2024 – 2034 Flood Protection Activity Management Plan

2024 – 2034 Te Mahere Ārai Waipuke

Nelson City Council
te kaunihera o whakatū

Quality Assurance Statement

Version No.	Date	Description	Prepared by	Reviewed by	Approved by
1	19 October 2023	Draft for Council	Various	A Louverdis	Council
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Cover Photos:

York Stream, Orphanage Stream and Maitai River (August 2022 Flood)

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Executive Summary

i The purpose of the plan

The Flood Protection Activity Management Plan (Plan) outlines the current and future operational requirements needed to operate, maintain, renew and upgrade assets to achieve the overall objective and activity specific goal defined below.

The overall objective of Activity Management is to:

Deliver a defined level of service to existing and future customers in a sustainable and cost effective manner.

The key elements of infrastructure activity management are:

- Taking a whole of lifecycle approach
- Developing cost-effective management strategies for the long-term
- Providing a defined level of service and monitoring performance
- Understanding and meeting the impact of growth through demand management and infrastructure investment
- Managing risks associated with asset failures and climate change
- Sustainable practices, including use of energy and physical resources
- Recognising and providing for the maintenance and enhancement of freshwater
- Continuous improvement in activity management practices

A formal approach to the management of infrastructure assets is essential in order to demonstrate how levels of service will be achieved in the most cost effective manner for the benefit of customers, investors and other stakeholders.

This plan focuses on ensuring flood protection assets are operated, maintained and upgraded to meet statutory requirements, respond to Central Government initiatives, and meet the current and future community outcomes in a sustainable manner, taking into consideration the anticipated effects of climate change.

The Goal of the Flood Protection Activity is to:

Provide a flood protection system that will prevent harm to people and property where this is feasible and affordable, contribute to community wellbeing and protect the environment from harm related to in-stream flood protection works.

This Plan provides the substantiation for budget forecasts put forward in the Long Term Plan (2024 - 2034) for the Flood Protection Activity.

What we do

Council flood protection works include physical upgrades to rivers and streams to increase the volume of flood water they can carry, increasing the size of culverts, and removing accumulated gravel where flow capacity is reduced.

Council aims to undertake this work in a way that is sensitive to the freshwater environment.

Why we do it

The proximity of the Nelson foothills, and the location of the commercial and residential development on the flood plains and close to waterways, mean that during heavy rainfall events stream and river flows can rise rapidly and cause flash flooding to occur.

ii Asset description

The Nelson City Council flood protection system can be categorized into two parts – natural and constructed components. The natural part consists of river and stream channels that play an important role in the support of aquatic ecosystems, recreation and the conveyance of flood flows in storm events. During high rainfall events the rivers and streams transport large volumes of water, debris, gravels and sediment with levels of energy that are capable of causing significant damage to assets and property adjoining these areas and within the flood path.

The constructed flood protection network includes the larger streams, culverts and constructed channels through which streams flow, grade control structures, flood gates, weirs, energy dissipators, channel bank retaining structures, flood detention basins located along the stream channel, fish passage assets and gravel traps. It should be noted that where stream culverts run under, or adjacent to, roads or highways, the asset may be an NCC Roading or Waka Kotahi asset.

The extent of the Nelson City Council water catchments is shown in the figures ES1 – ES3 and the extent of the river and stream network is shown in figure 1-1 in Chapter 1 – Introduction.

The inventory of public flood protection assets owned by Nelson City Council and managed by the Infrastructure Group - Utilities as at March 2024 is shown in Table ES-1.

Table ES-1: Summary of Flood Protection Assets

Asset Category	Quantity	
	km	units
Urban Streams/Rivers[1]	42	
Stream Culverts	0.85	
Retaining walls: Concrete	3.9	
Retaining walls: Timber	4.0	
Retaining walls: Gabion baskets	0.73	
Rock armouring	20	
Stopbanks (Earth)	4.3	16
Flood walls	0.4	3
Stream Intakes		7
Manholes		12
Outfalls		6
Detention Basins		4

The March 2024 full replacement valuation of the flood protection assets[2] are:

Flood Protection $56,008,285.

[1] Urban streams and rivers are listed in Table 4-5, Section 4.1 – Background Data.
[2] The June 2020 asset valuation is given in Table 4-13, Section 4.1 – Background Data

Figure ES-1: Water Catchment Boundaries: North Nelson

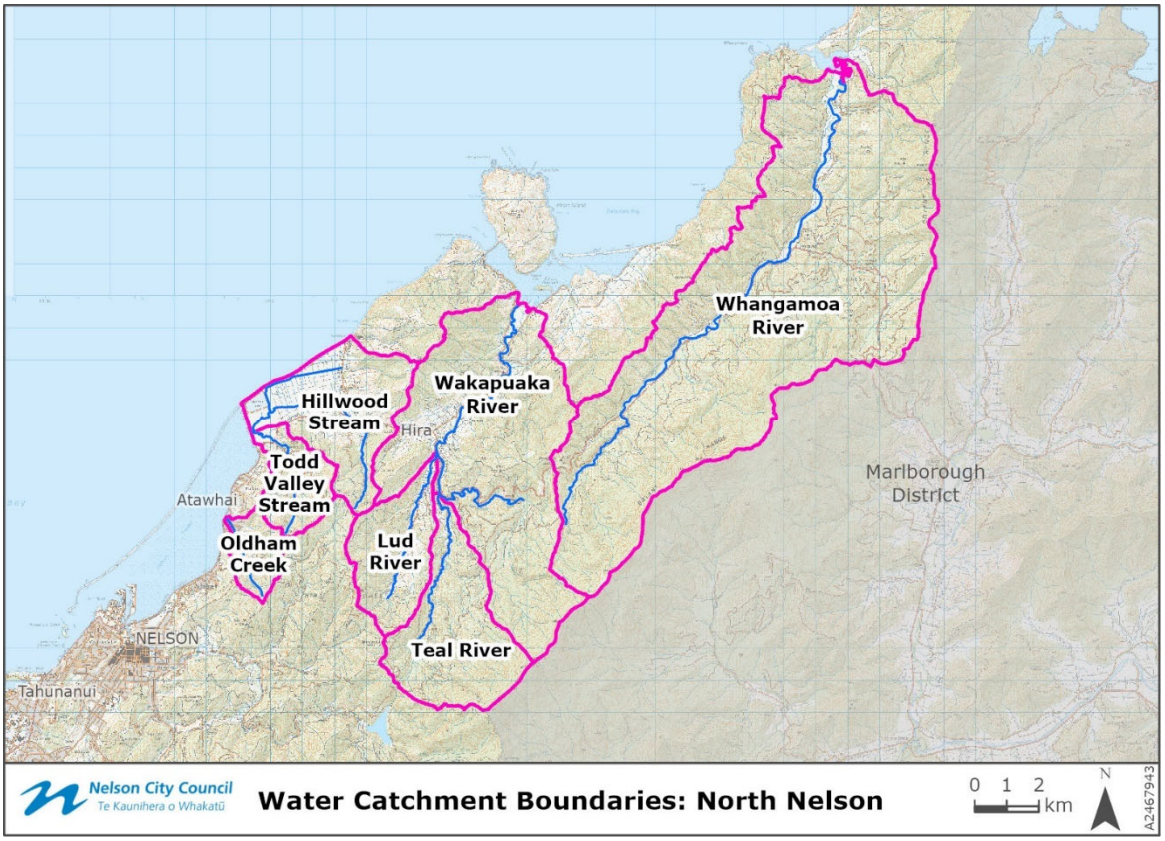


Figure ES-2: Water Catchment Boundaries: York, Brook, Maitai

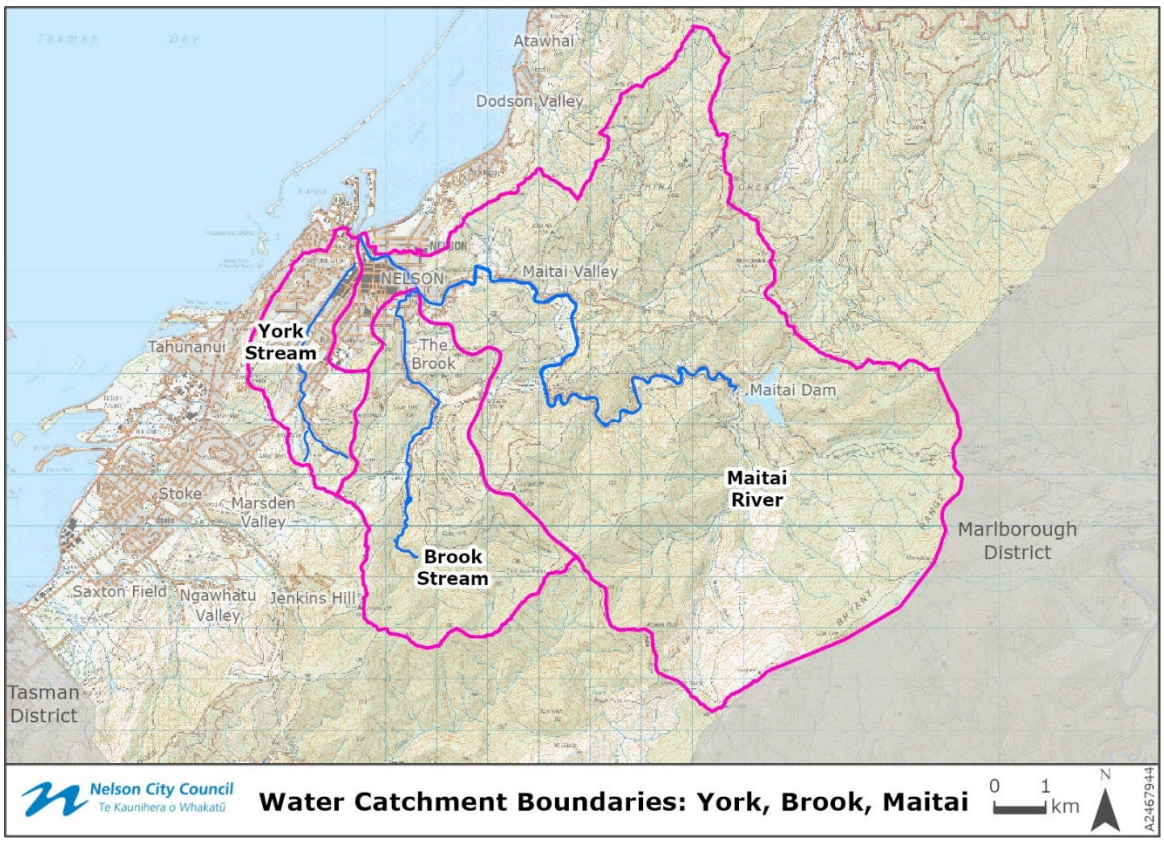
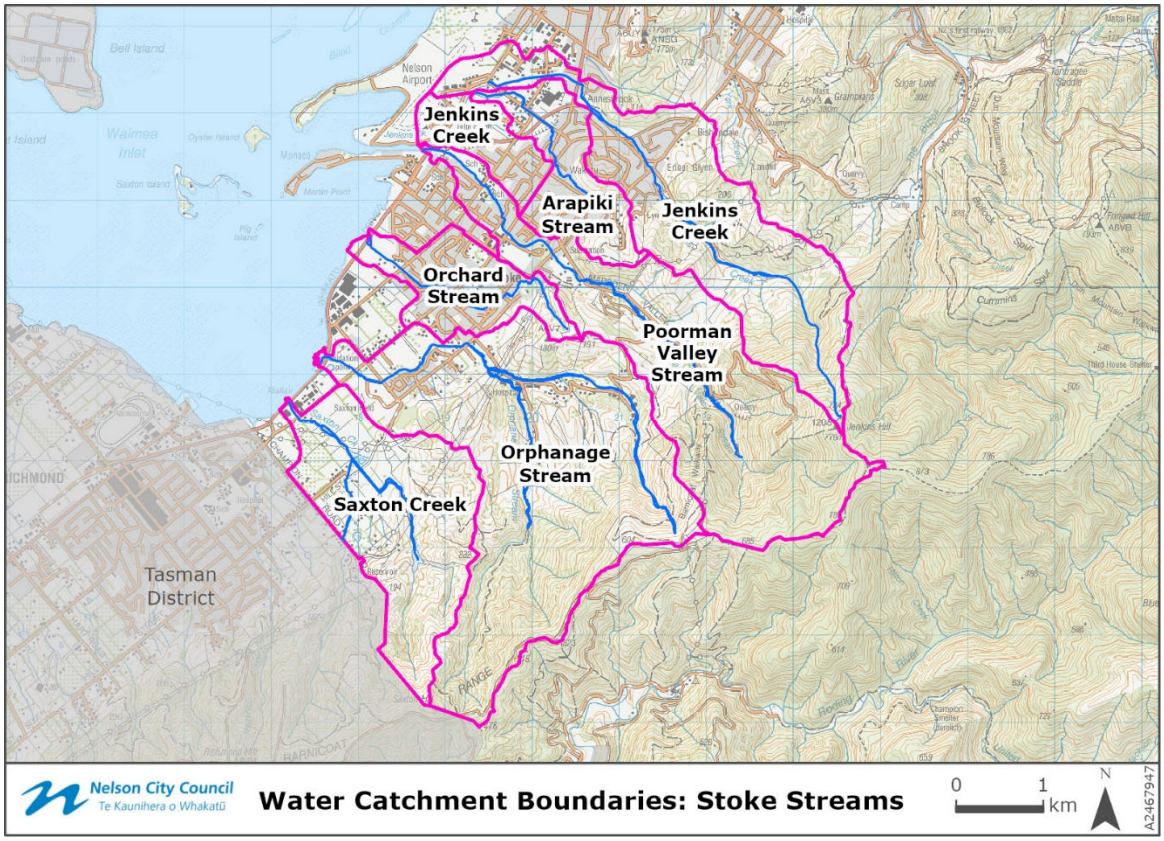


Figure ES-3: Water Catchment Boundaries: Stoke Streams



iii Māori contribution to decision-making processes

Council acknowledges that Treaty of Waitangi obligations rest with the Crown and seeks to uphold the mana of the Treaty of Waitangi Settlements for Te Tauihu by continuing to build its relationship with iwi. There are numerous pieces of legislation under which Council operates that recognise the Treaty of Waitangi and recognise or acknowledge iwi and Māori. Council believes that by working in partnership with iwi and Māori it will create benefits for the whole community.

Council signed a partnership agreement with the eight iwi and two other councils of Te Tauihu in December 2023. This agreement recognises the important and unique roles that both iwi and councils play in the cultural, social, environmental and economic wellbeing of Te Tauihu. It seeks to weave these aspirations together more closely, to strengthen our position as Te Tauihu and deliver to our shared aspirations more effectively. It will be an enduring relational agreement that sets out protocols and tikanga that all the partners have committed to. An accompanying action plan is being developed to set out partnership priorities and actions to complete over the next three years.

Council has an online iwi engagement platform, Te Parikaranga, which enables Council officers to share projects with iwi and to receive input on the level of interest iwi have with a Council project.

iv Climate change

Four key issues have been identified for this activity in both this Plan and the Infrastructure Strategy 2024 - 2054. These four issues, and their implications for the activity are discussed under the '*Key Issues*' section below. Climate change has been identified as an over-arching issue as it potentially has a bearing on all four of the identified issues for flood protection over the decades to come.

Climate Change as an Over-arching Issue:

Climate change is our biggest global challenge and Council is committed to considering and reducing climate change impacts.

At a local level, Council has a key role to play by reducing its corporate emissions, supporting and providing leadership on mitigation actions across the community, and managing and reducing risk by helping Nelson to adapt to climate change effects, especially in relation to:

Sea level rise: sea level rise is the most significant climate challenge for Nelson as a large proportion of its urban infrastructure is coastal or low lying. These areas will become more vulnerable to coastal inundation over time.

Heavy rainfall and flooding events: higher intensity rainfall events means Nelson will experience more regular and extensive flooding from streams, rivers and stormwater overflows, which will increase the risk of landslips.

Droughts and high temperatures: with a warmer climate, the temperature of the water within our rivers and streams will increase and affect habitats. Droughts will result in a higher risk of fires.

Responding to Climate Change

Mitigation

Mitigation is about reducing greenhouse gas (GHG) emissions and enhancing carbon sinks (sequestration to remove greenhouse gases from the atmosphere). Council is committed to emissions reduction targets for its own activities in line with government targets:

Net zero emissions of all GHGs other than biogenic methane by and beyond 2050;

10% reduction below 2017 biogenic methane emissions by 2030;

24-47% reduction below 2017 biogenic methane emissions by 2050.

Adaptation

Adaptation is the process of responding to current and future climate related impacts and risks. To manage these impacts and risks, Council is following the Ministry for the Environment guidance and is using the Dynamic Adaptive Pathways Planning (DAPP) approach. This means managing our assets in a way that makes them more resilient, or in some instances, it may mean moving those assets.

What Council is doing

How Council delivers its services will play a key role in meeting emissions reduction targets and building community resilience.

Acknowledging the need for urgent action, Council declared a climate emergency in May 2019. Council adopted Te Mahere Mahi a te Āhuarangi Climate Action Plan

in 2021, a living document which outlines what Council is doing to address climate change over the next decade. In 2022, Council also began developing a Climate Change Strategy, which will set the long-term direction and guide Council and community investment in climate action.

Council is working with Tasman District Council on a regional climate change risk assessment, which will build a comprehensive picture of how climate change will impact the region.

Further information relating to proposed responses by this activity to the challenge of climate change is provided in Section 1.2 of this Plan. Key Issue 1 also relates to how levels of service for this activity are projected to be impacted over time due to climate change.

- **Community Engagement**

Community engagement on flood risk management is planned for the following:

- Dynamic Adaptive Pathways Planning: This will follow the 10 step process laid out in Ministry for the Environment guidance on Coastal Hazards and Climate Change. Community engagement will be undertaken at critical steps in the process. This project is currently at Step 4 – 'Vulnerability and Risk'.

- Nelson Resource Management Plan – Plan Change 29 (Housing Plan Change): Formal plan change process with opportunity for public submissions on natural hazards overlays (including river and stream flood maps) and related provisions (Objectives, Policies, Rules and Methods)

- Maitai Flood Management Options: Consultation is to be undertaken at various stages in the project management cycle to inform a risk based approach to identify and prioritise response options. It is proposed that this consultation should be integrated within broader adaptive planning consultation led by the Climate Change Business Unit.

- Flood Management Plans: Consultation on flood management in other catchments will be undertaken in subsequent years, leading to the development and implementation of Flood Management Plans.

v Key Issues

Key issues for the activity are summarised under the following five headings:

Issue 1: Unless additional capacity is allowed for, the level of service provided by existing flood protection assets will progressively reduce over time due to more intense storm events and sea level rise projected with climate change.

Issue 2: Damage to flood protection assets from natural hazards.

Issue 3: The risk of flood protection asset failures will increase over time unless assets are maintained, renewed, upgraded or adapted (eg nature-based solutions).

Issue 4: Meeting new freshwater objectives and standards set under future freshwater plans drafted to meet the National Policy Statement for Freshwater Management (NPS-FM), and the National Environmental Standard for Freshwater Management (NES-FM).

Further information on the four issues, and the activities Council has already undertaken, or is planning to undertake to address these issues over the next 10 years, is provided below.

Issue 1: Unless additional capacity is allowed for, the level of service provided by existing flood protection assets will progressively reduce over time due to more intense storms and sea level rise projected with climate change.

Nelson City's location on a number of flood plains, and close to the coast, means the community is vulnerable to impacts of climate change that would cause more intense storms, increased flood flows, and coastal inundation resulting from sea level rise.

- ***Flood Management (Fluvial Flood Risk)***

  Flood management relates primarily to addressing flood risk associated with stream and river overflows during storm events. After decades of development on flood plains adjacent to urban watercourses, the city has a considerable investment in these areas and flood management is therefore a priority over the period of this Plan and beyond. Detailed computer flood models have been developed for ten of the eleven urban stream and river catchments in the city. Flood mapping for the 11th catchment, Saxton Creek, is being progressed to reflect completion of the stream upgrades which are due to be completed in December 2023. These models generate flood maps which show predicted overflows from streams and rivers across the city. The effects of climate change show the extent to which significant areas of the city would be more regularly and severely impacted by river, stream and coastal flooding in future, particularly low lying areas exposed to tidal inundation and sea level rise.

  Council has sought feedback from the public on the stream and river flood mapping shown on the Council's online map viewer[3] and further refinement of the flood models has been completed since the previous consultation. This includes updating the flood models to incorporate newly constructed flood protection works.

  Flood management seeks to reduce risks for existing development exposed to flooding through a range of measures, and to ensure that proposed new development is resilient to flooding, generally through raised building platforms and/or floor levels. Council has adopted a risk based approach to

[3] https://experience.arcgis.com/experience/896b2381eee844b386115e9d809127db

prioritise flood protection interventions for existing developments. Flood risk for proposed new developments is currently managed under the Nelson Resource Management Plan (NRMP), the Inundation Practice Note and the Nelson Tasman Land Development Manual (NTLDM 2020). The RMA reforms, in particular the proposed Climate Adaptation Act, are expected to include new direction on how existing and future development is managed in floodplains and low-lying coastal areas. If implemented, this would provide a legal framework, and potentially funding, for managed retreat from coastlines and other areas vulnerable to climate change. This new legislation would likely have a significant bearing on future planning for this activity in low lying coastal areas. The flood protection activity, and associated flood protection options, need to be considered within the wider context of adaptive pathways planning for these areas.

- ***Develop the risk based approach for decision making around flood protection issues.***

  Council has historically committed to a programme of works for urban rivers and streams for a primary capacity of Q50 (2% AEP flow), which is the peak flow arising from a rainfall event with a probability of happening once in 50 years. Ongoing concerns about climate change has led to a reappraisal of this approach. Where new land development and subdivision is proposed, the NTLDM 2020 has adopted a design standard of Q100 (1% AEP flow) in 2090 for secondary flow paths, open channels, streams and rivers, assuming an RCP 8.5 scenario.

  Achieving a similarly high level of service for all urban streams and rivers is not straightforward for a number of reasons. The costs of channel widening or bunding to achieve a future Q100 level of service is expected to be very high due to the proximity of existing properties, structures and land of high natural, economic and recreational value on the margins of these rivers and streams. Council recognises that the costs of meeting a Q100 design standard for the 2090 climate for all urban streams and rivers is likely to be unaffordable for the community. In addition to this, the scale of works required within and along these watercourses may not be acceptable to the community for amenity, environmental or cultural reasons.

  A risk-based approach for streams and rivers is expected to enable Council and the community to prioritise where and how interventions to manage stream and river flooding should be made. It is intended to enable the effective targeting of resources to higher risk areas where a high level of benefit can be achieved through intervention. This implies that some areas facing significant flood risk may not be prioritised due to other considerations outweighing the flood risk, until the flood risk increases to threshold levels. This approach needs to consider a broad range of options including flood works, flood preparedness, land use planning and appropriate urban design.

  A range of criteria such as environmental, economic, social, legislative, reputational and cultural implications is expected to be used when weighing up options to address flooding. Community perceptions of acceptable risk may evolve over time, particularly if climate change results in more regular and damaging flooding.

Issue 2: Damage to flood protection assets from natural hazards.
This issue relates to the need to develop resilient infrastructure to reduce risk of network damage caused by natural hazards that would otherwise compromise system performance and asset condition.

- ***Natural Hazards Security of the network***

  Further work is proposed in this Plan to build on the hazard vulnerability studies carried out by Treasury in 2017 in response to the Canterbury and Kaikoura Earthquakes and multiple flood events across the country. Natural hazard resilience includes wider network hazards such as earthquake fault line rupture and liquefaction. Earthquake damage as a result of ground shaking and liquefaction can cause significant and long term disruption to the community, and loss of services to affected areas.

