properties.



## WAIHOU PIAKO ZONE

### Zone Overview

The Waihou Piako zone covers an area of approximately 3,734 km<sup>2</sup>, and is dominated by the Waihou and Piako river systems. The total number of individual rate payers within the zone is 28,500.

Zone features include:

- Waihou & Piako River systems
- Native forests of the Coromandel, Kaimai and Mamaku ranges
- Kopuatai Peat Dome and Torehape wetland
- Firth of Thames foreshore
- Indigenous vegetation in the Kaimai and Mamaku ranges
- Tangata whenua areas of special significance.

The main economic drivers are primary production (farming, forestry) and tourism.



### Waihou Piako Zone River and Flood Protection Assets

The two largest rivers systems that the majority of River and Flood Protection assets are associated with are the Waihou and Piako Rivers.

On the Piako River the majority of scheme works are located within the lower reaches, between the mouth of the Piako River near Pipiroa to the confluence of the Piako and Waitoa Rivers. The Piako River experiences tidal influence from the Firth of Thames and stopbanks as far upstream as Kaihere on the Piako River and the Awaiti Canal are designed to protect against a tidal flood event.

Throughout the middle reaches there are a series of stopbanks and designated ponding zones. These are stopbanks designed to be overtopped at certain flood levels allowing larger flood events to be managed in a predictable way by the scheme.

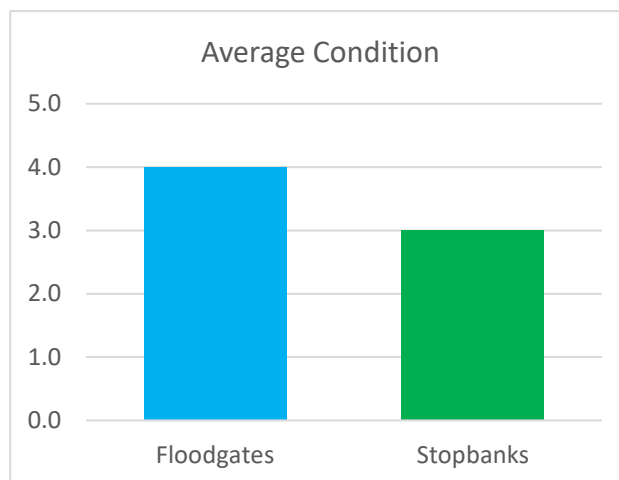
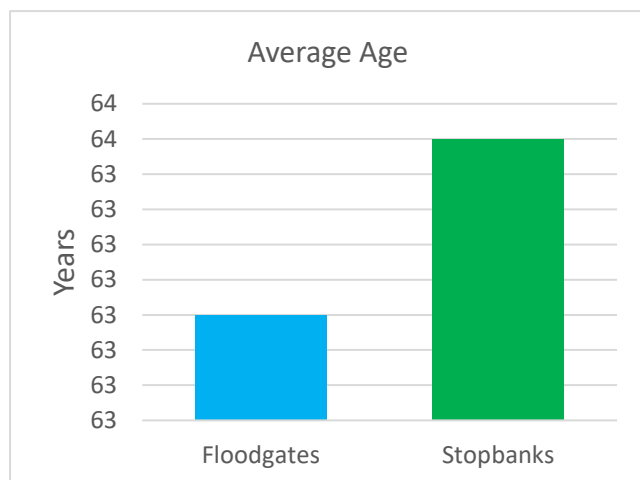
The Waihou River has a long narrow catchment bounded on the eastern side by the Coromandel, Kaimai and Mamaku Ranges. Many of the significant tributaries extend into these ranges so are susceptible to high intensity rainfall events from the north east. Upper tributaries respond quickly to rainfall due to the steep catchments. As with the Piako River the lower reaches of the Waihou River experience tidal influence.

A significant area of the Waihou Piako zone is low lying, with some areas being up to 2m below sea level. If sea level rise occurs as predicted, there is an increased risk of flood infrastructure failure and potential for widespread inundation which may impact on fresh water wetland systems, and the farming and urban communities.

Critical flood protection assets within the zone include those protecting the urban areas of Te Aroha, Paeroa, Turua, Kopu and Thames.