  The August 2022 flood event in Nelson highlighted issues with the size and debris control of a number of stream culverts and intakes around the city, as well as gravel and channel bed level management generally. A programme of reinstating and upgrading flood protection assets is underway and is expected to be completed by 2027/28.

  Post flood stream and river channel inspections for all urban catchments detected a high number of channel bank scour issues, which have been ranked as high, medium or low priority, based on proximity to assets at risk and channel bank height. There are a total of approximately 500 sites identified, of which a third are high or medium priority to address.

  An additional outcome of the August 2022 flood was the deposition of material along the beds of stream and river channels, particularly within estuarine reaches of these channels. In extreme cases such as Todd Valley Stream and Oldham Creek, the lower section of channel was completely infilled and needed to be re-instated. The Hillwood Streams were similarly affected, reflecting the high intensity rainfall that fell within these catchments which resulted in hillslope slips and stream bank scour.

  An assessment of natural hazard risk to Nelson flood protection assets is proposed to be carried out between 2027 and 2030. The assessment will focus on defining the assets potentially subject to natural hazards, and the criticality of those assets. This will lead to prioritisation of 'resilience works' with construction of network upgrades to follow investigation. For the Flood Protection Activity, this work is expected to focus on the stop banks, stream culvert intakes and bank retaining structures in specific areas of the city.

Issue 3: The risk of flood protection asset failures will increase over time unless assets are maintained, renewed and upgraded.

Increases in rainfall intensity and sea level rise as a result of climate change will impact on flood protection assets, including an increase in the likelihood of stream culvert blockages, silting up tidal streams, undermining of in-stream structures due to channel bed scour, and tidal inflows due to blockages at flood gates. Monitoring of flood protection assets to track condition and provide early detection of issues that could lead to failure is critical in order to maintain the integrity of the network.

An immediate priority is the completion of upgrades which are already in progress, as laid out below:

- ***The completion of Flood Protection works at Saxton Creek and Orphanage Stream***

    - Saxton Creek is nearing completion of an extensive stream channel upgrade resulting from the flood damage to both Tasman District and Nelson City in the extreme rain event of April 2013. The upgrade work has been carried out in four stages, with stages 1 to 3 from Champion Road to Main Road Stoke completed in 2020/21, and construction of stage 4, from Main Road Stoke to Whakatu Drive (SH6) due to be completed in 2023/24.

    - Orphanage Stream upgrade works between Main Road Stoke and Saxton Road East were completed in 2017/18 with the installation of an additional box culvert at Saxton Road East. The next stage of the upgrade included construction of stopbanks and a floodwall upstream of Saxton Road East which was completed in 2021/22. Future stages of this project include: Capacity upgrade between Main Road Stoke and SH6, improvements to secondary flow path routing and flood detention arrangements at Saxton Field, and channel upgrade in the vicinity of Suffolk Road. Further improvements to culvert and channel capacity are likely to be needed in the upper catchment.

- ***Develop Flood Management Plans for priority catchments***

It was recognised in the Stormwater and Flood Protection Activity Management Plan 2021 - 2031 that a more strategic approach was required to identify flood protection requirements across the city and develop appropriate responses. This will primarily be asset renewal and level of service upgrades. Catchment flood models have been developed to inform this assessment, which enables Council to take a more strategic approach to investigating, managing and improving the performance of these assets.

Five Flood Management Plans are proposed, as follows:

- Maitai Flood Management Plan
- The Brook Flood Management Plan
- York Stream Flood management Plan
- Jenkins Creek Flood management Plan
- Poormans Valley Stream Flood Management Plan

These will guide the following elements of flood management:

- primary system capacity (open channels and stream culverts)
- secondary flow paths and flood hazards
- receiving environments (coastal and estuarine environments)
- Network resilience
- Flood Protection Structures and channel bank stability
- Gravel Management
- River / Stream bed grade control
- River and stream channel habitat, ecological values and fish passage
- prioritisation of flood protection upgrades

- ***Flood Protection Asset Condition Assessments and Renewal Strategy***

  In stream structure condition surveys have historically been undertaken to support the investigation of new capital projects, prior to establishing new weirs, grade control structures, channel lining, stopbanks, or the laying of new stream culverts. Stream walks undertaken by the contractor identify issues which are visually evident. More comprehensive condition surveys should be undertaken on a more regular basis for critical flood protection assets, and this also needs to be incorporated in a renewal strategy for assets approaching the end of their design life.

  Structure details for flood protection assets are recorded in Council's asset system. Generally stream culvert diameter and length is well documented, although there are data gaps for attributes such as surveyed levels of culverts, which means that assumptions often need to be made in relation to culverts grade (slope), based on other survey information. These data gaps may affect capacity assessments for some stream culverts. Council generally relies on LIDAR and UAV (drone) surveys to identify areas and volumes of gravel build up. Reporting on Lower Maitai channel capacity is undertaken on a routine basis as this is a key performance indicator (KPI) under the Long Term Plan.

  The separation of the stormwater and flood protection assets that is currently in progress has led to the identification of a number of data gaps for flood protection assets which will need to be addressed. For instance it has been revealed that not all channel bed grade control structures, or bank retaining structures are adequately recorded. In addition, whilst checks are made through stream and river inspections, there is limited data about the condition of these structures.

  Flood Protection assets such as stopbanks and channel bank protection assets may require renewal during the 10 year period of this plan. Condition assessments for these assets are planned over the first 5 years of this plan with funding for renewals allocated in years 5 – 10 of the Plan.

- ***Extending the Flood Protection Activity to Rural Rivers***

  Council has collected a combined stormwater / Flood Protection rate to fund this activity in the 11 urban catchments South of the Gentle Annie Saddle. Areas North of this, and inland of the urban areas are generally excluded from this rate. In the wake of large flood events, such as the August 2022, and December 2011 floods, Council receives multiple requests from landowners in these rural catchments for assistance.

  Rural catchments and properties exceeding 15 ha have previously been excluded from the stormwater rate on the basis that owners of large properties maintain sections of channel that run through their land. However such maintenance has become increasingly difficult in recent years due to the evolution of freshwater policy and the requirement to obtain and comply with consents to undertake in-stream works.

  A decision is required on whether to extend the flood protection rate to rural catchments. This change, if implemented, would likely coincide with the

review of the existing Council stormwater rate to be applied from year 2024/25.

Issue 4: Meeting new freshwater quality objectives and standards set under the future freshwater plans drafted to meet the National Policy Statement for Freshwater Management 2020 (NPS-FM), and the National Environmental Standard for Freshwater Management 2020 (NES-FM).

- ***Compliance with Central Government freshwater reforms***

  The NPS-FM 2020 replaces the NPS-FM 2014 (amended 2017). This National Policy Statement sets out how Councils will manage water quality and quantity. The Freshwater NPS 2020 is one of several pieces of national direction for managing New Zealand's freshwater. New requirements of the NPS-FM include:

  - Manage freshwater in a way that 'gives effect' to Te Mana o te Wai: This is a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment.
  - Improve degraded water bodies, and maintain or improve all others using bottom lines defined in the NPS.
  - An expanded national objectives framework which includes a process for regional councils to follow in consultation with communities and tangata whenua. This includes delineating Freshwater Management Units (FMU) for their region and identifying values, environmental outcomes and attribute states (baseline and target) for each FMU.
  - Avoid any further loss or degradation of wetlands and streams, map existing wetlands and encourage their restoration.
  - Identify and work towards target outcomes for fish abundance, diversity and fish passage over time.
  - Set an aquatic life objective for fish and address in-stream barriers to fish passage over time.
  - Monitor and report annually on freshwater (including the data used); publish a synthesis report every five years containing a single ecosystem health score and respond to any deterioration.

  Based on the requirements of the NPS-FM, Council, Iwi and the wider community have developed environmental water quality objectives for streams and rivers in Nelson. These objectives are expected to be adopted as the basis of rules in the draft Whakamahere Whakatū Nelson Plan and will set the scene for water quality improvements into the future.

  Appendix N – Freshwater Management Units, includes a figure showing the draft FMUs for Nelson, and a comparison of baseline and draft target attribute states for the various catchments. In relation to stream catchments significant improvement is required to achieve target attribute states in Saxton Creek, Orphanage Stream, Lower Poormans Stream, Jenkins Creek,

York Stream and Todds Valley Stream. It is likely that this also applies for Maire Stream, although there is insufficient water quality or bio monitoring data available to determine baseline attributes state.

The Draft Whakamahere Whakatū Nelson Plan provides for achieving water quality and quantity targets by 2030 - 2040, which has the following implications for the flood protection activity:

- New water quality limits relate to nutrient levels, sediments, algae, bacteria and macroinvertebrates, and are much more stringent than those in the NRMP. This is expected to affect the consenting process for instream channel works. Council's consent to implement instream works (RM175025-v1) is set to expire on the date the relevant Regional Freshwater Rules in the Whakamahere Whakatū Nelson Plan become fully operative.
- New policies are expected to avoid the loss of river extent and values, including limiting the reclamation of river beds.
- Stricter controls over maintaining open waterways, and ensuring fish passage is not obstructed by structures in the beds of rivers.
- New rules are expected to avoid the impact of structures such as culverts, tide gates and tide flaps on freshwater species which need to swim between coastal and freshwater habitats to complete their life cycle.
- Piping, diversion or infilling of streams is not likely to be permitted.

Council will need to develop a clear picture of the extent of rivers, streams and culverted stream channels affected by these policy changes as this will affect Council's range of options to deal with tidal inflows from river and stream estuaries.

- ***Outcomes from Central Government's Three Waters Review – Affordable Water Reforms***

  Alongside the Central Government's Action for Healthy Waterways Package, the Three Waters Review has been looking at how to improve the management of drinking water, stormwater and wastewater primarily to address problems identified in the Havelock North Drinking Water Inquiry, but also to improve overall management of our water resources.

  The review has identified the need for a stand-alone water services regulator and the development of new entities to manage the water supply, wastewater and stormwater activities of councils.

  These reforms include new obligations on wastewater and stormwater network operators to manage risks to the environment, people and property associated with the operation of their infrastructure networks.

  It is possible that there will be related obligations for the flood protection activity, especially where small urban streams are located within stormwater catchments.

- **Sustainable development.**

This needs to be the focus of all parts of the flood protection activity in order to ensure the city can adapt to a changing climate affordably while recognising the wider environmental, cultural and social values that the community identify as making Nelson a special place. The following are some of the current initiatives that this Plan will build on:

- *Implementation of nature based solutions*

  Nature-based solutions (NbS) include restoring wetlands, developing water retention or detention areas, making room for the river by widening floodways and setting back stopbanks, removing obstacles to fish passage, and reviving old channels. They can complement conventional infrastructure to improve flood protection and create additional environmental and social benefits.

- *Stream waterway environmental enhancement*

  Examples include natural gravel management in beds where practicable, protection of natural river banks, river bank shade through vegetation, management of aquatic weeds in waterways, protection of fish spawning areas, protection of natural 'pool and riffle' stream bed form and incorporation of natural meanders where possible.

- *Streams and rivers to be free of manufactured obstructions that impede fish passage.*

  Removal of barriers to fish passage is in line with the National Policy Statement – Freshwater Management (NPS-FM), and the National Environmental Standard – Freshwater Management (NES-FM)

vi Levels of service

Table ES-2: Proposed Levels of Service 2024 - 2034

					Performance Target			
	Community Outcomes	**Level of service**	**Performance measure**	**Previous and current performance**	**2024/25 (Year 1)**	**2025/26 (Year 2)**	**2026/27 (Year 3)**	**2024/25 – 2030/31 (Year 4-10)**
Flood Protection	**Our unique natural environment is healthy and protected** **Our infrastructure is efficient, resilient, cost effective and meets current and future needs** **Our urban and rural environments are people-friendly, well planned, accessible and sustainably managed** **Our communities are healthy, safe, inclusive and resilient**	**Protection:** **Our flood protection structures and channels are managed to reduce the impact of flooding and erosion now and in the future**	**^**The major flood protection and control works are maintained, repaired and renewed to the key standards defined in the Flood Protection Activity Management Plan 2024-34* Measurement Procedure 1,2 (Mandatory measure 1)	No loss of current service potential in any urban streams between 2019/20 and 2021/22 2022/23 Major works undertaken to maintain capacity in all urban watercourses.	Network maintained to continue provision of original design service potential**			
				New target for 2024-2034 AMP	No failure of flood protection in the existing stopbank system maintained by the Council below the specified design levels: • Maitai River Stopbanks: ○ Hanby Park to Clouston Bridge = approximately 250 m3/s at Girlies Hole flow gauge, (2 % AEP to 3% AEP in 2020) ○ Clouston Bridge flood wall = approximately 290m3/s at Girlies Hole flow gauge, (1% AEP to 2% AEP in 2020) ○ Clouston Terrace = approximately 170 m3/s at Girlies Hole flow gauge, (10% AEP to 20% AEP in 2020) ○ Downstream of Trafalgar Street bridge (Left bank) • River Flow Capacity = approximately 450 m3/s @ Avon Terrace flow gauge (1% AEP in 2090), or • Coastal Inundation = 1% AEP event in 2060 • AEP = Annual Exceedance Probability ○ (Mandatory Performance Level 1).			
				No flood events within rivers/streams occurred that required a repair programme between 2019/20 and 2021/22 2022/23: 2 major flood events, August 2022 and May 2023. Five year flood recovery programme put in place.	Following major flood events: Flood event damage identified, and repair work prioritised			

^L.O.S. included in LTP

* Performance measures with an asterisk reflect the wording of the Non-Financial Performance Measures of the Department of Internal Affairs (DIA) incorporated into sec261B Local Government Act 2002. This is to allow the DIA to compare these measures across councils.

**Original design service potential expressed in m3/s

Measurement procedures:
1. Review check sheets for individual projects
2. GIS flood reports for properties inside flood overlay

vii Future demand

Table ES-3: Future demand

Stormwater and Flood Protection Demand Drivers	Changes to the Activity
Significant population growth and residential expansion into greenfield areas	Development of new areas on the periphery of the city and intensification in some existing developed areas leading to increased runoff rates as impermeable areas increase. Standards for stormwater attenuation in the NTLDM 2020 should largely off-set any increases in flood flows within rivers and streams.
Climate Change	The general future expected trend for Nelson is of winters being wetter and the other seasons being drier. More frequent heavy rainfall events have been predicted due to a warmer climate. This will require either increased network capacity, detention capacity, adaptation measures including nature-based solutions, or a greater acceptance by the community of the adverse impacts of extreme events. Design standards in the NTLDM 2020 recognise the need to meet expected increased rainfall intensities out to 2090, based on an RCP 8.5 global emissions scenario.
Community expectation to respond to predicted climatic changes	In 2019, Council declared a climate change emergency. This reflects a growing sense of urgency around the need to respond to climate change with both mitigation and adaptation measures. Climate change adaptation is a major consideration for this activity, particularly in relation to low lying areas of the city that would be exposed to sea level rise. There is an existing demand for increased protection from tidal flooding in some areas of the city, and it is expected this will grow following the publication of new coastal inundation mapping.
Changes in Customer Expectations on flooding	Customer expectations are increasingly tending towards higher Levels of Service, in both the reduction of extent, frequency and duration of flooding and ponding on property and roads during and after storms. This can drive a demand for the upgrade or installation of flood protection measures.
Community Expectation on environmental protection	There are increasing expectations for improved freshwater quality and enhancing the natural environment of streams and rivers. This demand driver can conflict with the expectations for reduced flooding as it can limit options for works along existing water courses that have insufficient flow capacity. There is growing support for nature-based solutions to improve flood management, which deliver improved environmental outcomes together with a reduction in flood risk.
Legislative National Policy Statements: • Freshwater Management	• Freshwater Management is a cornerstone central government initiative to improve the quality of freshwater bodies in New Zealand. This is expected to require an enhanced response to design and construction of stream channel works to align with the requirements of the NPS-FM and NES-FM. Cost implications are expected to become clearer as

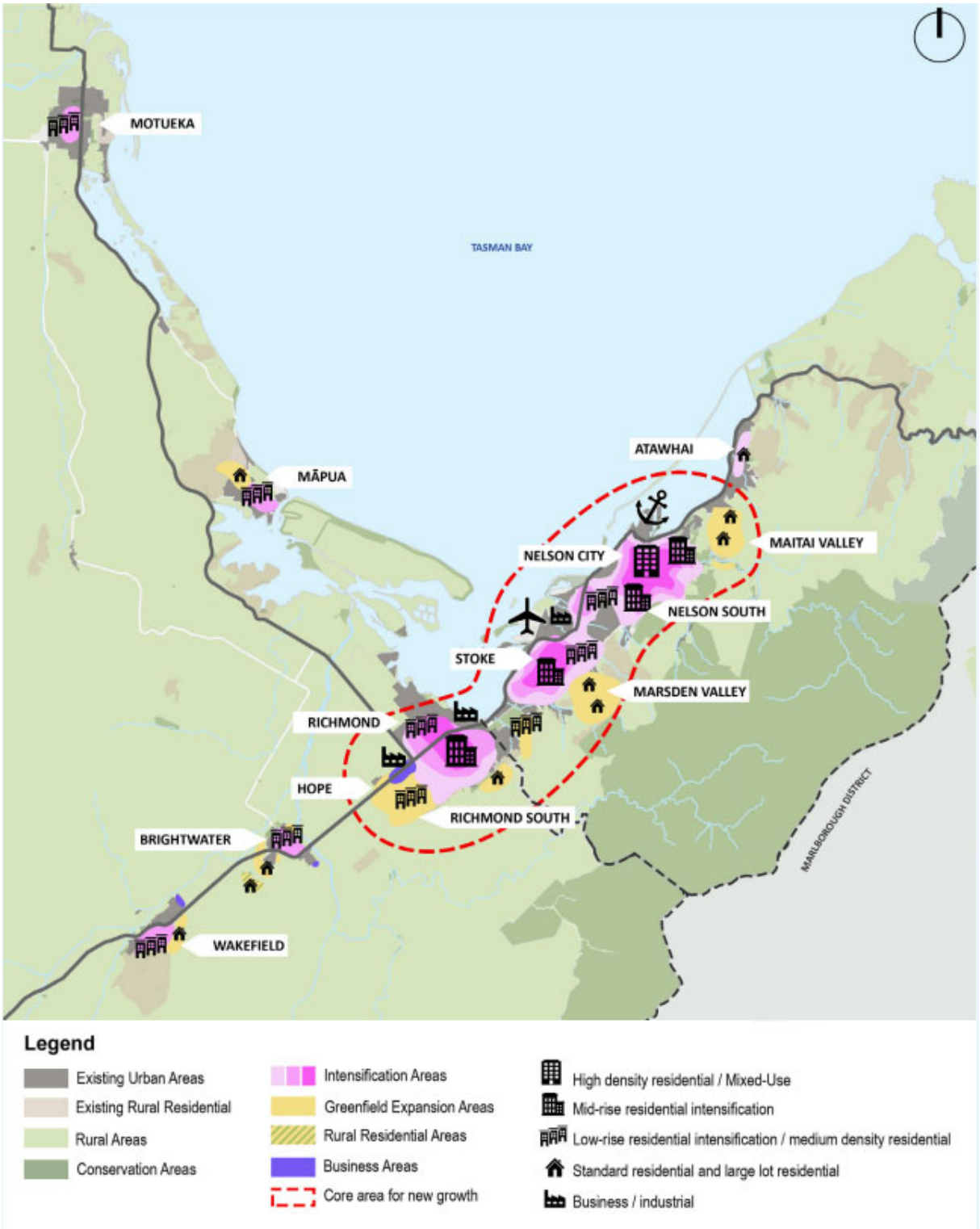
Stormwater and Flood Protection Demand Drivers	Changes to the Activity
• Urban Development	Council develops the freshwater sections of the proposed Whakamahere Whakatū Nelson Plan. • Urban Development will ensure each territorial authority makes adequate provision for future population growth in their areas. This will require Council to undertake strategic growth studies and identify the impact on the demand for adaptation and flood response measures.

An important aspect to consider is that customer expectations are increasingly tending towards higher levels of service, in both the reduction of extent and frequency of flooding and ponding on property and roads during and after storms, as well as enhanced freshwater quality and habitat. These expectations will need to be fully assessed and balanced against other desired outcomes.

Infrastructure Planning for Growth Projects

Figure ES-4 shows the areas identified for future growth in the current FDS. The NPS-UD requires Councils to review the current FDS and prepare an update. An updated version of the Future Development Strategy was adopted in 2022. As demand for development becomes clearer, growth areas will be prioritised for services upgrades, but the inclusion of a number of lower lying coastal areas will be reviewed in the light of the latest sea level rise projections (NZ SeaRise 2022).

Figure ES-4: Nelson Growth Areas



viii Lifecycle management plan

Assets have a lifecycle as they move through from the initial concept to the final disposal. Depending on the type of asset, and its location, its lifecycle may vary from 10 years to over 100 years. More information on lifecycle management is provided in Chapter 4 of this Plan.

As with many other urban areas across the country, much of the water related infrastructure in Nelson was developed during a period of intense urbanisation and conversion to public servicing from the 1960s and 70s.

Whilst the majority of flood protection assets in Nelson are relatively new with only a limited number of stream culverts due for renewal before 1960, these assets are now well into their useful working life. Figures ES-5 and ES-6 show a 'bow-wave' of stream culvert renewals projected for the period 2060 - 2100, based on the expected working life of assets. The 2060's are just beyond the 30 year forecasting period required by the Local Government Act 2002 for the Infrastructure Strategy. The timing of the bow wave is primarily based on the expected asset life for concrete pipes of 90 years. In practice the actual asset life of these pipes is variable and reflects a range of factors such as location, operating context, and maintenance arrangements.

As many Councils across the country are facing a similar renewals bow wave, the 3 waters industry has initiated a wide ranging programme of upgrading and updating the tools and methodologies that are utilised for renewal planning. This comprises a multi-year collaboration agreement between the University of Canterbury, Quake Centre, Water New Zealand and the Institute of Public Works Engineering Australia (IPWEA). The approach has the overall title 'Evidence Based Decision Making for the 3 Waters Networks (Pipe Renewals)'.

The associated Pipe Renewals Guidelines Programme is developing guidance documents and tools to enable Australia's and New Zealand's water organisations to make nationally consistent, evidence-based decisions in regards to pipe network operational and capital expenditure. The programme covers inspection, maintenance and renewal strategies for pipework in potable water, wastewater and stormwater systems.

Whilst it is expected that stream culverts in Nelson are generally performing better than those in the 3 Waters networks, further assessment is required to better support an evidence based decision making approach for stream culvert renewals. This will need to include collection of more information on the existing condition of assets and more regular assessment of critical assets. It is proposed to develop a Flood Protection Asset Renewal Strategy during the course of this Plan supported by condition and performance assessments. It is expected this strategy will also include a more refined approach to assessing theoretical asset life, to provide more certainty for renewals planning.

Figure ES-5: Estimated Stream Culvert Replacement Length by Year

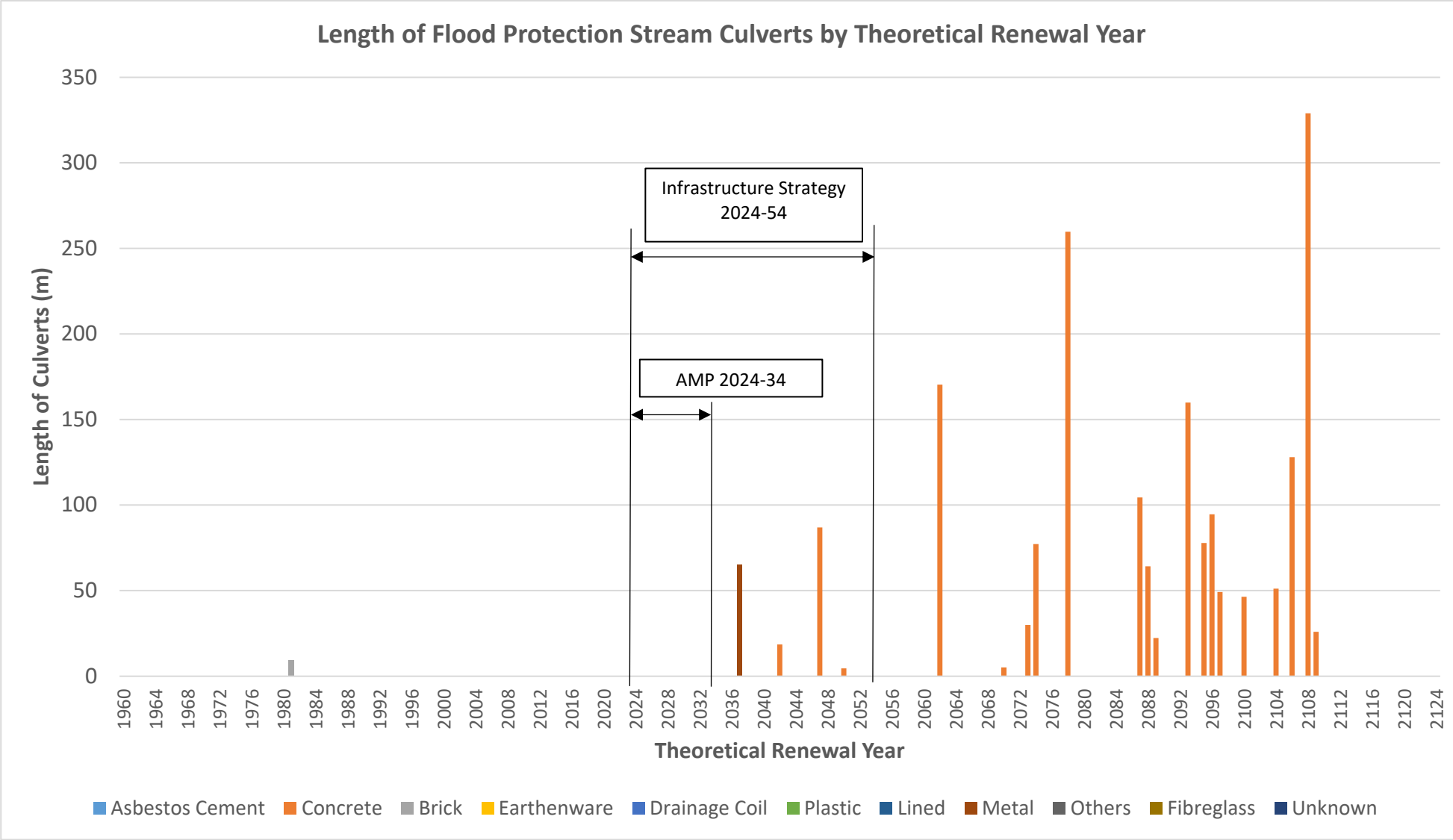
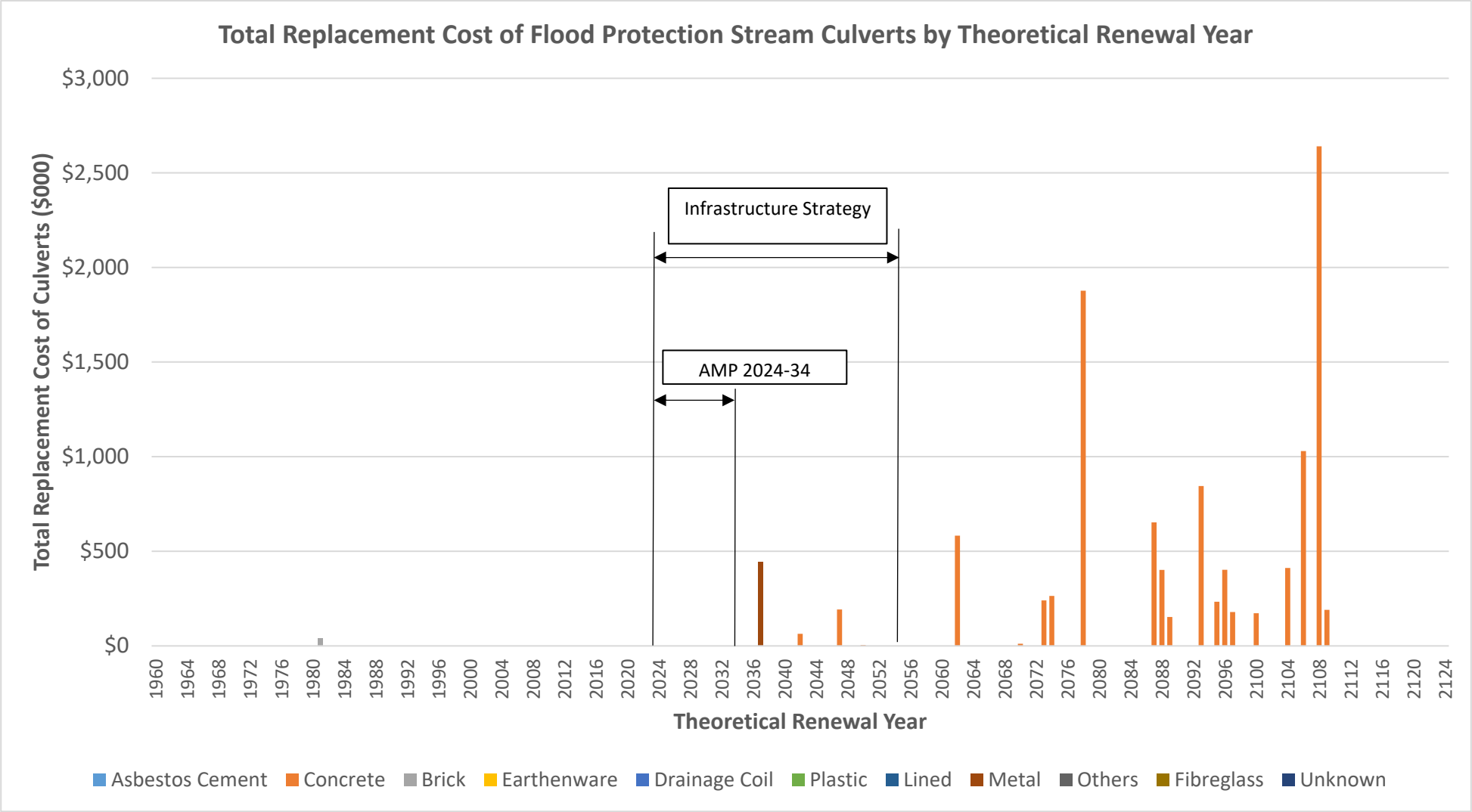


Figure ES-6: Estimated Stream Culvert Replacement Cost by Year



ix Risk management plan

Nelson City Council is committed to using risk management principles and techniques to understand and appropriately manage all internal and external factors and influences which affect the achievement of its objectives. Doing this will:

- Provide a reliable basis for sound decision making
- Increase the likelihood of achieving objectives
- Provide an agreed basis for prudent risk management
- Enable the organisation to understand the level of risk associated with each decision as well as the Council's aggregate exposure to risk
- Improve accountability and assurance of control
- Foster an organisational culture based on reasonable foresight and responsible hindsight.

The Council's standardised risk assessment method explicitly follows the process part (section 5) of AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.

Risk analysis involves consideration of the sources of risk, their consequences and the likelihood that those consequences may occur.

The following consequences are considered:

- Climate Change
- Health & Safety
- Legal compliance
- Relationship with Iwi
- Asset performance/Service Delivery
- Environmental/Historical/Cultural
- Financial
- Political/Community/Reputational

Consequences of an event are rated 1 - 5 (Insignificant to Extreme). Likelihood is then rated 1 – 5 (Rare to Almost certain) to calculate a risk level rated 1 – 5 (Very Low to Very High).

The objective of risk analysis is to separate the low impact risks from the major impact risks, and to provide data to assist in the evaluation and treatment of the risks. The four specific Community Outcomes that guide the Flood Protection risk analysis are also used to inform the Flood Protection levels of service:

- Our unique natural environment is healthy and protected
- Our urban and rural environments are people-friendly, well planned, accessible and sustainably managed
- Our infrastructure is efficient, resilient, cost effective and meets current and future needs
- Our communities are healthy, safe inclusive and resilient

As noted in the Issues section, there is potential for future Level of Service changes around the Freshwater NPS / NES, urban growth, and implementation of a risk-based decision making framework in this area.

Table ES-4: Risk Measures

Risk #	Risk Title	Control / Treatment	Treatment Description	Likelihood	Severity	Rating
R00239	Significant change in governing framework for 'Local Water Done Well'	MC00215	- Processes and procedures. Promap. - Annual review of Asset Management Plans - 3 year development. - Succession plans - Handover period	Possible	Major	HIGH
		MC00917	- Project stages for managing organisational change			
		MC00918	Staff training to enhance resilience for those likely to be impacted by 3-waters changes - First round of training, "Managing people through change" and "Coping with Change", rolled out in quarter three of 2021-22.			
R00242	Lack of resources to complete indicative business cases	MC00211	- Review workloads - Offload to Capital Projects where they have an available PM - Pay for external resources to PM.	Likely	Major	HIGH
R00249	Decisions about asset maintenance/ development/ replacement made ignoring advice in AMPs (e.g. politicized 'pet projects')	MC00226	- Ensure elected representatives and Senior Leadership Team are well informed with regard to necessity and scope of projects and the content of AMP's. - Workshop AMP development with Council.	Likely	Moderate	HIGH
R00251	Operational - One or more operated assets do not comply with resource consents	MC00235	- Processes for RMA compliance and reporting. - Independent contractor monitoring and reporting - Alarm systems, level indicators. - External audits.	Possible	Major	HIGH

R00256	Contractors do not meet required health and safety standard	MC00268	- Contractor reports to Council - Council reviews H&S systems - Audits of H&S systems	Possible	Major	HIGH
R00692	Lack of Staff (NCC) and operator (Nelmac) experience/resilience	MC01012	- Employ experienced people where possible. - Employ appropriately qualified and skilled staff. - Competitive pay and conditions should be competitive.	Possible	Major	HIGH
R00693	Climate Change /Sea Level Rise	MC01013	- Nelson Tasman Emergency Management Plan. - Emergency procedures manual and exercises. - Programmes related to resilience/adaptation underway - Continue to develop criticality and natural hazards understanding with a view to progressing to the development of solutions (that will minimise the risk of failure due to a natural hazard event) in order of priority	Possible	Major	HIGH

Significant change in governing framework for the Three Waters

The High rated risk (R00239) in Table ES-4 relates to the implementation of the Three Waters reforms.

On 1 March 2021, the Taumata Arowai – Water Services Regulator Act 2020 came into force. The Act implements decisions to establish a new regulatory body – Taumata Arowai – which will be responsible for:

- Administering and enforcing a new drinking water regulatory system (including the management of risks to sources of drinking water); and
- A small number of complementary functions relating to improving the environmental performance of wastewater and stormwater networks (developing standards and regulations, then monitoring and enforcing compliance with them and providing training).

Local Water Done Well

Central Government also signalled that they will continue with three water reforms through a programme of legislation headed 'Local Water Done Well'. Implementation of this programme will be through two further bills to be introduced to Parliament.

The first bill (Local Government (Water Services Preliminary Arrangements) Bill) is expected to be passed by the middle of 2024 setting out '…provisions relating to council service delivery plans and transitional economic regulation. It will also provide streamlined requirements for establishing council-controlled organisations under the Local Government Act 2002, enabling councils to start shifting the delivery of water services into more financially sustainable configurations should they wish to do so.'

The second bill is expected to be introduced in December 2024 and passed by the middle of 2025. This will set out – '…provisions relating to long-term requirements for financial sustainability, provide for a complete economic regulation regime, and a new range of structural and financing tools, including a new type of financially independent council-controlled organisation.'

At this stage the second bill is also signalled to establish regulatory backstop powers, to be used when required to ensure effective delivery of financially sustainable and safe water services. Some amendments to the water regulator's legislation are also anticipated.

Central Government expect all legislation to support the implementation of Local Water Done Well will be passed by mid-2025.

The review has identified the need for a stand-alone water services regulator and the development of new entities to manage the water supply, wastewater and stormwater activities of councils.

x Financial summary

Detailed financial statements and forecasts are provided in section 6 – Financial Summary. Tables 6-1 and 6-2 include a breakdown of projected expenditure by project.

Tables ES-5 and ES-6 below show total projected operational and capital expenditure on flood protection for 2021 – 2031 by expenditure type.

Projected expenditure for Flood Protection:

Operational expenses are variable within the range $500k - $900k per annum over the 10 years. Higher expenses in the first 3 years of the Plan are largely due to ongoing August 2022 Flood Recovery work involving gravel removal to maintain river and stream flood carrying capacity.

Capital expenditure is between $4 Million and $6.5 Million per annum over the 10 year plan. The majority of expenditure is on level of service upgrades, including flood recovery projects within the first 4 years to increase flood resilience of the network. Upgrades for the Maitai River, Jenkins Creek, Poormans Valley Stream and Atawhai Stream catchments have been identified as a priority for flood mitigation response based on flood risk. There is a single Capital Growth project associated with the Infrastructure Acceleration Fund which relates to reducing tidal inflows through culverts into the CBD. Renewal funding over the last 6 years of this Plan is targeted at renewal of in-stream structures, such as gabion and timber retaining walls which have a relatively short asset life. Prioritisation of these renewals will be guided by condition assessments.

- Major Flood Protection projects included within this Plan include:
    - Current/Ongoing Major Projects
        - Saxton Creek Upgrade (Expected completion 2023/24)
        - Maitai Flood Mitigation Project
        - Flood Recovery Programme (Gravel removal)
        - Flood Recovery Programme (Stream bank erosion)
        - Flood Recovery Programme (River Stream Improvements)
    - New Projects
        - Todds Valley Stream Upgrades
        - Oldham Creek Upgrades
        - Jenkins Creek Upgrades
        - Brook Stream Catchment Improvements
        - Wakapuaka Flats Drainage Upgrades
        - Rural Rivers Upgrades

Table ES-5: Projected Operational Expenditure 2024 – 34

Account	2024/25 AMP (2024/34)	2025/26 AMP (2024/34)	2026/27 AMP (2024/34)	2027/28 AMP (2024/34)	2028/29 AMP (2024/34)	2029/30 AMP (2024/34)	2030/31 AMP (2024/34)	2031/32 AMP (2024/34)	2032/33 AMP (2024/34)	2033/34 AMP (2024/34)
6520 Flood Protection	979,090	825,128	774,175	811,048	612,734	691,450	583,168	541,168	541,168	541,168
Base Expenditure	199,768	244,768	242,768	253,584	254,200	284,838	255,465	255,465	255,465	255,465
Unprogrammed Expenses	177,322	178,360	179,407	180,464	181,534	222,612	183,703	183,703	183,703	183,703
Programmed Expenses	602,000	402,000	352,000	377,000	177,000	184,000	144,000	102,000	102,000	102,000

Table ES-6: Projected Capital Expenditure 2024 – 2034

Account	2024/25 AMP (2024/34)	2025/26 AMP (2024/34)	2026/27 AMP (2024/34)	2027/28 AMP (2024/34)	2028/29 AMP (2024/34)	2029/30 AMP (2024/34)	2030/31 AMP (2024/34)	2031/32 AMP (2024/34)	2032/33 AMP (2024/34)	2033/34 AMP (2024/34)
6520 Flood Protection	3,422,000	5,205,500	4,470,000	3,970,000	4,620,000	5,955,000	6,435,000	5,255,000	4,705,000	5,865,000
Capital Growth	55,000	335,500	0	0	0	0	0	0	0	0
Capital Increased LOS	3,367,000	4,870,000	4,470,000	3,970,000	4,520,000	5,855,000	6,335,000	5,155,000	4,605,000	5,665,000
Renewals	0	0	0	0	100,000	100,000	100,000	100,000	100,000	200,000

xi Monitoring and improvement programme

The Plan is a regularly revised and evolving document and will be reviewed annually and updated at least every three years to coincide with the Annual and Long Term Plans and to incorporate improved decision making techniques, updated asset information, and Council policy changes that may impact on the levels of service.

The Plan will be improved throughout its lifecycle as further information about flood protection assets are collected in terms of condition, performance and service delivery. Council is committed to advanced data collection and management systems that will allow for a greater appreciation of the performance and condition of Council assets.

Council will report variations in the adopted annual plan budgets against the original activity management plan forecasts (based on inflated figures in the Long Term Plan) and explain the level of service implications of budget variations.

Council has been working with iwi, seeking their input into this Activity Management Plan. Some changes have been included in this Plan following their feedback, however, other matters require further thought. Council will consider the wider feedback raised as part of the review of its Asset/Activity Management Policy during 2024/25 and in work on the next iteration of the Activty Management Plans.

Internal Review

An internal review will be taken every three years to assess the effectiveness of the plan in achieving its objectives. The internal audit will also assess the adequacy of the asset management processes, systems and data.

Statutory Audit

The Local Government Act requires that an independent, annual audit of the operations of the Council be carried out.

Benchmarking

Benchmarking (trending) of the activity through Audit NZ, Local Government NZ and Water NZ benchmarking initiatives is carried out at the request of these organisations to give increased understanding of:

- The efficiency and efficiency variations of individual activities.
- Effects of any programmes instigated by the Activity Management Plan.
- Operating costs over range of individual activities.

Examples of types of benchmarking that are to be considered include tracking progress, responsiveness to service calls, operation costs i.e. $/metre/year and energy costs. As data is obtained and implications understood the benchmarking can be used for additional or revised Levels of Service and can be incorporated into a graphical display.

Water NZ annual performance reviews include benchmarking of a range of measures across all territorial and unitary authorities that are operators of 3 Waters networks. Results for the stormwater activity in Appendix H includes measures that apply to flood protection, as well as stormwater.

The effectiveness of this Plan will be monitored by the following procedures:

- Financial expenditure projections prior to year end
- Resource consent monitoring as required by consents

- Tracking progress against Key Performance Indicators laid out in Long Term Plans
- The ongoing updating of the asset register of flood protection assets when repairs are carried out and the attributes are compared with the asset register attributes
- The development of stream/ river catchment flood modelling, and secondary flow path modelling on a catchment by catchment basis

Table ES-7: Improvement Programme

Improvement Programme	Improvement Actions
Expand sustainable practice throughout the flood protection activity, including giving consideration to nature-based solutions at the investigation and optioneering stages of a project.	Integrate nature-based solutions into the benefits and outcomes section of business cases developed for Flood Protection projects. Preference will be given to nature-based solutions where they provide a similar level of flood mitigation at a comparable cost to conventional methods
Improve iwi engagement and engagement processes in the Flood Protection Activity Planning	Engagement occurred with iwi during development of the Activity Management Plans 2024-2034 and through the Long Term Plan Summit with Iwi Leaders. Council will continue to facilitate iwi input into Council's activity management plan processes, as part of the development of its long term plans. Council has an online iwi engagement platform, Te Parikaranga, which enables Council officers to share projects with iwi and to receive input on the level of interest iwi have with a Council project.
Progress towards 'Te Ao Maori' Improvement themes – Continuous Improvement Over Time	Understand how 'Te Ao Maori' Improvement themes can be integrated into the Flood Protection Activity Management
Improve linkage to Environmental Activity & Transport Activity Management Plans including creating a chart to show the links	Combined Flood protection and Transport Business cases have been undertaken but a chart showing the links is still required. Collaboration with the Science and Environment team on freshwater quality is being put in place through a cross Council working group to plan responses to the NPS-FM.
Review Levels of Service (especially in relation to sustainability & infiltration)	Levels of Service have been reviewed for this AMP but the Action for Healthy Waterways Package is still in progress and further direction will be provided by the Whakamahere Whakatū Nelson Plan
Develop Risk Management Plans	Risk Management Plans are proposed under the Central Government Action for Healthy Waterways package.
Complete computer flood modelling for streams and rivers, including updates for 2021 LIDAR and new sea level rise projections released in 2022.	This was achieved in 2020/21 although further updates are required, including incorporation of Saxton Creek, and new Sea Rise projections released in mid-2022

Improvement Programme	Improvement Actions
Complete a Flood Protection renewal strategy to manage the risks associated with aging assets	This strategy will include a framework for prioritising and implementing condition assessments.
Ongoing refinement of lifecycle decision making and financial forecasts, including review of asset life expectancy	The flood protection renewal strategy will investigate and provide guidance on the expected base life of assets. Asset values are being reviewed in 2023.
Develop Flood Management Plans for critical assets such as open channels, streams and rivers taking into consideration future climate change, and the potential to implement nature-based solutions	The development of these plans needs to address operational aspects as well as Level of Service upgrades. Aspects such as gravel management and stream bank erosion will need to be addressed.
Improve accuracy of data through review and modification of collection, storage, and auditing	Critical flood protection assets including structures along open channels and streams have been identified in the Council asset register but this information is not complete.

1. Introduction

1.1 Background

1.1.1. Purpose of the plan

The purpose of this Plan is to support the goal of this activity, to ensure that assets are operated and maintained to provide the required level of service, and to meet community outcomes for present and future customers in a sustainable and cost effective manner.

The content of this Plan further supports the purpose by:

- Demonstrating responsible, sustainable management and operation of flood protection assets which represent significant, strategic and valuable assets belonging to Nelson City.
- Justifying funding requirements.
- Demonstrating regulatory compliance under, Section 94(1) of the Local Government Act 2002 which in summary requires the Long Term Plan to be supported by:
    - *Quality information and assumptions underlying forecast information.*
    - *Framework for forecast information*
    - *Performance measures are appropriate to assess meaningful levels of service.*
- Demonstrating clear linkage to community agreed outcomes with stated levels of service.

The contribution of flood protection services to the Community Outcomes and Asset Management objectives will be seen through:

- Meaningful stakeholder consultation to establish service standards.
- Implementing a programme of inspections and monitoring of the network to assess asset condition and performance.
- Undertaking a risk based approach to identify operational, maintenance, renewal and capital development needs, and applying multi-criteria analysis techniques to select the most cost effective and sustainable work programme.
- Ensuring services are delivered at the right price and quality.
- Achieving the appropriate level and quality of asset management practice.
- Continuing programme of capital works.
- Futureproofing and resilience

The overall objective of activity management planning is to:

Deliver a defined level of service to existing and future customers in a sustainable and cost effective manner.

This plan will provide the justification for budget forecasts put forward in the Long Term Plan (2024 - 2034) for the flood protection activity.

What we do

Council flood protection works include physical upgrades to rivers and streams to increase the volume of flood water they can carry, increasing the size of culverts, and removing accumulated gravel where flow capacity is reduced. Council aims to undertake this work in a way that is sensitive to the freshwater environment.

Why we do it

The proximity of the Nelson foothills, and the location of the commercial and residential development on the flood plains and close to waterways, mean that during heavy rainfall events stream and river flows can rise rapidly and cause flash flooding to occur.

1.1.2. Relationship with other planning documents

Infrastructure Strategy

In 2014 the Local Government Act 2002 was amended to include section 101B - a requirement for local authorities to prepare an infrastructure strategy as part of the Long Term Plan. The strategy is expected to look at least thirty years into the future and detail the issues that the local authority can reasonably foresee. The office of the Auditor General has provided guidance documents for authorities to use when developing the strategy.

Much of the work required for the strategy comes from the development of this and other activity management plans and in order to avoid un-necessary duplication, this Plan focusses on the first ten years of the thirty year strategy timeframe.