## Assets Summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Waihou Piako	\$ 680.22 M	\$ 525.58 M	\$ 4.95 M



## Key issues

- Assets within Tidal area experience higher utilization, floodgates may be submerged daily.
- Accelerated asset deterioration due to saline conditions
- Sedimentation of floodgate outlets
- Marine Mud foundations. Leads to settlement of Stopbanks and associated Floodgates and Pumpstations which can result in performance issues.
- Stopbank stability particularly on the left bank of the Piako River between Pipiroa and Ngatea due to narrow berms. Extensive berm stabilisation and widening work has been carried out over the past 10 years.

## Waihou Piako Levels of Service Summary

Scheme	Level Of Service	Area
Piako River Scheme	1% AEP – Tide – 500mm freeboard 2% AEP – 370 m <sup>3</sup> /s – 300mm - 500mm freeboard	Tidal reach – Firth of Thames to Second Emergency Ponding Zone
	50% AEP, 10% AEP to 5% AEP – 300mm freeboard on stopbanks. Spillways have no freeboard	Ponding zones up to Paeroa Tahuna Road
Waihou Valley Scheme	1% AEP Variable flows at different locations – 300mm to 900mm freeboard	Waihou at Te Aroha – 790 m <sup>3</sup> /s Waihou at Puke Bridge – 1500 m <sup>3</sup> /s Ohinemuri at Karangahake 1270 m <sup>3</sup> /s
	Kauaeranga River 1%AEP – 1260 m <sup>3</sup> /s – 500mm freeboard	

## LAKE TAUPŌ ZONE

### Zone Overview

The Lake Taupō zone comprises of the catchments discharging into Lake Taupō. It covers approximately 3,500 square kilometres.

The population of the Taupō district is approximately 35,850 people.

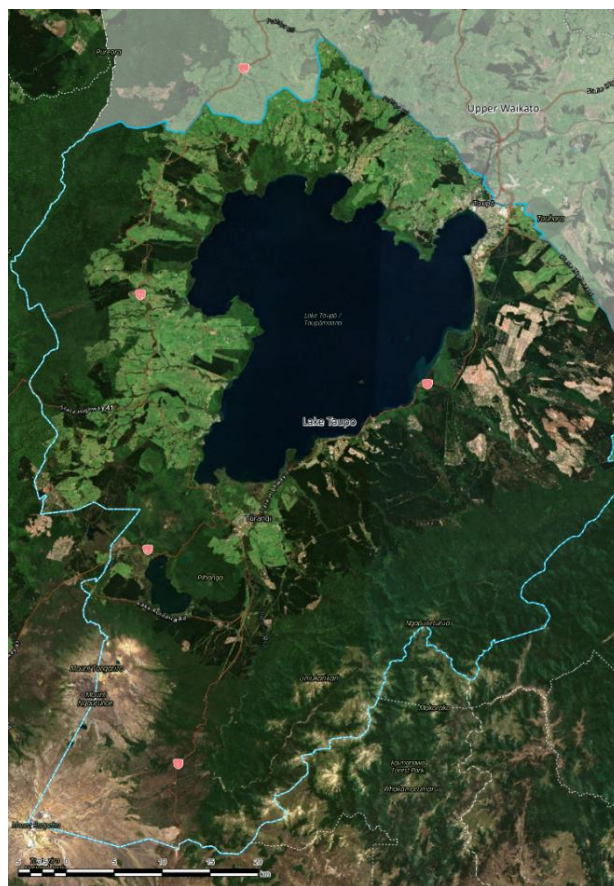
### Key Features

The area includes the township of Taupō and is recognised as a tourist destination.

WRC has long-standing relationships with primary hydro generators Mercury Energy and Genesis Energy.

Mercury own and operate the Taupō control gates. Genesis Energy owns and operates the Tongariro power scheme. Flood management of the hydro system is achieved through consultation and agreement between Mercury and WRC as provided for within the high flow management plan. We work closely on implementing a high flow management plan during times of flooding

State Highway 1 also runs adjacent to Lake Taupō and crosses both the Tongariro and Tauranga Taupō rivers.



### Lake Taupō Zone River and Flood Protection Assets

The Tongariro and Tauranga Taupō rivers have a recent history of flooding events resulting in inundation of land within the lower reaches of both rivers. Specifically, the township of Turangi and the communities of Oruatua and Te Rangiita are identified as being at risk of inundation from certain flooding events.

To provide the township of Tūrangi and the communities of Oruatua and Te Rangiita with an agreed level of protection from certain flooding events, WRC operates and manages two flood protection schemes:

- Tongariro flood protection scheme
- Tauranga Taupō flood protection scheme

WRC also undertakes works on rivers within the Lake Taupō catchment directed at controlling bank erosion, channel instability, riparian vegetation and the aggregation of riverbed sediments.