Current Nelson Resource Management Plan (NRMP)

The NRMP is the operative plan established under the Resource Management Act 1991 and is a regulatory document that covers both district and regional activities. Council seeks to operate the current network in compliance with this document. To that end, Council holds a range of resource consents for both global and site specific activities. In 2009 a global consent was granted for the discharge of stormwater into fresh water. This consent expires in 2044, and whilst it applies primarily to the stormwater activity, there may be sites where this consent is relevant to flood protection culverts. In 2017 a global consent for maintenance activities in watercourses was also granted. This consent will expire on the date the proposed Whakamahere Whakatū Nelson Plan becomes operative. A detailed summary of the resource consents held for the activity is given in Table 2-4.

Proposed Whakamahere Whakatū Nelson Plan

The Whakamahere Whakatū Nelson Plan (the Nelson Plan) will replace the Nelson Regional Policy Statement, NRMP and the Nelson Air Quality Plan, and will include transport and infrastructure, natural hazards, coastal and freshwater provisions. Engagement on the Draft Nelson Plan was carried out in 2020 and 2021 and notification of a Proposed Plan was deferred in 2021/22. While the impact of the Nelson Plan on the flood protection activity will become clearer as the proposed plan rules are developed and consulted on, it is expected that there will be an increased emphasis on water quality and the freshwater environment as the proposed plan responds to the NPS-FM, and NES-FM. Any future flood protection activities will need to meet the requirements of the proposed Nelson Plan when it becomes operative, with cost implications updated in future activity management plans. The proposed Nelson Plan will also include Council's response to the requirements of the NZ Coastal

Policy Statement (2010), and the National Policy Statement Urban Development (2020).

Infrastructure provisions

The definition of regionally significant infrastructure in the Draft Nelson Plan includes the wastewater, stormwater and water supply networks, as well as York Valley Landfill and arterial roads. The Draft Nelson Plan provides for the ongoing operation of regionally significant infrastructure. Some Flood Protection assets would have formerly been classified as stormwater assets, and so it is expected they will be regionally significant.

The Draft Nelson Plan reflects the Nelson Tasman Future Development Strategy and the Intensification Action Plan by explicitly stating where new urban expansion can occur (Development Areas) and enables intensification through zoning (the Medium Density Residential Zone) and rules relating to residential density.

Freshwater provisions

The Draft Nelson Plan provides for the progressive meeting of water quality and quantity targets by 2030. The planning response to the Action for Healthy Waterways package released in 2020 is still being developed in collaboration with Te Tauihu Iwi. Until the planning framework has been settled there is some uncertainty around the impacts on infrastructure management. The new provisions are likely to have the following implications for Flood Protection works:

- New water quality limits relate to nutrient levels, sediments, algae, bacteria and macroinvertebrates, and are much more stringent than those in the NRMP.
- • Where the health of streams and rivers in the region is known to be degraded, Council will need to take action. This includes improvements made to fish passage and processes for in-stream works where they may be contributing to the loss of health of those rivers and streams

Stormwater Activity Management Plan

The management and improvement of stormwater discharges falls under this plan, and it is expected that Council will need to implement a programme of works to achieve relevant targets in the NPS-FM and NES-FM. The stormwater network will continue to have a range of public and private owners, and it is anticipated that parts of the network (road drainage, solid waste facilities and Parks) will continue to be managed by Council. The National Transition Unit is developing a framework for the transfer of stormwater assets and functions to the Water Entities, and this provides for Service Level Agreements on aspects such as stormwater discharge quality.

Environmental Activity & Transport Activity Management Plans

Fresh water quality is a key component of the central government environmental programme for New Zealand. The National Policy Statement for Fresh Water Management 2020 is expected to halt the decline in fresh water quality and lead communities to the point of actively improving it.

Council's investigations of water quality show very good results in upper catchments where undisturbed native bush predominates and lesser quality through farm/forestry areas and urban sections of watercourses.

Freshwater quality improvements will be maximised where the source of the negative impacts can be addressed rather than the community relying on 'end of pipe' stormwater treatment techniques.

Where flood protection works involving streams and rivers are implemented by Council, environmental protection is considered in the design and resource consent process. Future emphasis is expected in the following areas:

- Stream water way environmental enhancement such as natural gravel management in beds where practicable, protection of natural river banks, river bank shade through vegetation, removal of manufactured barriers to fish passage, protection of fish spawning areas, protection of natural 'pool and riffle' stream bed form, and incorporation of natural meanders where possible.
- Improved quality of water discharged to streams and rivers, achieved through treatment and detention requirements under the NTLDM 2020,

A number of Council activities directly impact on the streams and rivers in the city. Transport assets channel stormwater containing contaminants from roads and public carparks into the stormwater network. Parks and Reserves can impact on water quality from vegetation grooming and mowing activities adjacent to streams. The respective activity management plans will be key documents that will set out initiatives for reducing or eliminating the negative environmental impacts on fresh water from these activities.

Climate Action Plan

This Action Plan shows all the resources Council has currently allocated to climate change projects over the next ten years, as set out in our Long Term Plan 2021- 31. The Action Plan is a living document that will be updated as the actions are completed, or amended or new actions are added. The actions in the Plan cover a wide range of infrastructural, social, and environmental areas, demonstrating Council's commitment to meeting the urgent challenge of mitigation of and adaptation to climate change.

Iwi Management Plans:

Iwi Management Plans are lodged by iwi authorities and received by Council under the Resource Management Act 1991. Once lodged with Council, they are planning documents that Council is required to take into account when preparing or changing Resource Management Act Plans (e.g. the Regional Policy Statement, Air Quality Plan or Nelson Resource Management Plan).

Iwi Management Plans document iwi worldview and aspirations for the management of resources, and help Councillors and staff to better understand those factors.

These are accessible on: http://www.nelson.govt.nz/council/plans-strategies-policies/strategies-plans-policies-reports-and-studies-a-z/iwi-management-plans/

Nga Taonga Tuku Iho Ki Whakatū Management Plan (2004):

This is a collective initiative involving five of the six local iwi (Ngāti Rārua, Ngāti Toa Rangatira, Te Ātiawa, Ngāti Koata, Ngāti Tama) that gives a big picture approach to the management of nga taonga tuku iho (the treasured resources). The vision statement includes the following desired outcomes which are most relevant to this activity:

- Rangatiratanga (Chieftainship) is recognised in the management of nga taonga iho (the treasured resources).

- Take tupuna (inherited rights) are recognised as being central to the management of nga taonga tuku iho (the treasured resources)
- Tangata whenua and Nelson City Councillors and staff maintain a good working relationship.
- The mauri (life force) and wairua (spirit) of nga taonga tuku iho (the treasured resources) is maintained and enhanced by tangata whenua.
- Nga tangata (the people) are healthy and able to maintain a good quality of life.
- Indigenous flora and fauna are maintained and enhanced for present and future generations.

Other Iwi management Plans include:

- Pakohe Management Plan 2015: (Ngāti Kuia) – Kaupapa (purpose) of the Pakohe Management Plan He Taonga Pakohe tuku iho - Mai ngā tūpuna ki ngā mokopuna (Maintaining our whakapapa and historical connections to Pakohe for today and for future generations and for managing its sustainable use forever).
- Iwi Management Plan 2002: (Ngāti Koata) – The primary purpose of this IMP is to provide a means by which Ngāti Koata are properly and fully considered in decision-making affecting their interests in Te Tau Ihu.
- Environmental Management Plan 2018: (Ngāti Tama) – The purpose of this plan is to highlight Ngāti Tama aspirations for managing ancestral whenua, awa, wāhi tapu and wāhi taonga in the Ngāti Tama rohe (from Whangamoa in the east to Kahurangi in the west).
- Te Tau Ihu Mahi Tuna (Eel Management Plan) 2000: (All iwi) – To ensure the sustainability of the eel fishery through good management which provides for a customary, recreational and commercial harvest.
- Piopioia Te Ao Turoa Ngāti Rārua Environment Strategy 2021

Long Term Plan 2024-34

This Plan supports Council in the development of the Long Term Plan 2024-34 by providing the justification for budget forecasts put forward in the Draft Long Term Plan for the flood protection activity. The AMP presents the recommendations of the authors for the future operations, maintenance and capital works necessary to meet the levels of service for the activity, and the Long Term Plan consultation is the means for the community and Council to provide direction on priorities and affordability for the next ten years.

Annual Plans

On an annual basis Council reviews the work programme and budgets for the following year and when changes are required Council will prepare an Annual Plan for public submissions. The Proposed Annual Plan is measured against the current AMP work programmes and priorities before being adopted.

Nelson Tasman Future Development Strategy

In response to the previous National Policy Statement on Urban Development Capacity 2016, Council and Tasman District Council (TDC) jointly adopted the Nelson Tasman Future Development Strategy (FDS) in 2019. The NPS-UD 2020 required Councils to review their first generation FDS and an updated FDS was adopted by both Councils in 2022. The strategy sets out how the combined region intends to plan for its future housing capacity to accommodate projected growth in population and households, as well as the attendant business and other demands this growth will bring. The potential impact on stream and river flows should be largely mitigated through stormwater treatment and attenuation required under the NTLDM 2020,

Nelson Tasman Land Development Manual (2020)

The NTLDM 2020 has replaced the Nelson City Council Land Development Manual 2010. The NTLDM 2020 sets out Council's engineering requirements for developments under the NRMP and is the basis of Council's requirements as a network utility operator under the Building Act 2004. This ensures the quality of assets that vest in Council are of a standard that the community can depend on and benefit from critical infrastructure providing safe and smart transport, water, wastewater, stormwater, flood protection and reserves and open space.

The new manual was developed jointly with Tasman District Council and community stakeholders and has been subject to a public notification and submission process. A plan change has been effected to reference the NTLDM 2020 in relevant sections of the NRMP, and the new NTLDM 2020 will also be referenced in the Whakamahere Whakatū Nelson Plan.

A major component of the NTLDM 2020 is the revised stormwater and flood protection section. A stronger emphasis on stormwater quality through treatment for high contaminant generating surfaces, on-site detention, and ground discharge have been included to improve freshwater outcomes and limit any increases in urban stream flood flows.

This manual is also supported by the following Practice Notes:

- Inundation Practice Note
- Wetland Practice Note
- Bioretention Practice Note

NCC Sustainability Policy (2008): Embeds a culture of sustainability into all areas of Council by having an overarching policy to be given effect through Council decisions, strategies, plans and actions and against which future Council actions will be evaluated. This policy was supported by a Sustainability Action Plan (2008 – 2011).

Biodiversity Strategy: The strategy provides principles for biodiversity management action. These underpin council wide actions and are recognised as inputs into the flood protection and stormwater activity.

Esplanade and Foreshore Reserves Management Plan: Identifies the issues relating to the management of reserves adjacent to water bodies. An important link to stormwater management.

Parks and Reserves Activity Management Plan(s): Recognises the shared interest in developing stormwater management wetlands throughout the city. This plan is relevant to the development of the new Stormwater Quality Improvement Strategy referred to above. These initiatives are intended to improve freshwater quality in streams and rivers.

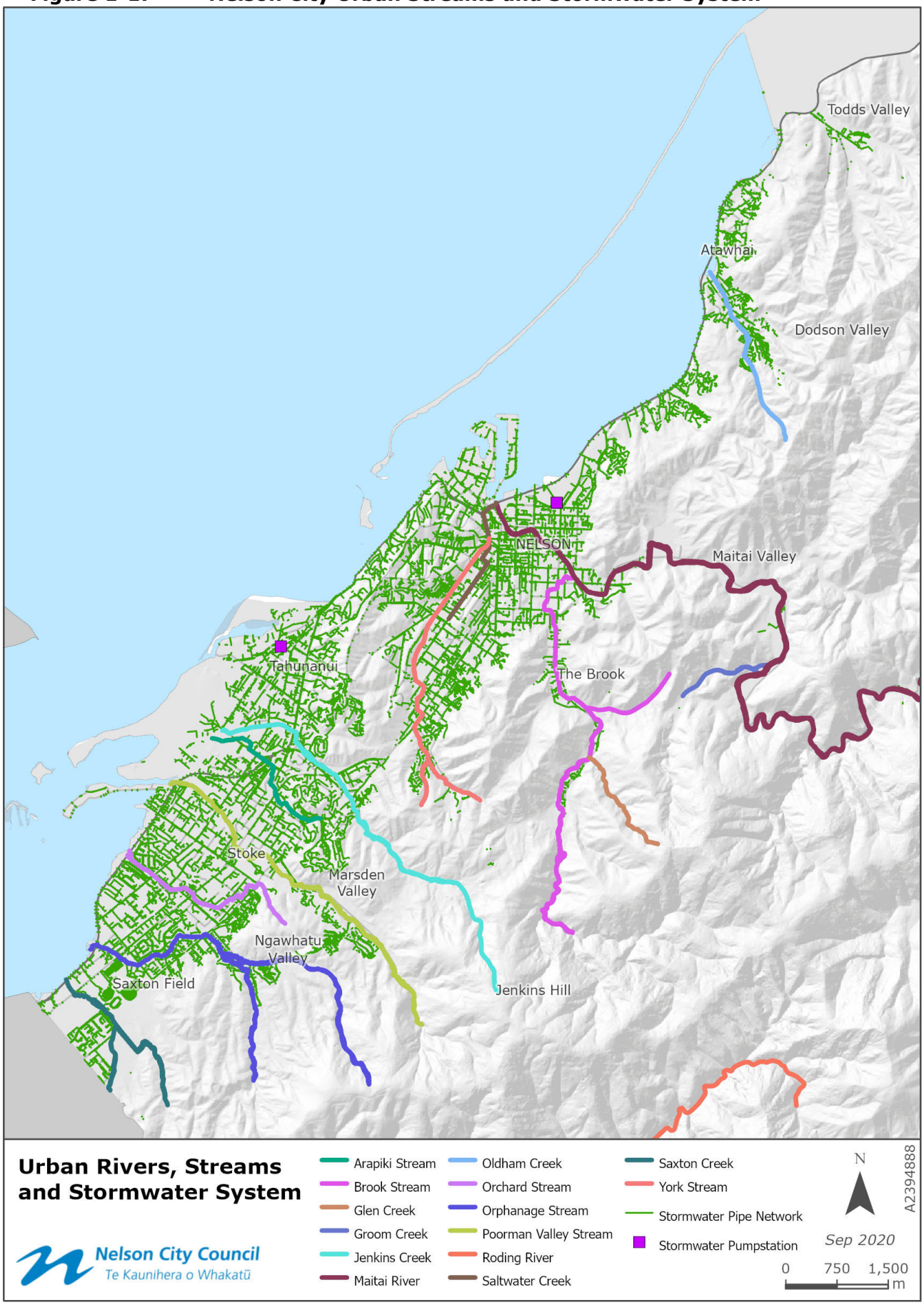
1.1.3. Infrastructure assets included in the plan

The Nelson City Council Flood Protection system can be categorized into two parts – natural and constructed components. In many urban catchments, the network covered by the activity is located downstream of the stormwater network, and constitutes the receiving freshwater environment for stormwater discharges. The natural part of this system consists of rivers and streams that play an important role in the support of aquatic ecosystems, recreation and the channelling of flood flows in rainfall events.

The constructed flood protection network includes the larger stream culverts and constructed channels through which steams flow, grade control structures, flood gates, weirs, energy dissipators, channel bank retaining structures, flood detention basins, fish passage assets and gravel traps. It should be noted that where stream culverts run under, or adjacent to, roads or highways, the asset may be an NCC Roading or Waka Kotahi asset.

The extent of the Nelson City Council Flood Protection system (streams and rivers) is shown in Figure 1-1 and discussed in section 4.1 – Background Data of this Plan. This includes the inventory of public Flood Protection services and assets owned by Nelson City Council and managed by the Infrastructure Group as at June 2023.

Figure 1-1: Nelson City Urban Streams and Stormwater System



1.1.4. Key partners and stakeholders in the plan

The plan recognises the following external and internal key partners and stake holders:

Table 1-1: Key Partners and Stake Holders

Key Partners and Stakeholders	Main Interests
Key Partners	
Tangata Whenua comprising of regional iwi	Environment, cultural heritage
Tasman District Council	Cross boundary watercourses.
Nelson City Council	Stormwater
External Partners and Stakeholders	
Residents and ratepayers	Public health and safety, service reliability, environment, cost
Industrial and commercial users	Service reliability, environment, cost
Nelson Marlborough District Health Board	Public health and safety, environment
Government agencies (MoH, MfE, Audit NZ)	Public health and safety, service reliability, environment, cost
Consultants, Contractors and suppliers	Procurement, technical, projects
Internal Stakeholders	
Councillors and Sub-committees	Public health and safety, service reliability, environment, cost
Nelson City Council (unitary authority)	Science & Environment, hydrology, freshwater values.
Nelson City Council (unitary authority)	Transport
Nelson City Council (unitary authority)	Parks & Reserves
Nelson City Council (unitary authority)	Environmental management (in particular land use planning)
Nelson City Council (unitary authority)	Strategic Planning (In particular Climate Change Business Unit)

1.1.5. Organisation structure

Council has an activity based structure with operations, maintenance and asset management functions for flood protection assets provided by separate Operations and Asset Management teams. Capital projects are managed by specialist project managers in a separate service delivery team.

The day to day operation and maintenance of the network is carried out by an external contractor managed by the Utilities Operations Manager. Asset management functions are undertaken by separate activity engineers, analysts and support staff, overseen by the Utilities Activity Manager.

1.2. Climate Change

Climate change is a significant and urgent international, national, and local issue. At a local level, Nelson City Council has a key role to work with the community towards creating a resilient and low emissions future and implementing adaptive measures to manage and minimise risk.

1.2.1. Leadership

At an Extraordinary meeting of Council on 16 May 2019 Council considered the issue of climate change and the role Council and the community could play in mitigating and adapting to the challenges it presents. The meeting resolution was in five parts. Parts 1 and 3 are as follows:

1. *(Council) Publicly declares that the world is in a state of climate emergency that requires urgent action by all levels of government; that human-induced climate change represents one of the greatest threats to humanity, civilisation, other species, and the life-supporting capacity of air, water, soil, and ecosystems; and that it is possible to prevent the most harmful outcomes, if societies take sustained emergency action, including local councils.*

3. *(Council) Commits to examine how Council's plans, policies and work programmes can address the climate emergency and ensure an emergency strategy is embedded into all future Council strategic plans.*

This Plan identifies the work programmes that will be required for the flood protection activity to support the resolution.

1.2.2. Climate change effects on the Flood Protection Activity

The key climate change effects that will impact on Council's flood protection assets are sea level rise and more intense storm rainfall associated with a warmer climate and the higher moisture retention capacity of the atmosphere.

Refer to section 5.2 – Risk Assessment for more specific detail.

Sea level rise

Sea level rise is one of the biggest climate challenge for Nelson as a large proportion of our urban infrastructure is coastal or low lying. These areas will become more vulnerable to coastal inundation (flooding) over time.

For the community, the main impacts will be the more regular inundation of areas around The Wood, the CBD (including Halifax, St Vincent, Vanguard, Gloucester and Rutherford Streets). Areas on the open coast that are more exposed to coastal swell such as the Glen, Wakefield Quay/ Rocks Road, Tahunanui and Monaco will be subject to increasing coastal inundation and erosion hazard associated with sea level rise.

Heavy rainfall and flooding events

Higher intensity rainfall events will result in an increase in stormwater and stream flows. The implications for the community is that without mitigation of these effects, they may experience more regular and extensive flooding from streams, rivers and stormwater overflows. The increase in storm rainfall intensity will also result in higher sediment volumes entering the stormwater network and stream channels which is expected to increase maintenance requirements over time especially for lower velocity sections of the network where higher rates of accretion (accumulation of silt and gravel) is likely to occur.

Stream and river flood mapping is shown on the Council's online map viewer. This mapping shows present day flood extents as well as predicted future flood extents allowing for climate change effects. Recent flood mapping assumes temperature increase and sea level rise will follow the Representative Concentration Pathway 8.5 (RCP 8.5M).

Drought and extreme temperatures

With a warmer climate, the temperature of the water within our Rivers and Streams will increase. This will have a negative impact on the stream health and biodiversity, and may lead to a proliferation of aquatic weeds and algae as well as the emergence of new pest plants better adapted to warmer temperatures.

For the flood protection activity the main issues will be along open channels including drains, streams and rivers, as well as ponds which retain standing water.

Refer to the Environment Activity Management Plan for more specific detail.

1.2.3. Climate Change Adaptation

Climate change adaptation relates to responding to the impacts of climate change.

Strategies and standards are in place or in progress to identify optimal solutions for responding to the risk of increased flooding and secondary flows associated with temperature warming and sea level rise.

- The NTLDM 2020 requires that new river or stream channels are designed to meet a specific level of service projected for 2090 and assuming a Representative Concentration Pathway 8.5 (RCP 8.5) scenario. Generally speaking, all flood protection projects contribute to climate change adaptation to some degree.
- Flood Management Plans that consider catchment flood flows and stream / river overflows out to 2130. Prioritisation of response options follows a risk based approach that gives consideration to the potential for nature-based solutions and allows for some flexibility in the level of service and design life for assets that may be different than for stormwater design. The aspirational target is to meet the 1% AEP flow capacity standard for 2090 that is set in the NTLDM 2020.
- Major projects included within this Plan that contribute to climate change adaptation include:
    - Current/Ongoing Major Projects
        - Saxton Creek Upgrade (Expected completion 2023/24)
        - Maitai Flood Mitigation Project
        - Flood Recovery Programme (Gravel removal)
        - Flood Recovery Programme (Stream bank erosion)
        - Flood Recovery Programme (River Stream Improvements)
    - New Projects
        - Todds Valley Stream Upgrades
        - Oldham Creek Upgrades
        - Jenkins Creek Upgrades
        - Brook Stream Catchment Improvements
        - Wakapuaka Flats Drainage Upgrades
        - Rural Rivers Upgrades

1.2.4. Climate Change Mitigation

The flood protection activity is part of the wider community commitment to reducing greenhouse gases, which are measured and monitored through the Council's Certified Emissions Measurement and Reduction Scheme (CEMARS – now called Toitū Envirocare) Action Plan.

In August 2020 Council committed to adopting the 5 year emissions reduction budgets to be developed and confirmed by Central Government at a national level in 2021. This commitment is to ensure that by 2025, Council realises measurable positive change towards achieving carbon zero status. Longer term the Council has also adopted the Government targets for Council's own greenhouse gas emissions reductions (i.e., net zero emissions of all GHGs other than biogenic methane by 2050, and a 24 to 47 per cent reduction below 2017 biogenic methane emissions by 2050, including 10 per cent reduction below 2017 biogenic methane emissions by 2030. These targets are intended to be achieved through the development and implementation of a Council wide 'Emissions Reduction Action Plan'.

The Flood Protection activity accounts for a negligible share of overall Council emissions as it does not currently include any facilities, such as pumping stations, that require a power source to operate. The carbon footprint of the activity is therefore limited to the production of materials that are used to maintain, create or renew assets. Generally the accounting of associated emissions is undertaken by the product manufacturer

Mitigation Actions:

Given that the production of materials for flood protection works is the sole existing source of emissions for this activity, it is expected that a range of materials should be considered for flood protection works, with a view to adopting materials which have a lower carbon footprint where these fulfil performance and durability criteria.

Whilst it is not anticipated that Council would need to account for the associated emissions (undertaken by the product manufacturer), this should be considered at design and procurement stages of a Flood Protection project.

The selection of materials with low carbon footprint is expected to apply across Council projects generally, and it is expected this will feed into the Councils overall Emissions Reduction Action Plan.

1.2.5. Climate Change Planning Assumptions

In order to frame the activity response to climate change the following assumptions have been made:

- Representative Concentration Pathway of 8.5 will be used to guide the climate change response in line with the Nelson Tasman Land Development Manual adopted by Council in 2020. This will be reviewed as climate change monitoring and assessment techniques develop over time.
- Sea level rise by 2090 will be approximately 0.86m including allowance for land subsidence (NZ SeaRise projections 2022, SSP 8.5M).

- The contribution of renewable energy sources to the national grid will progressively increase over time (currently targeting 90% renewable energy by 2025). This is expected to contribute to a steady reduction in the carbon footprint of Council assets that draw on mains power.
- Construction materials and techniques will be available that meet net zero GHG emissions by 2050.
- The community will confirm appropriate levels of service and affordability limits that support the Council resolution.
- Council will undertake investigations of the impacts of climate change on the Nelson City geographical area.

- Defend, Retreat or Accommodate: For the purpose of planning over the next 30 years, it is assumed at this stage that investment will continue in low-lying areas that are subjected to coastal and flooding inundation. Following notification of the Housing Plan Change 29, it is anticipated that new development in low lying urban areas will be designed to be resilient to flooding out to 2130.
- A Climate Change Adaptation Framework will be developed to inform adaptation responses for existing development in these areas.
- Finance Assumptions: Nelson City Council will seek co-financing where available from Central Government towards implementation of works.

1.2.6. **Community Engagement**

Community engagement on flood risk and response options is planned for the following:

- Statutory consultation for the Long Term Plan and Annual Plans.
- Whakamahere Whakatū Nelson Plan consultation on natural hazards overlays (including flood maps) and provisions (Objectives, Policies, Rules and Methods).
- Maitai Flood Management Options: Consultation was undertaken in 2021 on the flood risk to the city and high level adaptation options.
- Flood Management Plans: Consultation on flood management in other catchments will be undertaken in subsequent years, following a risk based approach.
- Notification of resource consents where required.
- Coastal Hazard Adaptation: Consultation is to be undertaken with the wider community on this significant issue, led by the Climate Change Business Unit.

1.2.7. **Knowledge Gaps**

- Adaptation Strategy identifying long term adaptation responses for each coastal area of the city.
- Data collection (stream recorders, flow and water level recorders, groundwater monitoring sites).

- Secondary flow path mapping generated by stormwater network hydraulic models.
- Pest weed management under warmer climates.
- Freshwater quality issues under a warmer climate.

1.3. Goals and objectives of asset ownership

1.3.1. Reasons and justification for asset ownership

Council is responsible for the provision of reticulation, treatment and disposal along with strategic planning and management functions. Council also has a role in regulation and enforcement of the existing legislative and regulatory framework (including bylaws) to ensure members of the community act appropriately.

History of Nelson City Council Stormwater and Flood Protection

The Nelson City Council has been responsible for stormwater and flood protection in the city since the first piped combined stormwater/sewer disposal system was placed in approximately 1907. The city has subsequently expanded by amalgamation of adjoining areas. The Tahuna Board joined the City in 1950, Stoke was transferred from Waimea County Council in 1958, Atawhai in 1968. Whangamoa Riding and the South Nelson area from Saxton Road to Champion Road were further additions to the city in 1989.

The role of Council in providing Flood Protection services

The Nelson City Council manages the provision of the public flood protection network for the residents of Nelson City in a way that minimises damage to most urban properties and roads from flooding and erosion, and protects the natural environment.

1.3.2. Links to organisation vision, mission, goals and objectives

Vision:

Our vision for Whakatū Nelson is a creative, prosperous, and innovative city. Our community is inclusive, resilient, and connected – we care for each other and our environment.

Community outcomes:

Councils are required by the Local Government Act 2002 to have Community Outcomes – a statement of the measures of success that Council is working to achieve for the community. Council has eight current community outcomes in the Long Term Plan 2024-2034 that are summarised below.

- Our unique natural environment is healthy and protected
- Our urban and rural environments are people-friendly, well planned, accessible and sustainably managed
- Our infrastructure is efficient, resilient, cost effective and meets current and future needs
- Our communities are healthy, safe, inclusive and resilient
- Our region is supported by an innovative and sustainable economy

- Our communities have opportunities to celebrate and explore their heritage, identity and creativity
- Our communities have access to a range of social, cultural, educational and recreational facilities and activities
- Our Council provides leadership and fosters partnerships, including with iwi, fosters a regional perspective, and encourages community engagement

Of these eight the first four have direct links with the flood protection activity and are discussed in more detail in the Levels of Service section.

Council Priorities

Council has the following three priorities for the development of the city for the period covered by this Plan. These form the high level strategic direction for the activity:

- **Support our communities to be prosperous, connected, and inclusive:** The flood protection activity is critical to the residents and business activities in the city. Good operation and maintenance of the network plus timely asset renewals and upgrades to maintain capacity underpin this activity.
- **Transform our city and commercial centres to be thriving, accessible and people-focused:** The CBD is the heart of the city and ensuring business and residential activities have adequate flood protection services to be successful and grow is very important to council's long term strategy.
- **Foster a healthy environment and a climate resilient, low-emissions community:** Council is encouraging the community to transition to more sustainable modes – choosing active transport (including walking, cycling, skateboarding, riding scooters), and public transport more often for their journeys. This will support social and environmental wellbeing and reduce the city's greenhouse gas emissions. Urban roads are often utilised as secondary flow paths for stream overflows, and an opportunity presents itself to make more use of road reserves as corridors for green infrastructure to provide freshwater quality benefits.

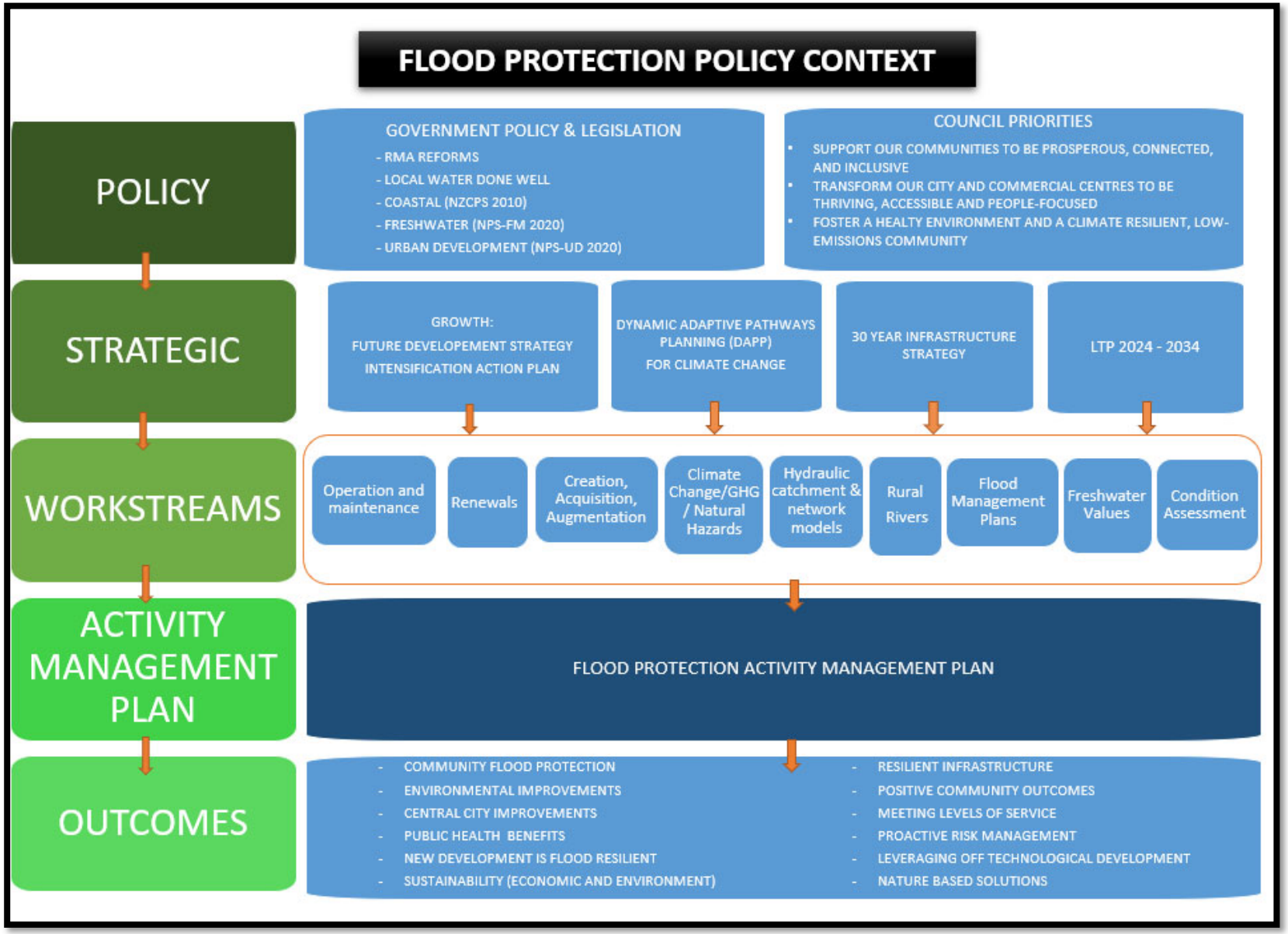
1.3.3. Plan framework and key elements

The framework of this Plan for 2024-34 follows the generic layout identified in section 4.2 of the International Infrastructure Management Manual 2015.

The plan has the following key elements:

- Why we need a plan (Introduction)
- What we provide (Levels of service)
- Planning for the future (Future demand)
- How we provide the service (Lifecycle management)
- Dealing with uncertainty (Risk management plan)
- What it will cost and how we pay for it (Financial summary)
- What we're doing to improve (Plan improvement and monitoring)

Figure 1-2: Flood Protection Policy Context



1.4. Asset Management Maturity

Asset Management is recognised as a critical component of Infrastructure Management globally and this sector has benefited from initiatives to formalise the practice of asset management since November 1996. The Association of Local Government Engineering New Zealand (Inc) and the Institute of Public Works Engineering of Australia (IWPEA) have lead the development of the International Infrastructure Management Manual (IIMM) that forms the basis of Infrastructure Asset Management Practices at Nelson City Council.

The IIMM provides an Asset Management (AM) Maturity Index. The Nelson City Council Asset Management Policy sets the level of maturity per activity. Refer to Section 8 of this Plan: Improvement and Monitoring – Status of AM Practices section for details about this activity's current maturity status and target levels of maturity.

2. Levels of service

Activity management plans set out the level of service Council seeks to provide the community for the respective activity.

Levels of service are the standards Council aims to meet when providing a facility or service in support of community outcomes. They are the measurable effect or result of a Council service, described in terms of quality, quantity, reliability, timeliness, cost or similar variables.

It should be noted that levels of service are not intended as a formal customer contract, rather, Council's responsibility is initially to aim to achieve these levels and then to achieve them more cost effectively through a process of improvement where it can be met within current budgets.

The levels of service provision for the flood protection activity, the current performance, and the performance measures and targets by which these will be assessed are defined in this section. Performance measures that are included in the Long Term Plan are reported on quarterly, through the Infrastructure Quarterly Report, and annually, through the Annual Report.

This section also contains information on customer research undertaken, strategic and corporate goals and the legislative requirements adhered to in arriving at the levels of service. Changes to the levels of service may significantly change funding requirements in some instances.

Council uses the Significance and Engagement Policy to determine the level of engagement required for a particular issue e.g. levels of service change.

2.1. Customer research and expectations

While the Long Term Plan consultation process incorporates the levels of service associated with the flood protection activity, Nelson City Council has also undertaken a range of consultation processes in the past specifically targeted at gathering information on preferred levels of service or the extent of infrastructure that Council has/will be required to install. The extent of the historical and additional proposed consultation is detailed in Table 2-1 below.

Table 2-1: Flood Protection Consultation Processes

Consultation Processes	Date/ Frequency	Reasons for Consultation	Extent of Consultation	Applicable to which Customer Value
Historical and Proposed				
Residents' Survey	Most years since 1998	Rate satisfaction with services provided by Council.	300-400 residents surveyed by telephone.	N/A
Long Term Plan process	Every 3 years	Legislative requirement criteria of Local Government Act 2002.	Public, business and Industry submissions requested. Advertising in local papers.	Sustainability Reliability Capacity Responsiveness
Annual Plan process	Each year that changes to the Long Term Plan are proposed	Legislative requirement criteria of Local Government Act 2002.	Public, business and Industry submissions requested. Advertising in local papers.	Sustainability Reliability Capacity Responsiveness

Residents' Surveys

Council has been carrying out residents' surveys to measure satisfaction with its work since 1997. These surveys help the Council gauge how well the community supports its direction and priorities, and the results are used to inform how the Council delivers services.

Gathering the views of the broader resident population is important so as to engage with residents who may not normally provide feedback. An independent research company is commissioned to carry out the survey. Usually, around 400 people are selected at random and surveyed. To ensure most interests of the community are reflected, the company seeks a sample that is representative of Nelson's demographics.

Longer twenty-minute surveys are undertaken prior to Long Term Plan years to inform decision making in these Plans such as the one undertaken in the 2020 year. Results are reported to Council annually and available on the Council's website. Refer to Figure 2-1 for survey results since 2011.

2014 Residents' Survey

31% very satisfied or satisfied with Flood Protection. Issues identified with Flood Protection were: too much flooding, Council were not doing enough in response to this issue, more protection needed, limited help during flooding.

2015 Residents' Survey

A residents' survey was not carried out in 2015

2016 Residents' Survey

The 2016 residents' survey did not seek feedback on the Flood Protection activity.

2017 Residents' Survey

35% very satisfied or satisfied with Flood Protection. Issues identified were: too much flooding, Council not doing enough, more protection needed, the feeling there is limited help and facilities to deal with flooding.

2018 & 2018/2019 Residents' Survey

The 2018 & 2019 residents' survey did not seek feedback on the Flood Protection activity.

2019/2020 Residents' Survey

56% very satisfied or satisfied with Flood Protection. This shows a stepped increase in resident satisfaction from previous years as shown in the figure below. The increase also applied to Stormwater, Water Supply and Wastewater as well as solid waste collection. It should be noted that levels of satisfaction for flood protection were lower than for the other activities referred to above.

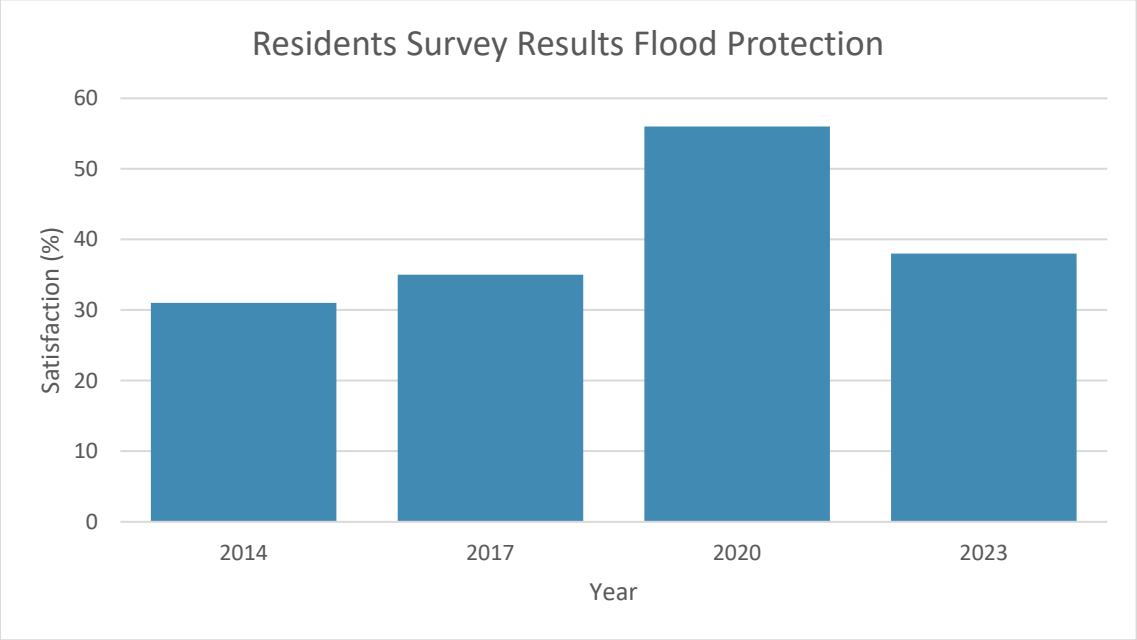
2020/2021 and 2021/2022 Residents' Surveys

The 2020/2021 and 2021/2022 residents' surveys did not seek feedback on the Flood Protection activity.

2023 Residents' Survey

38% very satisfied or satisfied with Flood Protection. The 2023 residents' survey did not seek specific feedback on the Flood Protection activity.

Figure 2-1: Resident Survey of Satisfaction with Services



Long Term Plan

Every three years Council sets out the proposed plans for the provision of services to the community for the next ten years. The long term plan covers the operation of the flood protection activity including the reasons for undertaking the activity, levels of service, description of major projects, financial projections and any key risks that have been identified.

Annual Plan

When variations to the long term plan are proposed by Council the Local Government Act requires these be set out in an annual plan for public consultation.

2.2. Strategic and corporate goals

Community Outcomes

Councils are required by the Local Government Act 2002 to have Community Outcomes - a statement of the measure of success that Council is working to achieve for the community. Nelson City Council's community outcomes are set out in the Long Term Plan 2024 - 2034. The following Community Outcomes are relevant to the flood protection activity.

Table 2-2: Link between Community Outcomes and the Activity

Community Outcome	How this Council activity contributes to the Community outcome
Our unique natural environment is healthy and protected	Nelson's environment is protected by an efficiently managed flood protection network that minimises damage to the modified and natural environment from rainfall events. Works to support the flood protection assets are managed as far as possible to respect the natural, recreational and heritage values that might be present. Further work under this plan will be undertaken to improve freshwater outcomes to better align with policies in the NPS-FM and the targets set in the Whakamahere Whakatū Nelson Plan.
Our urban and rural environments are people-friendly, well planned, accessible and sustainably managed	New development takes into consideration future flood risk and protection of existing development from flooding is prioritised following a risk based approach. New flood mitigation projects incorporate nature-based solutions where this aligns with the Goal of the Flood Protection Activity
Our communities are healthy, safe, inclusive and resilient	Homes, facilities and people are protected from the adverse effects of rainfall events by resilient design for new development and a well-managed flood protection network. Flood risk assessment includes consideration of public safety, and design of upgrades allows for future climate change.
Our infrastructure is efficient, resilient, cost effective and meets current and future needs	A good quality, sustainable and affordable flood protection network is achieved through regular inspections, condition assessment and maintenance. Capital investment follows an established business case process.

The community outcomes have been developed to provide a link between community issues and the current goal for this activity.

Table 2-3: Goal of the Flood Protection Activity

GOAL OF THE FLOOD PROTECTION ACTIVITY
Provide a flood protection system that will prevent harm to people and property where this is feasible and affordable, contribute to community wellbeing and protect the environment from harm related to in-stream flood protection works.

This Plan will also be reviewed in conjunction with the Stormwater Activity Management Plan. The stormwater system can have a significant impact on stream flows within urban areas, as well as the freshwater environment generally.

2.3. Legislative requirements

Legislative requirements form the minimum level of service that Council is required to provide.

The Flood Protection activity is influenced by the following legislative requirements:

The Local Government Act:

The Local Government Act 1974: Provides the authority for Nelson City Council to construct, operate and maintain the Wastewater, Water and Stormwater System. Certain flood protection assets are likely to be interpreted to be part of the stormwater system under this legislation.

The Local Government Act 2002: Defines the purpose of local authorities as enabling local decision-making by and on behalf of the community.

The Nelson City Council is a local authority established under the Local Government Act 2002 (the Act) with purpose and responsibilities set out in the Act, in particular:

10 Purpose of local government

(1) The purpose of local government is-

(a) to enable democratic local decision-making and action by, and on behalf of, communities; and

(b) to promote the social, economic, environmental, and cultural well-being of communities in the present and for the future.

14 Principles relating to local authorities

(1) In performing its role, a local authority must act in accordance with the following principles:

(h) in taking a sustainable development approach, a local authority should take into account-

(i) the social, economic, and cultural well-being of people and communities; and

(ii) the need to maintain and enhance the quality of the environment; and

(iii) the reasonably foreseeable needs of future generations.

5 Interpretations

good-quality, in relation to local infrastructure, local public services, and performance of regulatory functions, means infrastructure, services, and performance that are—

(a) efficient; and

(b) effective; and

(c) appropriate to present and anticipated future circumstances

In 2010 an amendment to the Act (sec261B) required the Secretary for Local Government to make rules specifying non-financial performance measures for local authorities to use when reporting to their communities. These have been developed for flood protection and control works and are incorporated into the levels of service.

The Act also requires that local authorities take a sustainable development approach to everything they do.

The *Local Government (Community Well-being) Amendment Act 2019* led to significant changes to sections in Part 2 of the LGA 2002 - Purpose of local government, and role and powers of local authorities. A greater emphasis has been placed on democratic local decision making and the four well-beings whilst sections relating to core service provision have less prominence.

Resource Management Act 1991 and its Reform:

The Nelson Resource Management Plan (NRMP) is the operative plan established under the Resource Management Act 1991. Council seeks to operate the current network in compliance with this document. To that end Council holds a range of resource consents for both global and site specific activities.

The Resource Management Amendment Act sets out obligations to protect New Zealand's natural resources such as land, air, water, plants, ecology, and stream health. It includes requirements relating to resource consent processes, compliance & monitoring, and a new freshwater planning process for regional planning instruments such as Regional Policy Statements and Regional Plans. In addition, there are requirements relating to planning for climate change, including a requirement for Councils to have regard to emissions reduction plans and national adaptation plans under the Climate Change Response Act 2002 (as amended by the Climate Change Response (Zero Carbon) Amendment Act 2019).

The Resource Management (Natural and Built Environment and Spatial Planning Repeal and Interim Fast-track Consenting) Bill was given Royal Assent in December 2023. This legislation removes the previous government's Natural and Built Environments Act and the Spatial Planning Act and reinstates the Resource Management Act. Central Government have confirmed that a wider review of land use legislation will be undertaken and future changes are expected.

- The Climate Adaptation Act is intended to address complex issues associated with managed retreat and financing adaptation. The content of the proposed Climate Adaptation Act was not available to Councils prior to compiling this Infrastructure Strategy, therefore the implications from this legislation will need to be considered once available.

Soil Conservation and Rivers Control Act 1941: This legislation established drainage districts and catchment boards. Council has the responsibility for the catchment board duties in Nelson. Section 126 confirms these as follows: *"It shall be a function of every Catchment Board to minimise and prevent damage within its district by floods and erosion."* This legislation is dated, but still relevant to the Flood Protection Activity, and the river management activities of Regional Councils and Unitary Authorities generally.

Climate Change Response Act 2002 (and Climate Change Response (Zero Carbon) Amendment Act 2019)

Puts in place a legal framework to support New Zealand to respond to climate change and meet its international obligations. It also established the New Zealand Emissions Trading Scheme.

In 2019 the Act was amended by the Climate Change Response (Zero Carbon Amendment Act 2019, which:

- Set a new domestic greenhouse gas emissions reduction target for New Zealand to reduce net emissions of all greenhouse gases (except biogenic methane) to zero by 2050
- Established a system of emissions budgets to act as stepping stones towards the long-term target
- Required the Government to develop and implement policies for climate change adaptation and mitigation
- Established a new, independent Climate Change Commission to provide expert advice and monitoring to help keep successive governments on track to meeting long-term goals.