### Key issues

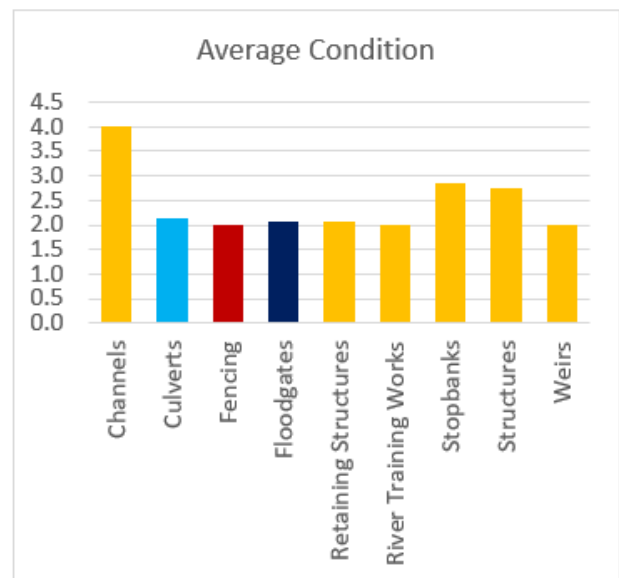
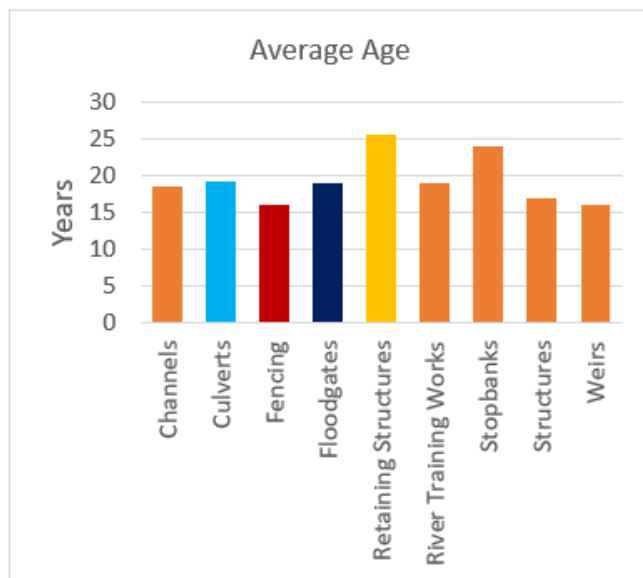
- Both Tongariro and Tauranga Taupō Rivers are 'Flashy' in nature and produce high velocity flood waters that can be damaging to river and flood management infrastructure.
- Gravel movement and aggradation are an issue on the Tongariro River
- Both Tongariro and Tauranga Taupō Rivers are susceptible to channel breakouts which can lead to the rivers changing course.
- Rivers in the zone have high recreational value and activities need to balance this against the desired river management outcomes.

## Taupō Level of Service Summary

Scheme	Level Of Service	Area
<b>Flood Protection</b>		
Tongariro River Scheme	1% AEP – 1500 m <sup>3</sup> /s – 300mm to 500mm freeboard	Tūrangi Township
Tauranga Taupō Scheme	2% AEP – 318 m <sup>3</sup> /s – 500mm freeboard 5% AEP – 271 m <sup>3</sup> /s – 300mm freeboard 50% AEP – 150 m <sup>3</sup> /s – N/A	Te Rangiita and Oruatua Settlements Forestry and rural areas. Kiko spillway
<b>River Management</b>		
Tongariro River Scheme	100% compliance with resource consents	121305, 121306, 104532, 104807, 110223, 110224 and 030640.
Tauranga Taupō Scheme	100% compliance with resource consents	107283, 107284 and 107285.

## Assets Summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Lake Taupō	\$ 16.33 M	\$ 13.09 M	\$ 167.4 K



## WAIPĀ ZONE

### Zone Overview

The Waipā zone covers an area of 306,569 hectares.