Acknowledging the need for urgent action, Council declared a climate emergency in May 2019. Council adopted Te Mahere Mahi a te Āhuarangi Climate Action Plan in 2021, a living document which outlines what Council is doing to address climate change over the next decade. In 2022, Council also began developing a Climate Change Strategy, which will set the long-term direction and guide Council and community investment in climate action.

Council is working with Tasman District Council on a regional climate change risk assessment, which will build a comprehensive picture of how climate change will impact the region.

Refer to section 1.2 for information on how this relates to the flood protection activity.

The Health Act 1956: places an obligation on Council to improve, promote and protect public health within the District. The provision of flood protection helps to promote and improve public health.

Health and Safety at Work Act 2015: Council must ensure the safety of the public and all workers (including contractors) when carrying out works.

New Zealand Coastal Policy Statement

The New Zealand Coastal Policy Statement (NZCPS 2010) guides local authorities in their day to day management of the coastal environment, including managing discharges to water in the coastal environment.

Policies 24 through to 27 relate to coastal hazards and set a timeframe of at least 100 years for considering coastal hazard risk for land use planning purposes. Policy 25 requires that any new developments within areas potentially affected must avoid increasing the risks associated with coastal hazards.

The NZCPS and the NPS-FM are inextricably linked because the discharge of freshwater from rivers and groundwater to the coastal environment can have adverse effects on recreational, cultural and ecological values at the coast.

National Policy Statement on Urban Development

The National Policy Statement on Urban Development 2020 (NPS-UD) replaces the NPS-Urban Development Capacity 2016 and requires local authorities to open up more development capacity, so more homes can be built in response to demand. One of the NPS-UDs objectives is that regional policy statements and district plans enable more people to live in, and more business and community services to be located in, areas of an urban environment near a city zone or other area with employment opportunities. In particular this includes areas well serviced by existing or planned public transport, and where there is a high housing demand. Nelson City Council has been assessed as a Tier Two Urban Environment in conjunction with the Tasman District Council which means that it must ensure there is sufficient development capacity to meet demand in the urban environment in the short term (within 3 years), medium term (3-10 years) and long term (10-30 years). Short-term capacity must be zoned and infrastructure ready, while medium-term must either be ready or have funding for adequate infrastructure identified in the Long Term Plan.

Action for Healthy Waterways Package

The Action for Healthy Waterways package includes amendments to the Resource Management Act, a new NPS for Freshwater Management, new regulations around the measurement and reporting of water takes, an updated proposal for National Environmental Standard for Sources of Human Drinking Water, and new National Environmental Standards for Freshwater and proposed standards for Wastewater.

Key changes:

- Speed up the implementation of freshwater regulations through amendments to the RMA
- Change the hierarchy of obligations towards water management, so that the first priority is maintain the health of the waterway (known as Te Mana o Te Wai)
- Set and clarify policy direction to bring our freshwater to a healthy state within a generation in a new National Policy Statement for Freshwater Management (NPS-FM)
- Raise the bar on freshwater ecosystem health by introducing new attributes and requirements in the NPS-FM to protect threatened species and habitats Refer to the section below on the NPS-FM 2020.
- Support the delivery of safe drinking water through amending the National Environmental Standard for Sources of Human Drinking Water
- Better manage stormwater and wastewater to stop things getting worse and improve freshwater health in a generation, through new regulations and potentially new legislation
- Increase Māori participation in water management

- Improve farming practices where needed to stop things getting worse and improve freshwater health in a generation, through new National Environmental Standards for Freshwater and regulations.
- The Government proposes to require stormwater network operators to prepare a risk management plan (RMP). This is similar to the proposal for wastewater operators, but would address specific stormwater risks, including at a minimum:
    - Meeting stormwater discharge resource consents and/or permitted activity requirements
    - Ensuring public health risks associated with stormwater are managed where community values exist, such as for recreation or mahinga kai
    - Proactively managing the risk of flooding in and around buildings and habitable areas (which will be exacerbated by climate change).

National Policy Statement for Freshwater Management 2020

The NPS-FM 2020 replaces the NPS-FM 2014 (amended 2017). This National Policy Statement sets out how Councils will manage water quality and quantity. The Freshwater NPS 2020 is one of several pieces of national direction for managing New Zealand's freshwater. National Environmental Standards for Freshwater and RMA Section 360 regulations for stock exclusion are also being introduced. Guidance to support the implementation of these new rules and regulations will be released as they come into force. New requirements of the NPS-FM relate to:

- Manage freshwater in a way that 'gives effect' to Te Mana o te Wai: This is a concept that refers to the fundamental importance of water and recognizes that protecting the health of freshwater protects the health and well-being of the wider environment.
- Improve degraded water bodies, and maintain or improve all others using bottom lines defined in the NPS.
- An expanded national objectives framework:
- Avoid any further loss or degradation of wetlands and streams, map existing wetlands and encourage their restoration.
- Identify and work towards target outcomes for fish abundance, diversity and fish passage over time.
- Set an aquatic life objective for fish and address in-stream barriers to fish passage over time.
- Introduce new attributes and requirements in the NPS-FM to protect threatened species and habitats.
- Monitor and report annually on freshwater (including the data used); publish a synthesis report every five years containing a single ecosystem health score and respond to any deterioration.

Treaty of Waitangi Land Claim Settlement Acts relevant to Te Tauihu:

Council acknowledges that Treaty of Waitangi obligations rest with the Crown and seeks to uphold the mana of the Treaty of Waitangi Settlements of Te Tauihu by continuing to build its relationship with iwi. There are numerous pieces of legislation under which Council operates that recognise the Treaty of Waitangi and recognise or acknowledge iwi and Māori.

Council believes that by working in partnership with iwi and Māori it will create benefits for the whole community.

Settlement Acts are designed to settle historical claims for breaches of Te Tiriti o Waitangi/Treaty of Waitangi. Settlements aim to resolve these claims by providing some redress to claimants. Redress may involve:

- An historical account of the Treaty breaches and Crown acknowledgement and apology
- Cultural redress
- Commercial and financial redress.

These settlements include Statutory acknowledgment that the eight iwi will potentially be considered as affected parties under section 95E of the Resource Management Act.

The Treaty of Waitangi Land Claim Settlement Acts relevant to Te Tauihu comprise:

I. The Ngāti Kōata, Ngāti Rārua, Ngāti Tama ki Te Tau Ihu, and Te Ātiawa o Te Waka-a-Māui Claims Settlement Act 2014

II. The Ngāti Apa ki te Rā Tō, Ngāti Kuia, and Rangitāne o Wairau Claims Settlement Act 2014

III. The Ngāti Toa Rangatira Claims Settlement Act 2014

Obligations under these Settlement Acts may impact works programmes in the Flood Protection AMP.

Outcomes from the Three Waters Review

The Three Waters Review looked at how to improve the management of drinking water, stormwater and wastewater (three waters) to address issues identified by the Havelock North Drinking Water Inquiry, and improve overall management of our water resources.

Central Government passed the Water Services Acts Repeal Bill on 13 February 2024. The bill (Act) repeals the previous governments Three Waters legislation. This Act restores local council ownership and control of water services, and responsibility for service delivery.

Local Water Done Well

Central Government also signalled that they will continue with three water reforms through a programme of legislation headed 'Local Water Done Well'. Implementation of this programme will be through two further bills to be introduced to Parliament.

The first bill (Local Government (Water Services Preliminary Arrangements) Bill) is expected to be passed by the middle of 2024 setting out '…provisions relating to council service delivery plans and transitional economic regulation. It will also provide streamlined requirements for establishing council-controlled organisations under the Local Government Act 2002, enabling councils to start shifting the delivery of water services into more financially sustainable configurations should they wish to do so.'

The second bill is expected to be introduced in December 2024 and passed by the middle of 2025. This will set out – '…provisions relating to long-term requirements for

financial sustainability, provide for a complete economic regulation regime, and a new range of structural and financing tools, including a new type of financially independent council-controlled organisation.'

At this stage the second bill is also signalled to establish regulatory backstop powers, to be used when required to ensure effective delivery of financially sustainable and safe water services. Some amendments to the water regulator's legislation are also anticipated.

Central Government expect all legislation to support the implementation of Local Water Done Well will be passed by mid-2025.

The review has identified the need for a stand-alone water services regulator and the development of new entities to manage the water supply, wastewater and stormwater activities of councils.

On 1 March 2021, the Taumata Arowai – Water Services Regulator Act 2020 came into force.

The Act implements decisions to establish a new regulatory body – Taumata Arowai – which will be responsible for:

- administering and enforcing a new drinking water regulatory system (including the management of risks to sources of drinking water); and
- a small number of complementary functions relating to improving the environmental performance of wastewater and stormwater networks (developing standards and regulations then monitoring and enforcing compliance with them, and providing training)

Resource Consents for Flood Protection

Council seeks resource consents where required for all discrete operational activities and capital work projects. In addition two 'global' consents that were granted for stormwater and flood protection authorise activities that occur on a day-to day basis. With the separation of stormwater and flood protection functions, the consenting requirements for each of these activities will need to be reviewed against the current consents held by Council.

In 2009 a global consent (RM 075499) was granted for the discharge of stormwater into fresh water. This consent expires in 2044. The application was processed as a controlled activity and conditions were imposed relating to monitoring of runoff from urban catchments. Whilst this consent relates primarily to the Stormwater Activity, there are a number of flood protection assets that are likely to require this discharge consent.

In 2017 a further global consent (RM175025) was granted for stream and river repairs and maintenance across the city. A variation to this consent RM175025V1 was subsequently granted. This consent will remain in force until the proposed Whakamahere Whakatū Nelson Plan is notified at which point, the consent will need to be renewed. This consent applies primarily to the Flood Protection Activity, although there may be some channels within the stormwater network where this, or a similar consent will be required by the flood protection activity.

The resource consents held for the flood protection activity by Nelson City Council are detailed in Table 2-4 below. Consents for specific capital projects are excluded from this table.

Table 2-4: Flood Protection Resource Consents

Consent Number	Consent Type	Consent Expiry Date	Consent Allowance
RM 075499-V1	Discharge of stormwater to fresh water	19 February 2044	The discharge this consent authorises shall not cause in the opinion of Council's Monitoring Officer any of the following after a zone of reasonable mixing being a point which is 30 times the receiving water channel's width at the point of discharge downstream of the discharge point: (a) Significant adverse effects on aquatic life; (b) Adverse effects on human health; and (c) The maximum number of *E coli* shall not be increased by more than 550 E.coli/100 ml of ambient levels (as measured at a sampling point immediately upstream of the discharge point).
RM175025-V1	Land use consent for disturbance of rivers, including culvert and bridge maintenance works, deposition of material, vegetation removal, and gravel extraction throughout the Nelson Region for the purpose of maintenance and repair works	Expires on the date the relevant Regional Freshwater Rules in the Whakamahere Whakatū Nelson Plan become fully operative.	Only the amount of gravel necessary to maintain the efficient functioning of the river and/or structure shall be removed. The amount of gravel extracted shall be determined by the Council's River Engineer and certified by the Council's Monitoring Officer in consultation with the Consent Holder. The Consent Holder shall record the volume of all gravel removed and shall forward the records to the Council's Monitoring Officer annually on or prior to 30 April. Extraction volumes are to be submitted in "cubic metres solid measure". A multiplier of 0.8 shall be used to convert "truck measure" to "solid measure". The placement of rock protection and other suitable materials for the purpose of repairing bank erosion or to protect against bank drop outs that is undertaken to protect property and public safety shall be limited to the minimal distance required to prevent continued erosion and mitigate ongoing risk. Variation V1 to this consent allowed for use of other suitable materials. Any exposed river bank resulting from the works shall be re-grassed or planted in a manner that minimises erosion and enhances in-stream habitat. Preference shall be given to the planting of appropriate native riparian species.
RM 205095	To discharge hydroseed to land where it may enter water and sediment into water from works carried out under land use consent RM175025V1 and water permit RM175033.	Expires on the date the relevant Regional Freshwater Rules in the Whakamahere Whakatū Nelson Plan become fully operative	The Consent Holder shall advise the Council's Monitoring Officer in writing, at least 5 working days prior to works commencing on site. No application of hydroseed mix shall be undertaken within 0.5 metres of a flowing channel unless agreed by the Freshwater Ecologist approved in accordance with condition 16 of RM175025V1. Hydroseed shall only be applied during calm conditions and when no rain is forecast for the following 24-hour period. All hydroseed mix shall be certified as 100% biodegradable, with limited or no use of fertiliser. A maximum of 50 square metres of hydroseed mix shall be applied at each work site.

Consent Number	Consent Type	Consent Expiry Date	Consent Allowance
RM 205133	The discharge of herbicides in or near waterbodies within the Nelson Region to control invasive aquatic pest plants	Expires on 27 October 2035	The use of herbicides shall be limited to products with the following active ingredients: (a) Glyphosate; (b) Metsulfuron; (c) Triclopyr triethylamine; or (d) Imazapyr Refer to consent document for specific conditions
RM 175033	Water permit: to temporarily dam (with coffer dams) and divert rivers and install fish baffles and other fish passage enhancement structures throughout the Nelson Region This consent should be read in conjunction with the associated Land Use RM175025	Expires on the date the relevant Regional Freshwater Rules in the Whakamahere Whakatū Nelson Plan become fully operative.	***In-stream Works and Diversions:*** Machinery shall only work in the wet areas of any watercourse where it is the only practicable means of conducting the works. The Ecologist shall determine what flow levels work can be undertaken within. The duration of any diversion shall be based on advice from the Ecologist. Fish salvage and transfer prior to and during any work shall occur where required. Unless otherwise agreed by the Ecologist, the Ecologist shall monitor for the presence of migrating fish both prior to and during work and shall make provision for fish to bypass the site where necessary. Unless otherwise agreed by the Ecologist, the Ecologist shall inspect the sediment control measures immediately following their construction to ensure they are functioning properly and shall be on site when sediment control measures are decommissioned. The Consent Holder shall take all practicable measures, as determined by the Ecologist and approved by the Council's Monitoring Officer, to minimise sedimentation and increased turbidity of any river or stream. Any river diversion shall be carried out in accordance with best practice methodologies as determined by the Ecologist in order to maintain fish passage and minimise downstream sedimentation associated with the diversion.
RM 155171	Water permit to temporarily divert water	11 December 2050	Water permit associated with the construction of gravel traps (and the associated removal of gravel) in the beds of Poorman Valley Stream and Orphanage Stream.
RM 155428	To disturb the bed of Little Go Stream and extract gravel	20 January 2051	Activity can be done in association with the removal of accumulated gravel from the gravel trap and clearance of debris from the intake structure within the Stream. Activity also covered under RM175025 above.
RM 155138	Consent to authorise ongoing removal of aggregate from a gravel trap in Saxton Creek in relation to the stage two Saxton Creek flood capacity upgrade.	2 July 2050	The maximum quantity of aggregate removed from the gravel trap shall not exceed 350 m3 per gravel extraction operation. Activity also covered under RM175025 above.
RM 145269V1	Time frame extension	No expiry date in consent	To extend the timeframe for reinstatement of fish passage at 187 Champion Road, Nelson.

Civil Defence Emergency Management (CDEM) Act 2002

Sections 64 and 60 of the CDEM Act (Duties of local authorities and Duties of lifeline utilities accordingly) require that a local authority must plan and provide for civil defence emergency management within its district and that a local authority and lifeline utility must ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency. The Risk section of this Plan provides detail of Nelson City Council's preparation and arrangements for emergency management.

2.4. Current level of service

Significant negative effects

It is a requirement of the Local Government Act 2002 Amendment Act 2010 (2(1)(c)) to outline any significant negative effects that any activity within a group of activities may have on the social, economic, environmental, or cultural well-being of the local community.

Table 2-5 below identifies the negative effects for the Nelson City community that the flood protection activity may have. It indicates the existing approach or proposed action to address these in future. The Nelson City Council flood protection activity is carefully managed, particularly with regard to the use of chemical sprays and mechanical equipment within river and stream channels, to ensure there are no significant negative effects.

Table 2-6 lays out the level of service and performance targets set out in the Long Term Plan 2021-31 (current levels of service). Refer to Table 2-8 for the desired levels of service for the Long Term Plan 2024-34.

Table 2-5: Negative Effects – The Flood Protection Activity

Effect	Status of Effect		Type of Effect		Impact on Well-Being				Existing Approach or Proposed Action to Address
	Existing	Potential	Negative	Significantly Negative	Social	Economic	Environmental	Cultural	
Rivers and Streams									
Sedimentation and vegetation build up.	Static	Static	√		Minor	Minor	Mod	Minor	Removal by mechanical/spraying means.
Use of chemical sprays.	Static	Static	√		Mod	Minor	Mod	Mod	Compliance with MFE, EPA and resource consent requirements.
Pest weeds.	Static	Static	√		Mod	Minor	Mod	Mod	Compliance with the Tasman-Nelson Pest Management Strategy.
Environmental									
If flooding were to occur on a regular basis this may affect the ability of industries to obtain or retain ongoing insurance.	Static	Static	√		Mod	Mod	Minor	Nil	Development of flood management plans for the different areas of the city, following a risk based approach.
Flood protection works have the potential for environmental impacts on instream habitats/riparian margins, impacts on cultural values associated with natural waterways and for social impacts related to the amenity/use of esplanade reserves.	Static	Static	√		Mod	Minor	Mod	Mod	Council intends to investigate nature-based solutions where possible, in order to help mitigate these effects.
Effects of instream works on water turbidity within watercourses	Static	Static	√		Mod	Minor	Mod	Mod	The effects of instream works is mitigated through implementing by-pass flow arrangements or undertaking work during periods of elevated flow.

Table 2-6: Current Levels of service for Flood Protection in the Long Term Plan 2021 - 31

					Performance Target			
	Community Outcomes	**Level of service**	**Performance measure**	**Previous and current performance**	**2021/22 (Year 1)**	**2022/23 (Year 2)**	**2023/24 (Year 3)**	**2024/25 – 2030/31 (Year 4-10)**
Flood Protection	**Our unique natural environment is healthy and protected** **Our infrastructure is efficient, cost effective and meets current and future needs** **Our urban and rural environments are people-friendly, well planned and sustainably managed**	**Quality** ^Environmental protection, damage to people and property minimised, and a reliable flood protection network	The major flood protection and control works that are maintained, repaired and renewed to the key standards defined in the Stormwater and Flood Protection Activity Management Plan* Measurement Procedure 3,4	No loss of current service potential in any urban streams between 2017/18 and 2021/22 2022/23 Major works undertaken to maintain capacity in all urban watercourses.	Network maintained to current service potential			
				No flood events occurred which required a repair programme between 2017/18 and 2019/20. (achieved 20/21 & 21/22) 2022/23: 2 major flood events, August 2022 and May 2023. Community meetings held and a five year flood recovery programme put in place.	Flood event damage identified, prioritised and repair programme agreed between Council and the community			
				No flood events within rivers/streams occurred that required a repair programme between 2017/18 and 2021/22. High priority emergency works completed within the emergency declaration and transition period	High priority work completed as soon as practicable			
				Between 2017/18 and 2019/20 only minor flood protection repairs were required to maintain waterways 2020/21 First phase for the maintenance of the Brook Stream embankment near Willow Walk was completed. This is a major renewal project to address the undermining of a concrete retaining wall on the Brook Stream. 2021/22 The Implementation of a gabion basket retaining wall is	Network components renewed to continue provision of original design service potential			

					Performance Target			
	Community Outcomes	**Level of service**	**Performance measure**	**Previous and current performance**	**2021/22 (Year 1)**	**2022/23 (Year 2)**	**2023/24 (Year 3)**	**2024/25 – 2030/31 (Year 4-10)**
				in progress for Jenkins Creek at the Ridgeway. 2022/23 Major works undertaken to maintain capacity in all urban watercourses. Gabion basket retaining wall on Jenkins creek completed.				
			Develop risk based Maitai flood response options Measurement Procedure 5	Flood analysis completed in 2018/19 Response options identified in 2019/20 2020/21 Engagement with the community on the Maitai flood response was planned to be undertaken after the Nelson Plan consultation on Flood Hazards. However, due to the delay with the Nelson Plan, this work was postponed. 2021/22 Consultation with the community on coastal adaptation and Maitai Flood Protection was undertaken. Refinement of options has been progressed for the Maitai River, showing the benefits and impacts of options on 1% AEP river flood events at 2050 and 2070. Development of business cases for Maitai Flood Mitigation options has been initiated, starting with an evaluation of raising riverbank levels and installing flood gates to protect low lying areas of the CBD and The Wood. 2022/23: Refinement of options has been progressed for the Maitai River, showing the benefits and impacts of options on 1% AEP river flood events at 2050 and 2070. Development of	Consult with the community, and refine options and initiate business case	Develop concept designs for quick win projects	Initiate Resource consent process	Detailed design and Implementation

					Performance Target			
	Community Outcomes	**Level of service**	**Performance measure**	**Previous and current performance**	**2021/22 (Year 1)**	**2022/23 (Year 2)**	**2023/24 (Year 3)**	**2024/25 – 2030/31 (Year 4-10)**
				business cases for Maitai Flood Mitigation options has been initiated, starting with an evaluation of raising riverbank levels and installing flood gates to protect low lying areas of the CBD and The Wood.				
			Develop city wide flood protection strategies Measurement Procedure 5	2018/2019 Completed flood models for major streams 2019/20 Prioritised flood response based on results of risk based analysis 2020/21 River and Stream flood maps were published in August 2021. 2021/22 – 22/23 Flood mitigation Options report for Jenkins Creek, Arapiki and Poorman Valley streams was delivered in 2021/22 and updated with capacity assessment in 22/23.	Identify flood management options in priority catchments	Engage with the community in priority catchments	Develop concept designs for quick win projects	Consultation, Resource consent, design and implementation

^L.O.S. included in LTP

* Performance measures with an asterisk reflect the wording of the Non-Financial Performance Measures of the Department of Internal Affairs (DIA) incorporated into sec261B Local Government Act 2002. This is to allow the DIA to compare these measures across councils. Targets have been adjusted where necessary to align.

Measurement procedures:

3. Council RMA infringement records at 1 July
4. Report from SR system at 1 July
5. Review check sheets for individual projects
6. GIS flood reports for properties inside flood overlay
7. Ensure annual targets are met

Reliability

Minimise Stormwater Blockages within Reticulation

A 24-hour callout system provides a prompt response to any stream blockage event.

Responsiveness

Reliable and Timely Response to Service Requests and System Failures

Generally system failures within the urban watercourses are reported by the public. Whatever the means of reporting, it is important that response to failures is prompt to maintain public health and to avoid potential damage.

Table 2-7 sets out the response times for system failures that are detailed in the maintenance contract for Stormwater and Flood Protection Activities with Nelmac.

Table 2-7: System Failure Response Times

Circumstance	Investigation and Appraisal	Complete Repair
Clearance of obstructions from inlet and outlet structures along watercourses. Note that where bridges and culverts are NCC roading assets, these will be managed by the Transport Team.	1 working day	2 working days
Other non-urgent works.	As soon as practicable	10 working days
Flooding and overtopping of streams and rivers.	30 minutes	As soon as practicable
Other emergency work.	30 minutes	As soon as practicable

2.5. Proposed level of service for 2024 - 2034

The updated levels of service for the Flood Protection activity are based on those in the 2021 – 2031 AMP, but these exclude the Stormwater levels of service. There are a few changes in the proposed Levels of Service for Flood Protection:

- *Flooding of habitable floors*: This has been removed from the flood protection performance indicators as it is a statutory measure for stormwater based on the number of properties connected to the stormwater network.
- *Develop risk based Maitai flood response options*: This has been removed as the previous targets related to a work programme for developing flood mitigation options, rather than a clear performance outcome.
- *Develop city wide flood protection strategies*: This has been removed as the previous targets related to a work programme for developing strategies, rather than a clear performance outcome.
- A new measure has been included for Flood Protection.
  - *No failure of flood protection in the existing stopbank system maintained by the Council below the original design levels.*

Table 2-8 outlines the proposed levels of service for 2024-2034.

Table 2-8: Proposed Levels of Service for Flood Protection 2024-2034

					Performance Target			
	Community Outcomes	**Level of service**	**Performance measure**	**Previous and current performance**	**2024/25 (Year 1)**	**2025/26 (Year 2)**	**2026/27 (Year 3)**	**2024/25 – 2030/31 (Year 4-10)**
Flood Protection	**Our unique natural environment is healthy and protected** **Our infrastructure is efficient, resilient, cost effective and meets current and future needs** **Our urban and rural environments are people-friendly, well planned, accessible and sustainably managed** **Our communities are healthy, safe, inclusive and resilient**	**Protection:** **Our flood protection structures and channels are managed to reduce the impact of flooding and erosion now and in the future**	**^**The major flood protection and control works are maintained, repaired and renewed to the key standards defined in the Flood Protection Activity Management Plan 2024-34* Measurement Procedure 1,2 (Mandatory measure 1)	No loss of current service potential in any urban streams between 2019/20 and 2021/22 2022/23 Major works undertaken to maintain capacity in all urban watercourses.	Network maintained to continue provision of original design service potential**			
				New target for 2024-2034 AMP	No failure of flood protection in the existing stopbank system maintained by the Council below the specified design levels. • Maitai River Stopbanks: ○ Hanby Park to Clouston Bridge = approximately 250 m3/s @ Girlies Hole flow gauge, (2 % AEP to 3% AEP in 2020) ○ Clouston Bridge flood wall = approximately 290m3/s @ Girlies Hole flow gauge, (1% AEP to 2% AEP in 2020) ○ Clouston Terrace = approximately 170 m3/s @ Girlies Hole flow gauge, (10% AEP to 20% AEP in 2020) ○ Downstream of Trafalgar Street bridge (Left bank) • River Flow Capacity = approximately 450 m3/s @ Avon Terrace flow gauge (1% AEP in 2090), or • Coastal Inundation = 1% AEP event in 2060 • AEP = Annual Exceedance Probability (Mandatory Performance Level 1).			
				No flood events within rivers/streams occurred that required a repair programme between 2019/20 and 2021/22 2022/23: 2 major flood events, August 2022 and May 2023. Five year flood recovery programme put in place.	Following major flood events: Flood event damage identified, and repair work prioritised			

^L.O.S. included in LTP

* Performance measures with an asterisk reflect the wording of the Non-Financial Performance Measures of the Department of Internal Affairs (DIA) incorporated into sec261B Local Government Act 2002. This is to allow the DIA to compare these measures across councils. Targets have been adjusted where necessary to align.

**Original design service potential expressed in m3/s

Measurement procedures: 1. Review check sheets for individual projects 2. GIS flood reports for properties inside flood overlay

3. Future demand

This section outlines the existing demand, demand forecasts, growth and expectations and the demand management strategies that Council utilises.

3.1. Demand drivers

Flood protection demand drivers are set out in Table 3-1.

Table 3-1: Flood Protection Demand Drivers

Flood Protection Demand Drivers	Flood Protection Activity
Significant population growth and residential expansion into greenfield areas	Development of new areas on the periphery of the city and intensification in some existing urban areas will lead to increased runoff rates if impermeable areas increase.
Changes in Customer Expectations on flooding	Customer expectations are increasingly tending towards higher levels of service, in both the reduction of extent, frequency and duration of flooding and ponding on property and roads during and after storms. This can drive a demand for the installation of flood protection assets in existing urban areas.
Community Expectation on environmental protection	There are increasing expectations for enhancing the natural environment of streams and rivers. This demand driver can conflict with the expectations for reduced flooding as it can limit options for works along existing water courses that have insufficient flow capacity.
Community expectation to respond to predicted climatic changes	In 2019, Council declared a climate change emergency. This reflects a growing sense of urgency around the need to respond to climate change with both mitigation and adaptation measures. Climate change adaptation is a major consideration for this activity, particularly in relation to low lying areas of the city that would be exposed to sea level rise. Under the NTLDM 2020, stormwater design currently allows for temperature warming and sea level rise to 2090. There is an existing demand for increased protection from tidal flooding in some areas of the city, and it is expected this will grow following the publication of coastal inundation and coastal erosion mapping.
Legislative National Policy Statements: • Freshwater Management • Urban Development	• The NPS-FM 2020 is a cornerstone central government initiative to improve the quality of freshwater bodies in New Zealand. This is expected to require an enhanced response to design and construction of stream channel works. Cost implications are expected to become clearer as Council scales up freshwater quality monitoring and develops the freshwater sections of the proposed Whakamahere Whakatū Nelson Plan through to notification in 2022. • The NPS-UD will ensure each territorial authority makes adequate provision for future population growth in their areas. Council has completed a Future Development Strategy in collaboration with Tasman District Council. For the 10 years covered by this Plan, new green field sites and areas of urban intensification have been identified. Funding has been allocated within this plan to provide for the additional demand for flood response measures associated with this urban growth.

Flood Protection Demand Drivers	Flood Protection Activity
Organisational Policies Environmental Sustainability Certified Emissions Measurement and Reduction Scheme (CEMARS)	This includes an Emissions Inventory Report and Action Plan to Reduce Council Greenhouse Gas Emissions. In August 2020, Nelson City Council adopted the Government targets for Council's own greenhouse gas emissions reductions (i.e., net zero emissions of all GHGs other than biogenic methane by 2050, and a 24 to 47 per cent reduction below 2017 biogenic methane emissions by 2050, including 10 per cent reduction below 2017 biogenic methane emissions by 2030). This activity has a very low carbon footprint as there are no flood protections assets that require a power source. The only associated emissions are from the production and supply of materials, such as concrete, which should be accounted for by the manufacturer.

3.2. Demand forecasts

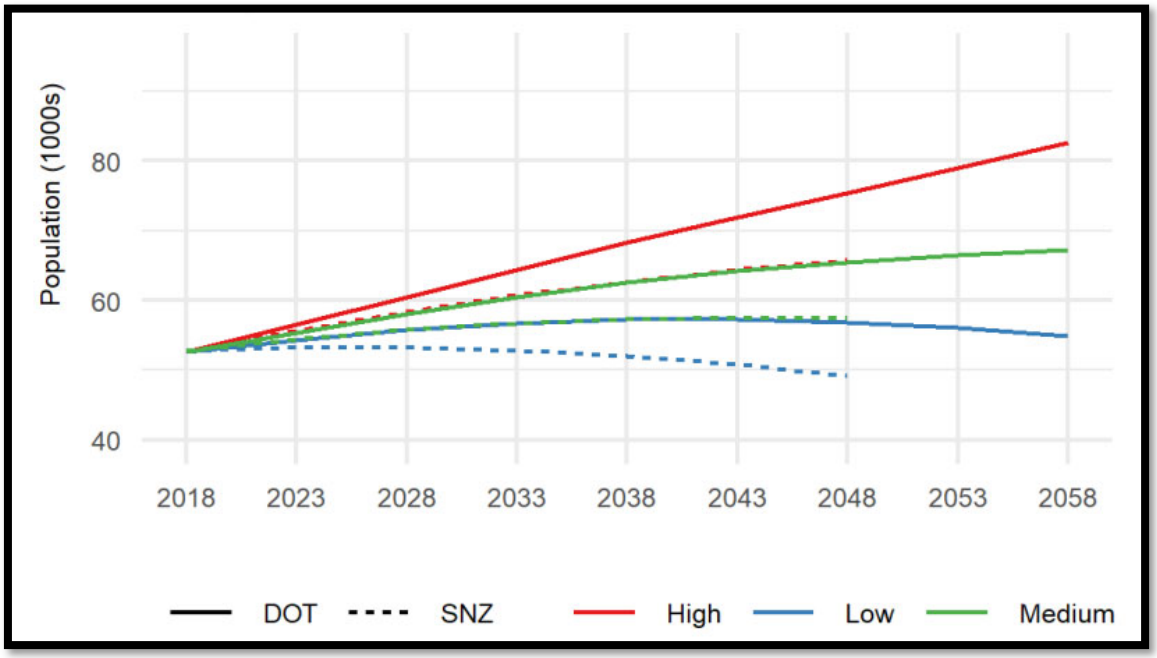
Nelson Population and Household Projections: 2020 - 2050

Traditionally, Statistics New Zealand would provide high, medium and low scenarios for Councils to use. In 2023, the latest census was completed but the results are yet to be released. It is reported that census forms have been returned for over 4 million people. In this context there is a lot of uncertainty involved with projecting future population change. To account for this a custom, or hybrid, population projection for Nelson has been developed looking back at trends over previous recessionary periods to assist in developing rationale for choosing variables to develop the custom population projection.

The rates of growth in Figure 3-1 are based on commissioned demographic analysis and reflect the medium scenario projection from the findings of this analysis. These projections are higher than those produced by Statistics New Zealand, primarily due to higher net migration assumptions used for this analysis.

Nelson's population is expected to increase from 55,406 in 2023 to 60,419 in 2033. The projections suggest a relatively modest annual average growth rates for 20232033 of around 0.9%. Growth rates are likely to decline over time due to structural population ageing.

Figure 3-1: Population growth projections 2023 - 2053, Nelson



Projected demand under the National Policy Statement on Urban Development

The National Policy Statement on Urban Development 2020 (NPS-UD) requires local authorities to ensure there is sufficient development capacity to meet demand over the next 30 years with specific zoning and servicing requirements over different time frames:

- Short term (within 3 years) – zoned and serviced
- Medium term (3-10 years) – zoned and planned to be serviced within LTP
- Long term (10-30 years) – zoned and planned to be serviced beyond LTP

Council does not have control over the location or level of uptake of intensification or urban expansion opportunities, as this is largely dependent on decisions by individual landowners and/or developers. Council can however, set enabling rules and policies, initiate the right infrastructure at the right time and support the perception of medium density living through high quality design, actions that are supported through its Intensification Action Plan

Residential growth areas and the potential sequencing of urban development capacity in the short, medium and long term are shown in Figure ES-5 and discussed in section 3.5 - Asset programmes to meet demand.

3.3. Demand impacts on assets

Demand for flood protection services is driven by growth or intensification in the city, an associated increase in impermeable surfaces, and the frequency and severity of observed flood events. The August 2022 and May 2023 floods have led to a heightened awareness of flood risk, and a large volume of associated requests.

3.4. Demand management plan

Demand Management strategies are used as alternatives to the creation of new assets. They are aimed at modifying customer demands to achieve:

- The delivery of cost-effective services.
- Defer the need for new assets and optimise the performance/utilisation of existing assets.
- Environmental Sustainability in the flood protection activity, including utilising nature-based solutions or nature-based infrastructure where effective, feasible and affordable.
- Develop ways to incorporate wider interdepartmental and community involvement enhancing the major natural waterways.

Nelson City Council is working on a range of strategies to manage the demand for flood protection services and therefore the requirement for additional infrastructure.

Table 3-2 details the demand management strategies that have or will be instigated.

Table 3-2: Demand Management Strategies

Strategy	Objective / Description
Regulation	Protect property from flood damage by enforcing appropriate regulations for housing and subdivision development, and for commercial/industrial operations in both the Building Act and the Nelson Resource Management Plan (NRMP). The NRMP controls the areas in which development can occur and the associated density that is permitted. This includes restrictions on buildings in high flood risk areas by ensuring buildings are sited clear of areas that are at risk of flooding and inundation. The NTLDM 2020 and the accompanying Inundation Practice Note includes the use of standards to set minimum floor levels for buildings and to ensure adequate secondary flow paths and detention areas for new developments. Regulations to protect new residential and communal buildings from flooding are also set under the Building Act and Building Code. Integrating growth planning with infrastructure provision is an objective of this Plan to the extent that providing for growth can also fulfil the Goal of this activity.
Education	Production of mapping to show areas potentially subject to river and stream flooding, coastal inundation and coastal erosion serve to increase public awareness of the risks, both current and future.
Alternative disposal strategies	The Land Development Manual includes standards for treatment of stormwater that have a bearing on stream and river channels. There are specific standards which seek to reduce stream bank scour through a requirement for extended detention of stormwater where the discharge is to an open channel. Private detention tanks and community rainwater harvesting are encouraged through the Land Development Manual and stormwater reduction education.

3.5. Asset programmes to meet demand

Nelson Tasman Future Development Strategy 2022

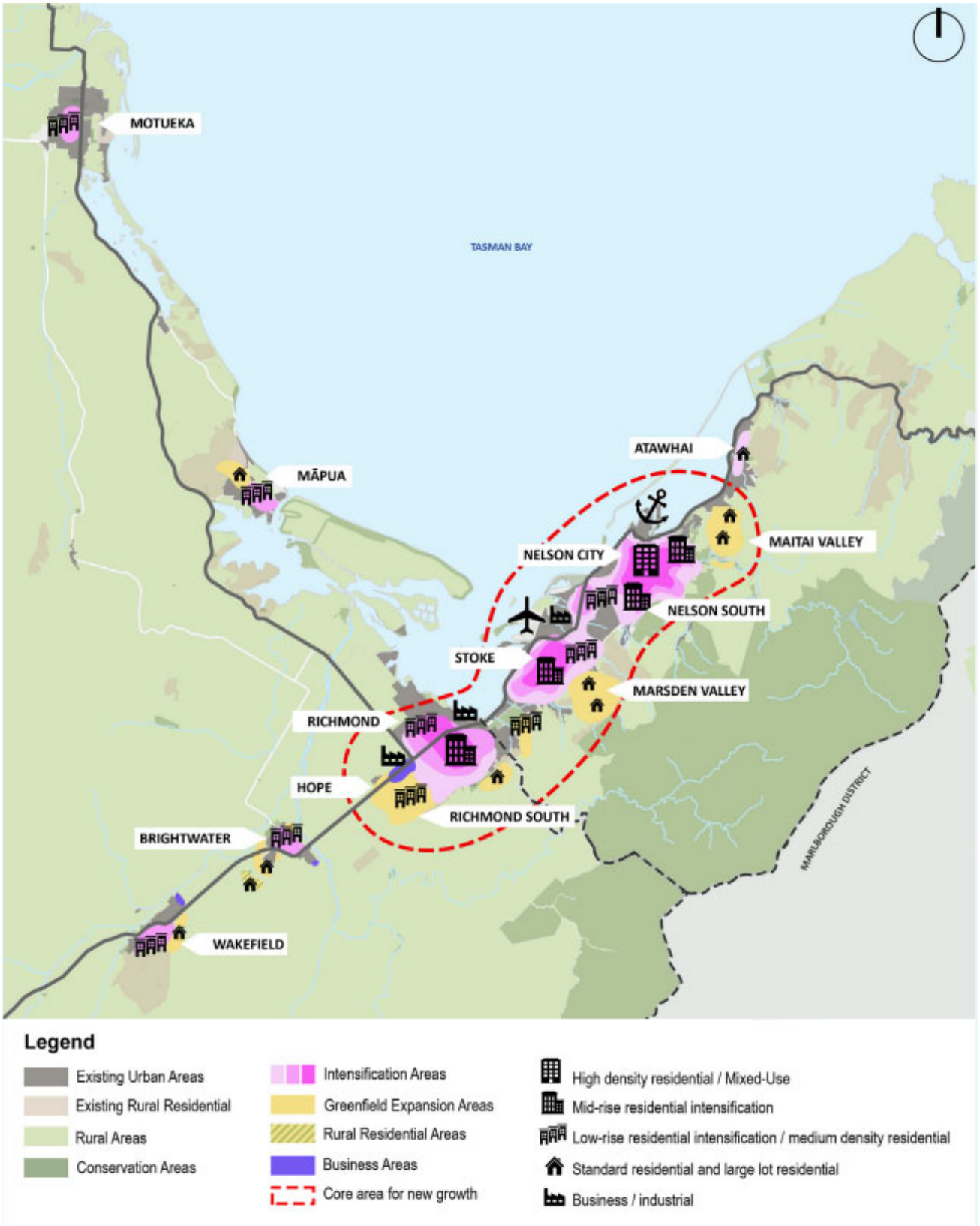
The Nelson Tasman Future Development Strategy 2022 (FDS) provides capacity for about 24,000 houses over the next 30 years in the combined urban environment.

In Nelson, the FDS identifies capacity for about 11,500 new dwellings, with 78% of this growth to be achieved by adding new housing into existing urban areas, and the remaining 22% expected to be through new greenfield expansions. This proportion reflects community feedback supporting growth through intensification of existing urban areas rather than expansion onto rural land.

Provision of intensification infrastructure is identified for the City Centre, Stoke and Tāhunanui, where higher density and mixed-use environments will see growth consolidated. Most of the new greenfield potential identified are within the Maitai, Marsden, and Ngawhatu valleys. Parts of Nelson Central and Tāhunanui are subject to flood risks and future intensification will be guided by the outcome of a Dynamic Adaptive Planning Pathways process, which is currently underway.

Figure 3-2 shows the areas that are expected to grow and/or intensify in the coming three decades and are identified for future growth in the FDS. As demand for development becomes clearer they will be prioritised for services.

Figure 3-2: Future Development Strategy Growth Areas for Nelson and Tasman



Implementation of intensification projects is more complex than traditional expansion. The Council does not have full control over the location or level of uptake of intensification or urban expansion opportunities, as this is largely dependent on decisions by individual landowners and/or developers. Where the Council can take a lead include:

- Identify priority areas in which to undertake this neighbourhood planning.
- Lead investment in urban amenity and public transport to encourage growth in specific areas, such as the City Centre.
- Provide for flood protection to service existing urban areas where intensification is planned. This includes areas such as the Vanguard St / St Vincent St corridor which are potentially vulnerable to flooding from the York Stream.

Strategic Planning

Significant upgrading of flood protection assets and river / stream channel capacity has occurred under previous asset management plans. The capital investment programme in this Plan sets out the areas of the city where flood protection projects are proposed. In addition, a number of wider plans are identified to review the existing network and assess the most appropriate options to improve the overall performance of the system. These include:

- Flood Protection Management Plans for each of the urban streams and rural rivers. The prioritisation of these follows a risk-based approach.
- Flood Protection Assets Renewal Strategy to better capture existing network age, condition and criticality. Based on identified risks renewals can be prioritised and aligned with upgrade requirements to optimise overall network performance.

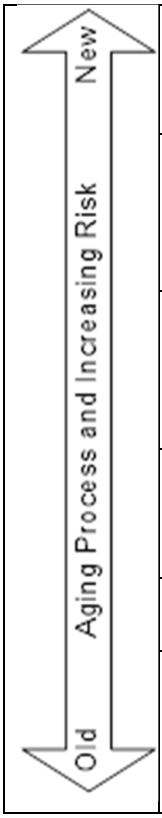
4. Lifecycle management

Lifecycle Management has a direct impact on the provision of flood protection services to the residents and businesses of Nelson through the measures that need to be implemented to achieve levels of service. Lifecycle Management will allow Nelson City Council to clearly identify both the short and long term requirements of the flood protection system ensuring that service delivery to the community is cost effective.

Asset Lifecycle

Assets have a lifecycle as they move through from the initial concept to the final disposal. Depending on the type of asset, its lifecycle may vary from 10 years to over 100 years. Key stages in the asset lifecycle are:

Table 4-1: Asset Lifecycle

	**Asset planning**	When the new asset is designed - decisions made at this time influence the cost of operating the asset and the lifespan of the asset. Alternative, non-asset solutions, must also be considered.
	Asset creation or acquisition	When the asset is purchased - constructed or vested in the Nelson City Council. Capital cost, design and construction standards, commissioning the asset, and guarantees by suppliers influence the cost of operating the asset and the lifespan of the asset.
	Asset operations and maintenance	When the asset is operated and maintained - operation relates to a number of elements including efficiency, power costs and throughput. Preventative maintenance is where minor work is carried out to prevent more expensive work in the future and reactive maintenance where a failure is fixed.
	Asset condition and performance monitoring	When the asset is examined and checked to ascertain the remaining life of the asset - what corrective action is required including maintenance, rehabilitation or renewal and within what time frame.
	Asset rehabilitation and renewal	When the asset is restored or replaced to ensure that the required level of service can continue to be delivered.
	Asset disposal and rationalisation	Where a failed or redundant asset is sold off, put to another use, or abandoned.

Asset Failure Modes

Generally it is assumed that physical failure is the critical failure mode for many assets. However the asset management process recognises that other modes of failure exist. The range of failure modes includes:

Table 4-2: Asset Failure Modes

Structural	Where the physical condition of the asset is the measure of deterioration, service potential and remaining life.
Capacity	Where the level of under or over capacity of the asset is measured against the required level of service to establish the remaining life.
Level of Service Failure	Where reliability of the asset or performance targets are not achieved.
Obsolescence	Where technical change or lack of replacement parts can render assets uneconomic to operate or maintain.
Cost or Economic Impact	Includes where the cost to operate and maintain an asset is greater than the benefit it delivers
Operator Error	Where the available skill level to operate an asset could impact on asset performance and service delivery.

The Lifecycle Management Programmes cover the four key categories of work necessary to achieve the required outcomes for the flood protection activity. These programmes are:

Table 4-3: Lifecycle Management Programmes

Management Programme: Management functions required to support the other Programmes - Developed and Implemented by Nelson City Council **Operations and Maintenance Programme:** To ensure efficient operation and serviceability of the assets so that they achieve their service potential over their useful lives - Developed, Managed and Implemented by Nelson City Council **Renewal Programme:** To provide for the progressive replacement of individual assets that have reached the end of their useful lives - Developed, Managed and Implemented by Nelson City Council	Maintaining the service potential of the assets and ensuring that the assets achieve that potential
Development Programme: To improve parts of the system currently performing below target service standards and to allow development to meet future demand requirements - Developed, Managed and Implemented by Nelson City Council	Closing service gaps. Meeting future demand

The Operations & Maintenance and Renewal Programmes are focused on maintaining the current service potential of assets, and are primarily driven by the condition of assets although asset performance is often an indicator of asset condition.

The Development Programme is focused on closing service gaps by increasing the service potential of the flood protection system and is primarily driven by the performance of assets and the need to accommodate growth in the City.

Community infrastructure is installed and maintained on the understanding that the assets are provided in perpetuity for the benefit of future generations. Longevity of an asset is a prime consideration when design and planning is undertaken for new or

replacement components in the network. Sustainability has been reflected in the decision making process when designing and constructing flood protection assets.

4.1. Background data

Council supports the following public flood protection works:

Flood Protection network

In areas where flood protection rates are taken:

- Maintain the current flood channel capacity and repair bank erosion where public assets or private buildings are at imminent risk.
- Upgrade the existing flood protection network using a risk based approach where channel capacity issues are identified.
- Extend the flood protection network to new growth areas

In areas where flood protection rates are not collected:

- The only flood protection work carried out in areas where flood protection rates are not taken is where utilities and structural facilities such as bridges and buildings owned by Council are threatened.

To date, Council has not taken a stormwater or flood protection rate from any property to the East of the Gentle Annie Saddle, nor from rural zone properties that are greater than 15 Hectares in area in the rest of the city. In the wake of the 2022 and 2023 floods there have been increasing requests for Council intervention within these catchments, largely associated with flooding, gravel deposition leading to a reduction in channel capacity, and river bank erosion.

The Activity Management Plan 2024-34 has been developed on the basis that the Flood Protection Activity will be split from the Stormwater Activity, and that a Flood Protection rate will be levied on rural as well as urban catchments.

4.1.1. Physical Parameters

Summary of Assets

Nelson City Council is responsible for a wide variety of assets that constitute the Flood Protection System. Table 4-4 shows the flood protection assets managed by Utilities as of March 2024.