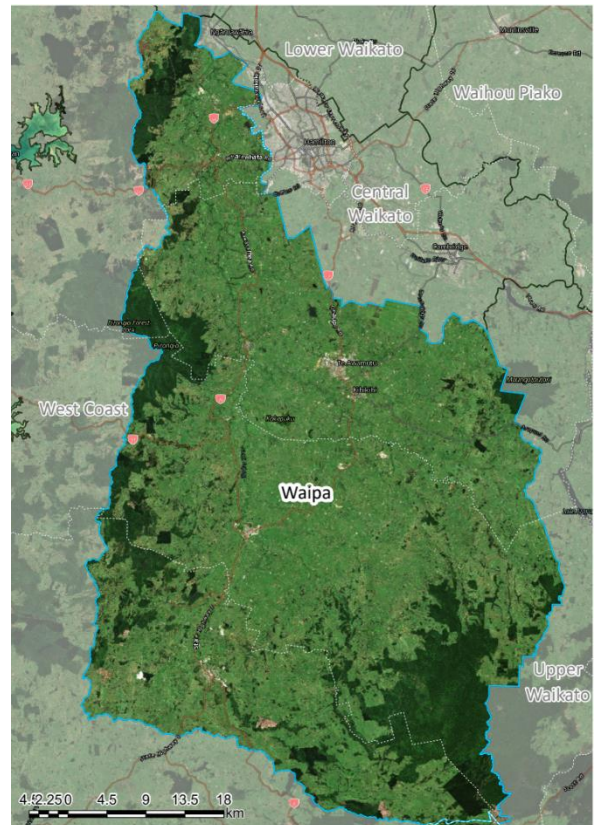
The Waipā River is the single largest tributary to the Waikato River, and is the largest part of the Waikato catchment area that is not affected by hydro-electric power generation activities.

### Key Features

The Hakarimata ranges define the northern boundary of the zone. The volcanic cones of Pirongia and Maungatautari dominate the landscape from west to east.

The Waipā zone covers an area bordered by the catchment divides with the:

- Upper Waikato, West Coast, Central Waikato, and Lower Waikato.



### Waipā Zone River and Flood Protection Assets

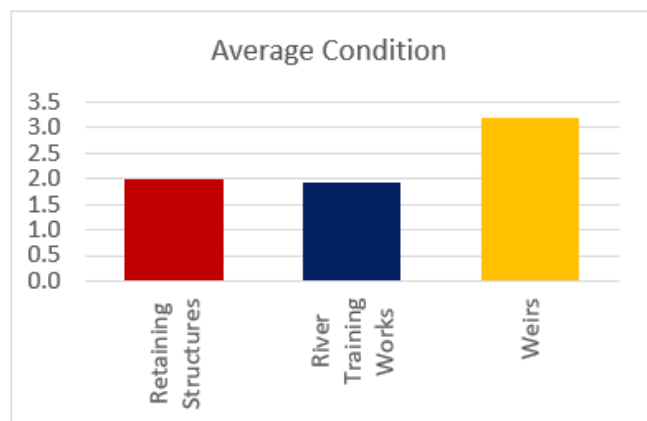
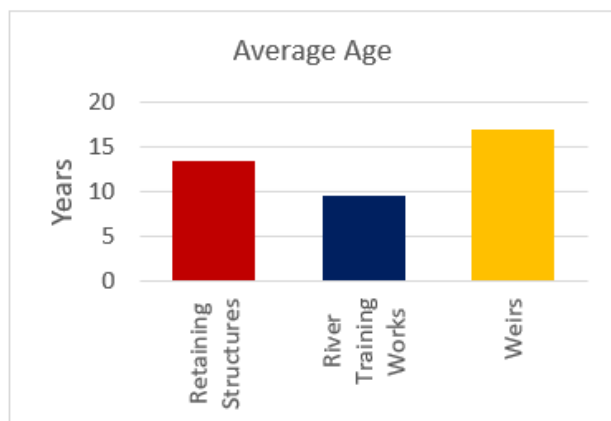
The Waipā Zone contains the Waipā River, the major tributary of the Waikato River. There have been flood protection works carried out to protect the townships of Te Kuiti and Ōtorohanga. The stopbanks and three pumpstations associated with the Ōtorohanga scheme are owned by the Ōtorohanga District Council and Waikato Regional Council assists with the management via a service level agreement.

The main river management activity challenges are maintaining channel capacity whilst managing bank erosion. This is achieved through vegetation management including removal of Crack Willows, removal of blockages and channel bank protection works.

River Management activities are generally undertaken in partnership with landowners on a cost share basis.

### Assets Summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Waipā	\$ 3.57 M	\$ 3.10 M	\$ 52.5 K



### Key issues

- Channel capacity – impacted by blockages and undesirable vegetation
- Bank erosion
- Vegetation management

### Waipā Level of Service Summary

Scheme	Level Of Service	Area
Mangaokewa-River Management Scheme	2% AEP – 125 m <sup>3</sup> /s – N/A	Te Kuiti Township
Ōtorohanga Scheme	1% AEP – 550 m <sup>3</sup> /s – 600mm freeboard	Ōtorohanga Township

# UPPER WAIKATO ZONE

## Zone Overview

The upper Waikato zone covers 436,000 hectares.

Economic drivers for the zone are forestry, agriculture, energy production (hydroelectricity and geothermal) and tourism.

## Zone Features

The area includes the hydro lakes of Aratiatia, Ohakuri, Atiamuri, Whakamaru, Maraetai, Waipāpa, Arapuni and Karāpiro.

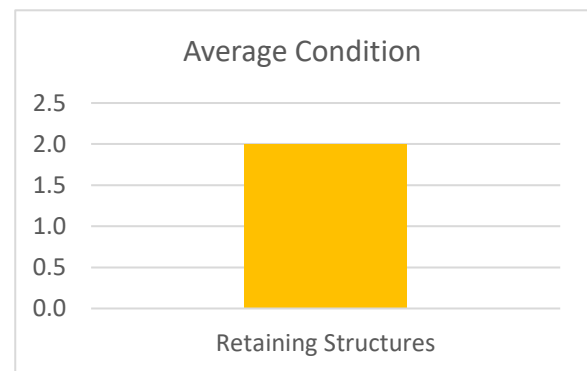
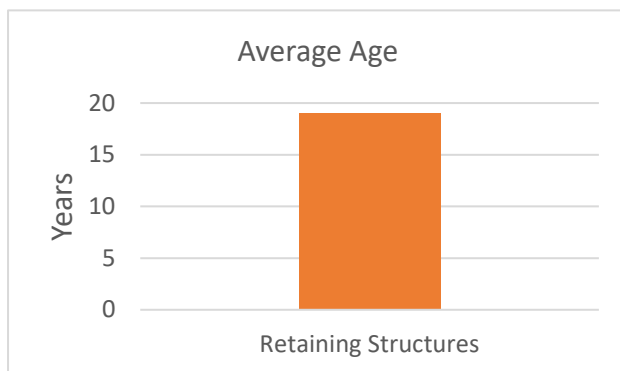
Geologically the zone is volcanic in nature with 68 per cent being comprised of Taupō pumice. The remainder is made up of other volcanic materials, including tephra and muds from the Rotorua Volcanic Centre. Much of the zone is characterised by young, soft and loose materials prone to erosion.



## Upper Waikato Zone River and Flood Protection Assets

Forestry and pastoral farming are the predominant land uses but in recent years there has been a marked increase in dairy conversions and intensification.

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Upper Waikato	\$ 339 K	\$ 126 K	\$ 11.3 K



## Key issues

The following issues have been identified as being particularly relevant to the Upper Waikato Zone:

- Declining water quality
- Erosion and changes in land use
- Loss of indigenous biodiversity
- Co-management
- Scheme management.

# CENTRAL WAIKATO ZONE

## Zone Overview

Waikato River has an area of 64,000 hectares. And contains the major population centre for the region (Hamilton city). The total number of rateable properties within the Central Waikato zone is 67,795.

Agriculture (dairy, dry stock farming) is the dominant economic activity. There is significant industrial activities including power generation, coal mining and quarrying.

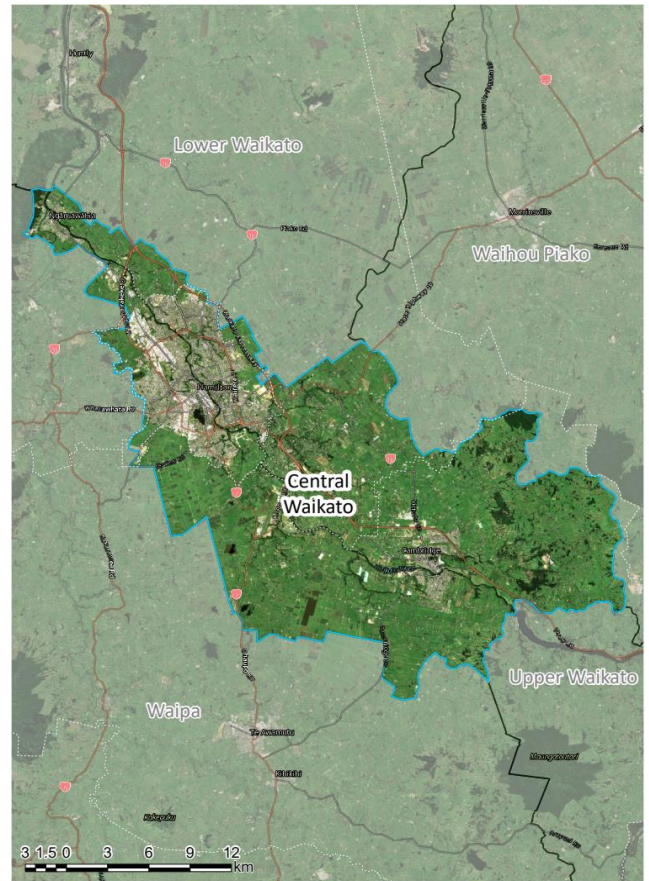
## Zone Features

The Central Waikato zone contains two dominant features,

- Waikato river and associate tributaries
- Urban areas of Hamilton, Cambridge, and Ngāruawāhia.

A number of elements of nationally important infrastructure traverse through the zone including:

- State Highway 1, 1B, 3, 26 and 39
- North Island Main Trunk Railway
- National electricity grid transmission lines.



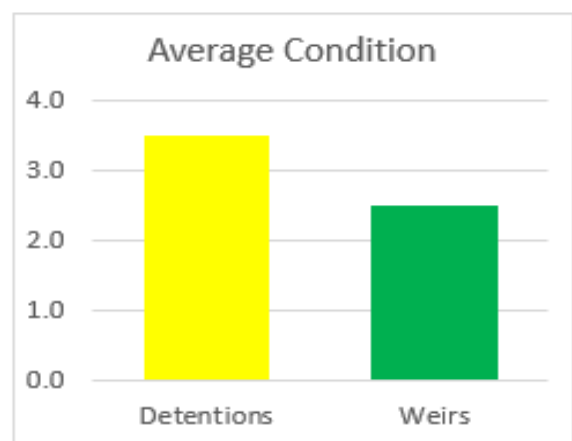
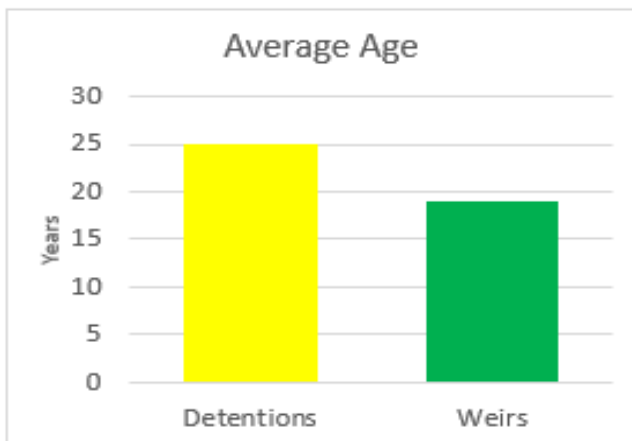
## Central Waikato River and Flood Protection Assets

### Assets Summary

The Central Waikato is unique in that it is significantly more urbanised than other catchment zones within the region. In recognition of this the river management works programme within the Hamilton City boundary is carried out by Hamilton City Council under a Services Agreement with Waikato Regional Council.

There are no flood protection assets owned or management by the Waikato Regional Council

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Central Waikato	\$ 0.16 M	\$ 0.13 M	\$ 0.9 K





# LOWER WAIKATO ZONE

## Zone Overview

The Lower Waikato zone covers an area of 283,757 hectares. It occupies a position at the lower end of the Waikato River catchment, and is the destination of all waters flowing into the Waikato River catchment, thus is heavily influenced by activities that occur higher in the catchment within each of the other four zones – Lake Taupō, Upper Waikato, Waipā and Central Waikato.

## Zone Features

- Lower Waikato Flood Protection Scheme
- Lakes and wetlands.

The total number of individual rate payers within the Lower Waikato Zone is 15,970.

Agriculture (dairy and dry stock farming) are the dominant economic activities. There are also significant industrial activities including power generation, coal mining, quarrying and sand mining.

Nationally important infrastructure traverses through the zone, including State Highway 1, 1B, 2, 22 and 39, the North Island Main Trunk Railway, the national electricity grid transmission lines and the main natural gas pipeline to Auckland

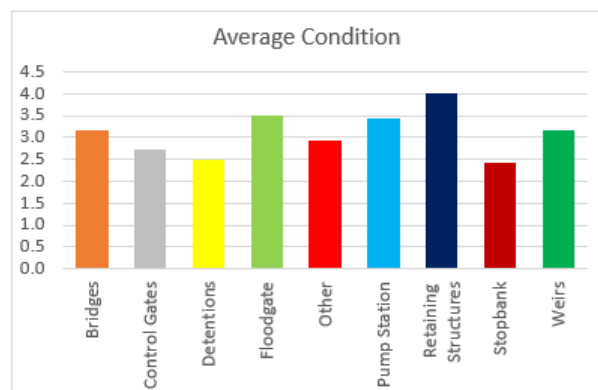
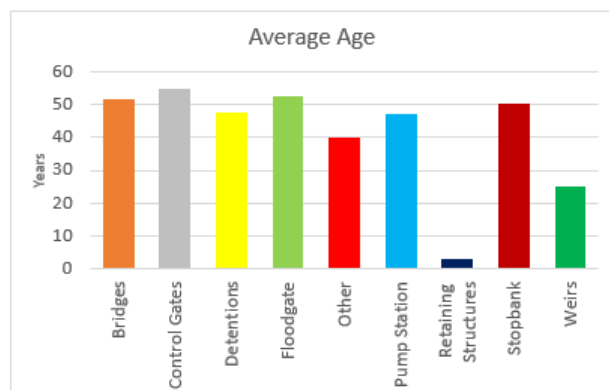


## Key issues

- Environmental management
- Peat settlement

## Lower Waikato River and Flood Protection Assets

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
Lower Waikato	\$ 351.20 M	\$ 271.06 M	\$ 2.57 M



Scheme	Level Of Service	Area
Section A – Huntly Urban	1% AEP – 1840 m <sup>3</sup> /s - 600mm freeboard	Huntly Township
Section B – Huntly to Rangiriri Rural Areas East and West	1% AEP – 1840 m <sup>3</sup> /s - 300mm freeboard	Huntly West to Lake Whangapae and Huntly to Rangiriri East
Community Works -Rangiriri Spillway Lake Waikare and Whangamarino Flood Storage and attenuation	2%AEP – 1400 m <sup>3</sup> /s - N/A 1% AEP – Waikare Storage Level at 7.36 m RL MVD and Whangamarino Storage Level at 5.85 m RL MVD - 600mm freeboard	Diversion into storage includes Te Onetea Gate, Waikare Gate, Whangamarino Gates, Pungarehu Canal, Waikare Foreshore and Norther Outlet Canal Stopbanks
Section B – Downstream of Rangiriri	1% AEP 1590 m <sup>3</sup> /s – 600mm & 300mm freeboard 10% AEP - 1150 m <sup>3</sup> /s - 600mm & 300mm freeboard	Waikao River East Bank Rangiriri North to Aka Aka, and Waikato River West Bank Lake Whangapē to Te Kohanga and Horseshoe
Section B – Waikato River Tributaries. Whangamarino, Mangatawhiri, and Lake Whangapē	1% AEP Level 5.85 m RL MVD– 450mm freeboard, 10% and 5% AEP – 110 m <sup>3</sup> /s and 140 m <sup>3</sup> /s - 300mm freeboard, 1% AEP – 1590 m <sup>3</sup> /s – 300mm freeboard 10% AEP – 1150 m <sup>3</sup> /s – 600mm freeboard	Swan Road, Vrsaljos, Island Block, Lock, Bell Road, Motukaraka, Parish Polder, Waller Commins Mangatawhiri Compartments 1 to 4 Compartment 5 Deroles and Waikokowai
Section D – Mangawara	2% AEP – 450 m <sup>3</sup> /s – 300 mm freeboard 10% AEP and 20% AEP on Tributaries	Mangawara Valley

## WEST COAST ZONE

### Zone Overview

The West Coast zone covers a large geographic area of 425,835 hectares, and overall has a low population base of less than 3 per cent of the region’s population.

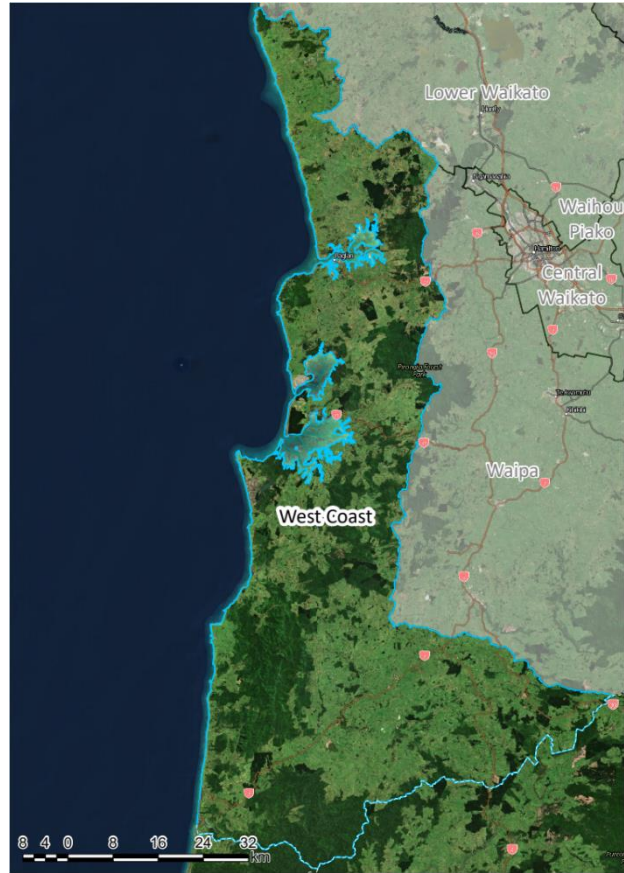
The West Coast zone is very sparsely populated and this is in part as a result of its rugged hill country and harbour topography. Agricultural land use on the West Coast generally remains of low intensity, and sheep and beef farming predominates.

Some isolated rural areas are experiencing population decline which may threaten the viability of some communities.

### Zone Features

The zone contains a range of high value natural habitats, landscapes and ecosystems that make the West Coast unique, and highlight the importance of on-going initiatives to maintain and enhance the environment of the West Coast zone. These include the following:

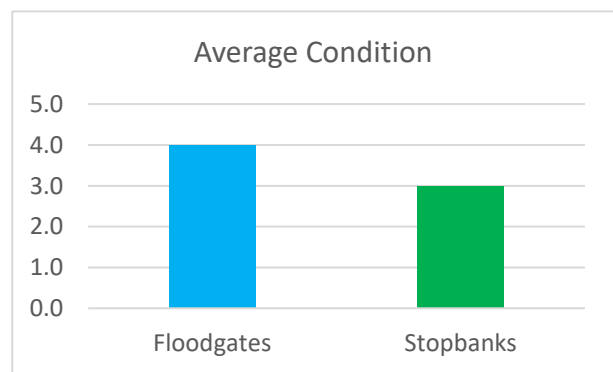
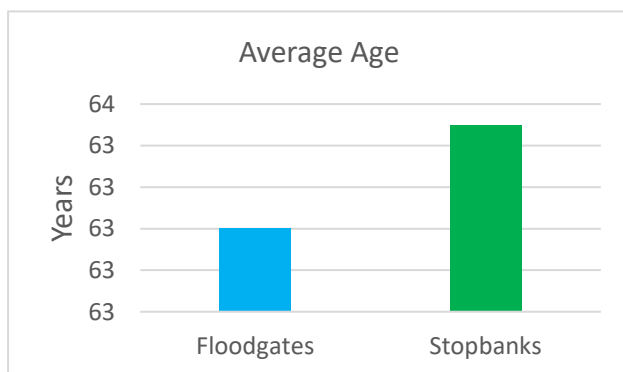
- Coastal landforms
- Harbours and major river mouths
- Dune lakes
- Considerable areas native bush.
- Karst landscapes
- A range of threatened plants and animals
- A rich cultural heritage
- Extensive areas of erosion prone (Class VI and VII) hill country.



### West Coast River and Land Assets

#### Assets Summary

Zone	Optimised Replacement Cost (ORC)	Optimised Depreciated Replacement Cost (ODRC)	Annual Depreciation (AD)
West Coast	\$ 0.24 M	\$ 0.23 M	\$ 0.2 K



## **Key Issues**

The key issues relating to the management of the West Coast zone are as follows:

- Stock access to waterways.
- Hill country management.
- Nutrient management.
- Increased stocking rates versus the capability of the land and soil.
- Loss of seeps and wet areas adjacent to streams.
- Riparian management.
- Impacts on water quality.
- Impacts on the habitats of taonga species.

Negative effects on indigenous biodiversity, aquatic recreation and flood risks, as well as future pastoral productivity and community prosperity.

Waikato Regional Council Policy Series 2024/14

ISSN 2230-4363 (Online)

ISSN 2230-4339 (Print)

Published December 2024

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