Table 4-6 shows the lengths of stream culverts, and open channel by material type for the entire Nelson City flood protection network. This includes assets within watercourses that are owned by other parties such as Waka Kotahi (NZTA), and other departments at Nelson City Council including Transport and Parks & Reserves.

Table 4-4: Summary of Flood Protection Assets

Asset Category	Quantity	
	km	units
Urban Streams/Rivers[4]	**42.0**	
Stream Culverts	0.85	
Retaining walls: Concrete	3.9	
Retaining walls: Timber	4.0	
Retaining walls: Gabion baskets	0.73	
Rock armouring	20.0	
Stopbanks (Earth)	4.3	16
Flood walls	0.4	3
Stream Intakes		7
Manholes		12
Outfalls		6
Detention Basins		4

[4] Urban streams and rivers are listed in Table 4-5, Section 4.1 – Background Data.

Table 4-5: Urban Rivers and Streams

River/Stream	Overall Channel Length (m)
Orphanage Stream	3,584
Orchard Stream	2,548
Poorman Valley Stream	4,918
Arapiki Stream	2,536
Jenkins Creek	4,393
York Stream	4,252
Brook Stream	4,576
Maitai River	3,410
Todd Valley Stream	2,876
Oldham Creek	2,393
Saxton Creek	2,628
Saltwater Creek	962
Maire Stream	3,266
Total	**42,342**

Table 4-6: Flood Protection Channels, Culverts and Bank Protection

Asset Category[1]	Metres
Stream Culverts	850
Flood walls	400
Concrete Retaining	3,899.50
Gabion Wall	726.31
Rock Armouring	19,987.64
Stopbank Earth	4,328.32
Timber Retaining Wall	3,975.05
Grand Total	**34,166**

[1] Refer to Appendix 1 for asset category codes

Design Standards for the Reticulation System

The NTLDM 2020 sets the design standard for the capacity of the primary system (piped or open channel) at a 1 in 15 year (Q_{15}) flood event for a 2090[5] climate assuming an RCP[6] 8.5 future greenhouse gas concentration scenario. In addition, the

[5] 2090 is a mid-point for the 2081 – 2100 time period adopted for temperature projections.
[6] RCP – Representative Concentration Pathway is a greenhouse gas concentration (not emissions) trajectory adopted by the Intergovernmental Panel on Climate Change (IPCC).

NTLDM 2020 requires provision to be made for suitable secondary flow paths, rivers and streams to carry flood flows in the event of a less probable storm, up to a 1 in 100 year (Q_{100}) flood event for the same 2090 climate (LDM Table 5-5). The minimum freeboard from the hydraulic grade level of the primary system to the finished ground level (or for open channels to top of bank) shall be 250mm (NTLDM 5.4.5). This is a subset of the total freeboard to building platforms as per NTLDM Table 5-4. Where a pipeline or water way discharges into a much larger system, the peak flows do not generally coincide and backwater profiles should be set based on the outputs from hydraulic modelling or in accordance with NZS4404:2010 – clause 4.3.9.8 (as per LDM 5.5.11).

Designing for a 2090 climate requires an allowance to be made for higher rainfall intensity expected due to climate warming. For storm durations up to 1 hour, the Q_{15} rainfall adjustment factor for 2090 is approximately 34% which is significantly higher than the 16% applied previously. The difference is largely due to the adjustments to these rainfall augmentation factors made in the latest version of the High Intensity Rainfall Design System (HIRDS v4, NIWA 2018).

For Nelson, this implies that a large percentage of the existing river and stream network will not be able to meet the expected future storm flows. It is not viable to upgrade all these systems over the next 10 years, or even 30 years. A project prioritisation process is being undertaken which ranks projects using a risk based approach, with consideration given to economic, social, environmental, and cultural factors, and meeting the requirements for growth areas as a priority.

Expected Working Life of Flood Protection Assets

The Nelson City Council has stream culverts ranging from new to over 50 years old. The expected base life of stream culverts and bank protection structures can be seen in the table 4-7, and the consequent distribution of stream culvert length verses installation year can be seen in figures 4-2 and 4-3 below. A condition assessment will be undertaken for assets approaching end of life to confirm whether renewal or upgrade is required and budget has been provided for this work under this Plan.

Table 4-7: Expected Base Life of Flood Protection Assets

Material	Base Life (Years)
Armour coil	60
Brick	80
Cast Iron	80
Concrete	90
High Density Polyethylene	80
Plastic	80
Concrete lined steel	50
Concrete retaining wall	100
Gabion retaining wall	25
Timber retaining wall	50
Rock armouring	Indefinite

Typical useful lives from the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines (from National Asset Management Support 2006 Edition) have been used as a guide in determining base lives. However the manual generally provides insufficient detail for our asset components and so Nelson City Council experience from the renewal of its assets has been used to vary these base lives.

Where an asset has exceeded its nominated base life, a residual life of 5 years is assumed pending condition assessment.

Figure 4-1: Year of Installation by Material and Stream Culvert Length

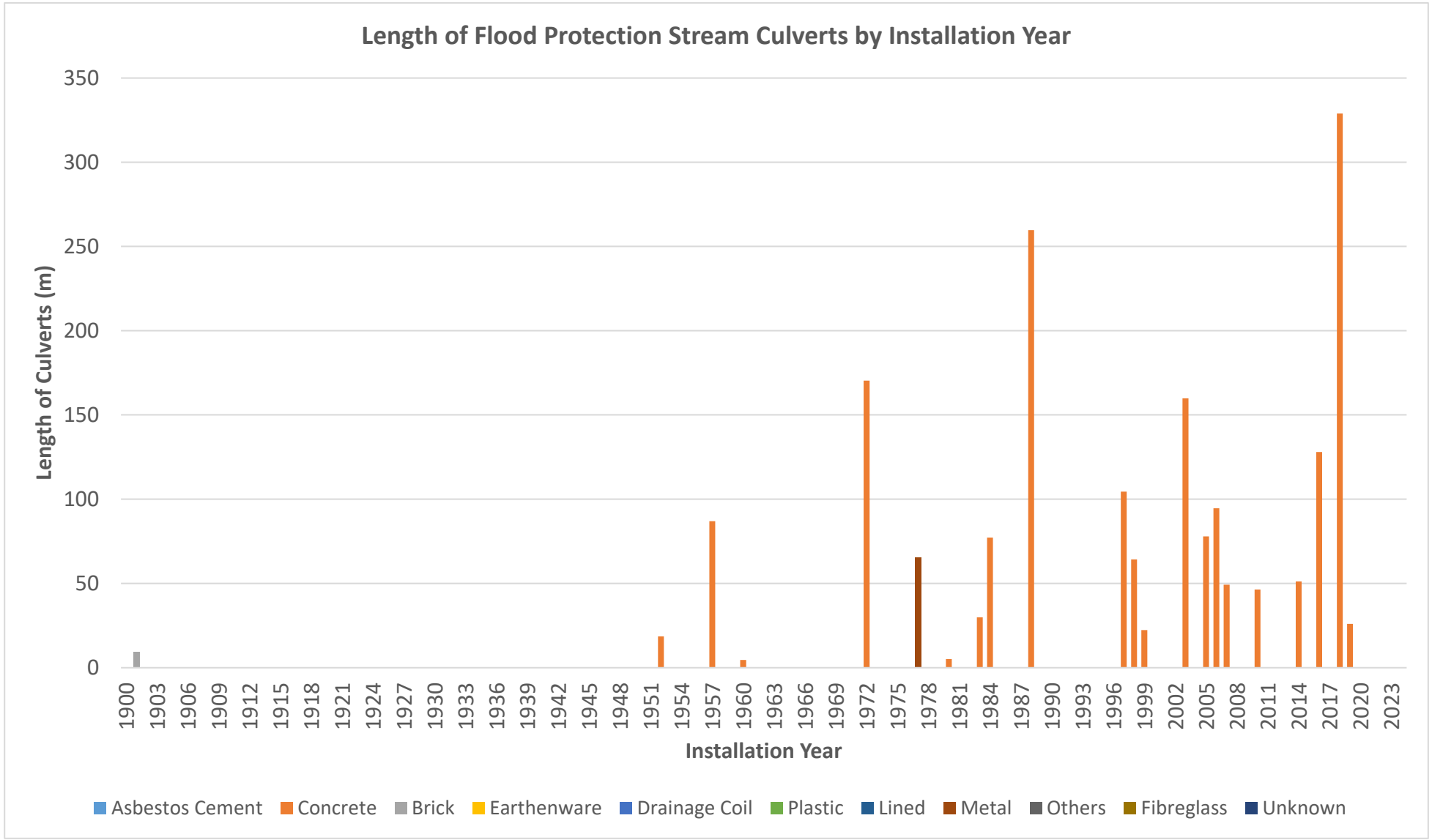


Figure 4-2: Theoretical Renewal Year by Stream Culvert Length

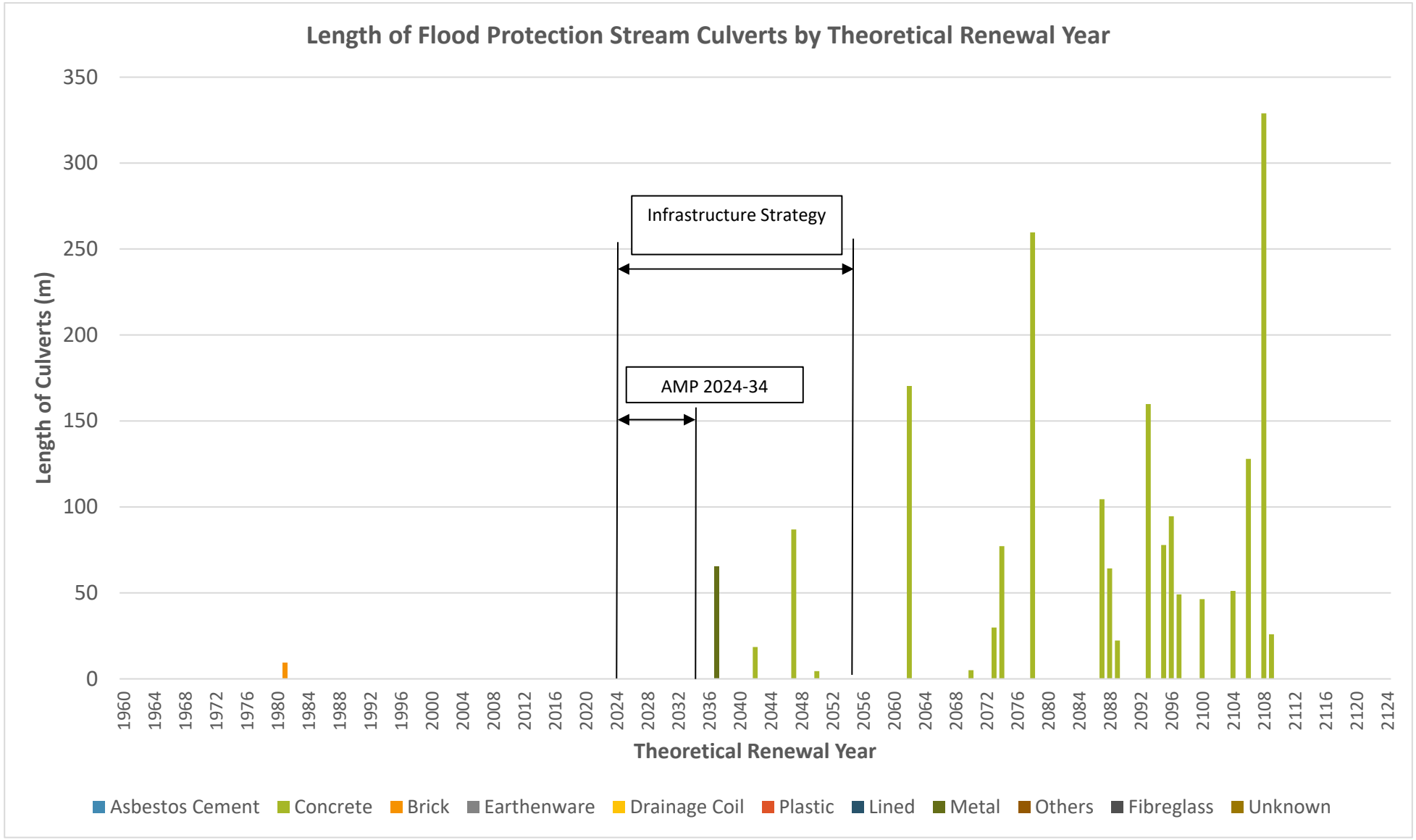
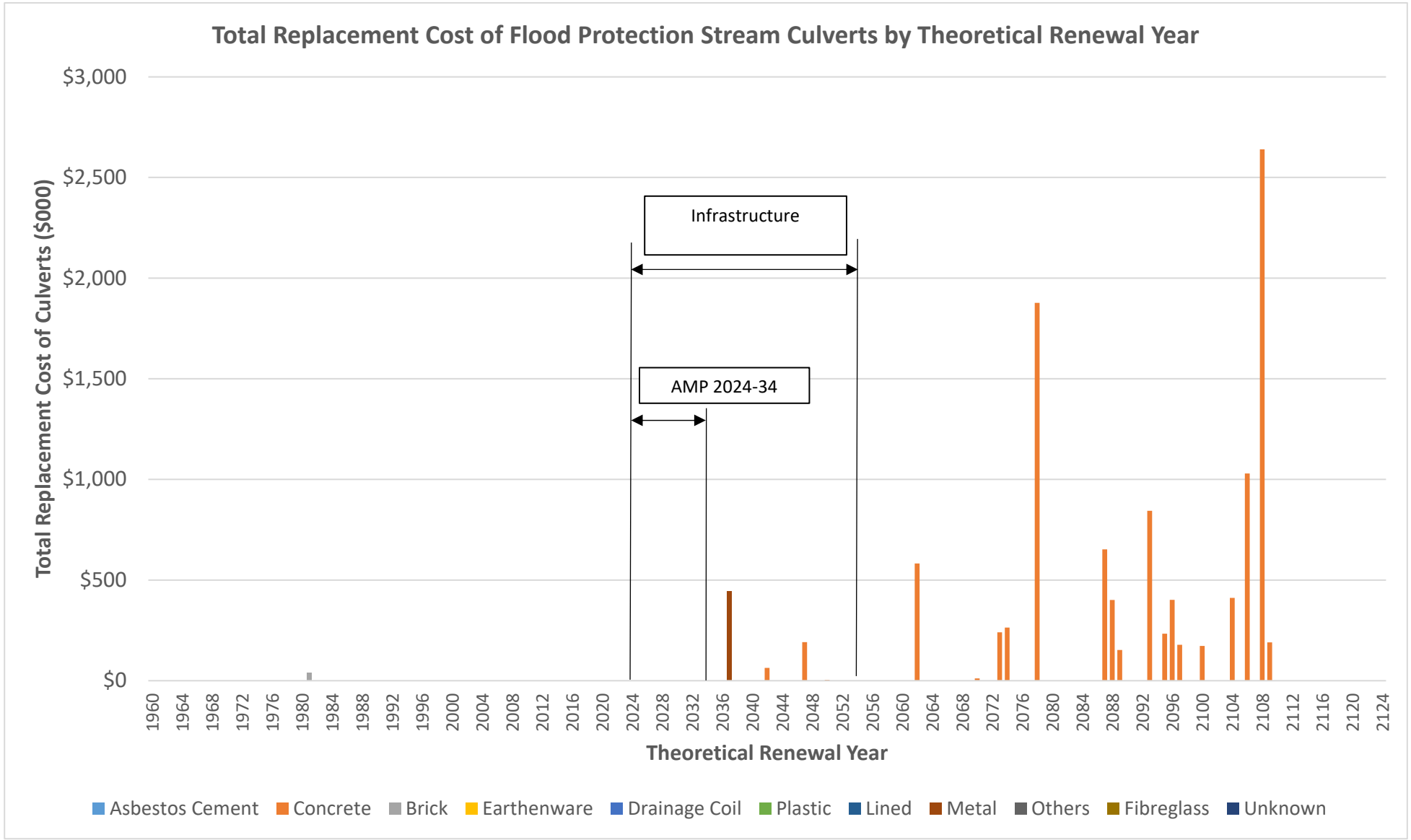


Figure 4-3: Estimated Stream Culvert Renewal Cost by Year



Stream Culverts

The Council has approximately 5.4 km of stream culverts which are categorised as Utilities assets. A significant number of the culverts on stream crossings are counted as Transport assets, which is consistent with how road bridges are classified. Large culverts such as the York Stream box culvert under St Vincent Street are classified as Transport assets as the location of the road required a culvert to be put in place, and because structural failure would present a significant risk to the road, and traffic flows.

Manholes on Culverted Streams

Manholes that are located along culverted streams are Flood Protection assets, where the culvert is classified as a Utilities Flood protection asset. There are 12 manholes in the NCC Utilities flood protection network ranging from 1050 diameter to deep trap man holes for grit removal.

Culverted Outfalls

Nelson City Utilities has a number of culverted outfalls to rivers, streams or the coastal area, which are mostly stormwater assets. A small number of these will be classified as flood protection assets following the asset separation process. A good example is the pipe culvert under the Boulder Bank that drains the area of the Wakapuaka Flats adjacent to the Cawthron Aquaculture Park.

In-Stream Detention Devices

Four in-stream detention devices vested in Council are located within the city, and the flood detention bunds at Saxton Field are off-line (storing flood overflow from Orphanage Stream). These basins are formed with either earth or concrete detention structures which drain through controlled outlets and spillways. The location of these detention devices are shown in the table below:

Table 4-8: Flood Protection Detention Basins (Vested)

Location	Catchment
Todd Bush Saddleback Road	Todd Valley Stream
Bledisloe North Reserve	Arapiki Stream
Bridgewater Lane	Orphanage Stream
Saxton Field Detention	Orphanage Stream

The flood protection utility services contractor inspects the detention dams after floods, earthquakes or heavy rain and carries out minor maintenance.

A number have a dual use as both neighbourhood parks/reserves and detention dams as follows:

- Ngawhatu Valley- area above Bridgewater Lane
- Saxton pond on Saxton Field
- Todd Valley at Saddleback Road

Managing Stream Floods

Rivers and larger streams are the primary stormwater transport mechanism in the Nelson City urban area and significant sections are enhanced and maintained by Council to ensure adequate protection from flooding.

Rivers and Streams

Rural Rivers

Currently, Council does not collect stormwater/flood protection rates from any property to the East of the Gentle Annie Saddle, nor from properties that are greater than 15 Hectares in area. Consequently the only day to day maintenance or capital upgrades carried out in the majority of these rural areas are where utilities and structural facilities such as bridges and buildings, owned by Council are threatened. The general exception is gravel extraction which is carried out in the Maitai River upstream of the urban area. There are a number of properties that pay a stormwater / flood protection rate in this area.

Council does receive occasional requests for assistance from landowners in rural areas. These requests typically follow heavy rain events and can range from assistance with the removal of tree debris and gravel build-up, to the protection of river banks from erosion. In June 2013 Council recognized the need to respond to these requests, while noting that there is currently no funding stream for any work, and agreed to the following policy of cost sharing with property owners for works that have a private benefit.

"Council will investigate bank protection and river control works to private property in the areas where stormwater rates are not applied, on a cost sharing basis with adjacent property owners"

It will be necessary to occasionally reconsider the response to rural rivers as increased residential development takes place and residents' expectations about flood protection develop.

Urban Streams and Rivers

In previous Activity Management Plans, The Nelson City Council has taken responsibility for the rivers and streams within the city's urban area. With the separation of stormwater and flood protection assets and functions, there are a number of catchments where upstream sections would be better managed as part of the stormwater network, and the proposed boundary between the stormwater and flood protection functions are as set out in the table below.

Table 4-9: Management of Urban Streams and Rivers

River / Stream	Reach of channel
Biggsburn Stream	End of Saddleback Rd to Todd Valley Stream confluence
Todd Valley Stream	From 33 Todd Valley Rd to SH6 Wakapuaka Road outfall
Little Todd Valley Stream	From 20 Little Todd Valley Rd to Todd Valley Stream confluence
Oldham Creek (South tributary)	From stormwater outfall opposite 1 Devenish Place to SH6 Atawhai Drive outfall
Maitai River	Jickell Bridge to SH6 QEII Drive outfall
Brook Stream	570 Brook Street to Maitai River confluence
York Stream	York Stream Tributary at Bishopdale Reserve and downstream to Saltwater Creek outfall
Saltwater Creek	From Briscoes covered channel at Vanguard Street to Maitai River confluence
Maire Stream	From Awatea Place Stormwater outfall through to outfall at end of Parkers Road
Maire Stream Tributary	Bolt Road culvert outlet To Maire Stream confluence
Jenkins Creek	From 33 Enner Glynn Rd to South end of Trent Drive at Airport
Arapiki Stream	Quarantine Road to Jenkins Creek confluence
Poorman Valley Stream	From 10 Vintners Way to SH6 Whakatu Drive outfall
Poorman Valley Stream Tributary	From Elderberry Lane culvert outlet to Poorman Valley Stream
Orchard Stream	From Main Road Stoke culvert outlet to SH6 Whakatu Drive outfall
Orphanage Stream (North tributary)	From 12 Tussock Place (Solitaire stormwater detention basin outfall) to SH6 Whakatu Drive outfall.
Orphanage Stream (South tributary)	70 Sunningdale Drive to Orphanage Stream confluence
Saxton Creek	From Champion Road box culvert to SH6 Whakatu Drive outfall
Saxton Creek East	From upstream end of Summerset development to Saxton Creek confluence

River and Stream Flood Capacity Management

Photo: Orchard Stream rock bank protection

Protection of the Central Business District

The Maitai River, Brook Stream and York Stream are the major watercourses that impact on the central business district. Flooding from these channels can impact on most areas of central Nelson. In order to inform options for management, a computer flood model of these water courses has been constructed. This model is being used to investigate flooding patterns for a range of present day and future rain events and assess the effectiveness of management options.

Maitai River

The Maitai River has undergone limited upgrading in the lower reaches to allow for extreme flood events. The current arrangements are being reviewed in light of flood data that has been collected over the past two years, and the focus has now moved to assessing what response may be appropriate based on risk. Part of this process involves discussions with the community about the aspects of the Maitai River that are considered to be critical to retain.

A range of flood control options are available to the community, including detaining flood flows in the upper catchment, upgrading constrictions to flow such as bridges, widening the channel, setting back stopbanks, and increasing the height of the banks. Inevitably there will have to be some trade off made between protecting properties from flooding and maintaining the natural and recreational values of the river.

Brook Stream

The Brook Stream is a mix of natural and concrete lined channels, in an increasingly urbanised environment, from the outfall to the Maitai River to the headwaters above the Brook Motor Camp. In 2013 Council, through its hydrology contract with Tasman District Council, installed flow monitoring equipment within the concrete channel section. The Brook stream is represented as a tributary network within the wider Maitai catchment flood model, and this is supporting an assessment of flood capacity into the future.

Council has also been investigating options for creating a more natural channel environment to promote fish passage. A trial of a range of materials that may be suitable for the improvement of fish passage within the concrete sections began in 2016. These have been installed and their resilience was tested in flood flow conditions of the August 2022, and May 2023 events. The results of the trial suggest that the flexible baffles sustained less damage, and are easier to replace that the rigid concrete and timber baffles. Reinstatement of fish passage is planned as part of the flood recovery works, and extension of fish passage up the concrete lined channel will be progressed once repairs to the base of the channel have been completed.

York Stream

York Stream is also a mix of natural and modified channels. Upper reaches are controlled by three detention dams in the Bishopdale area and with culverted and open channel sections to Victory School. Council has recently completed construction of a large 1800mm diameter pipeline from the York Stream intake at the Bishopdale reserve to the open channel section in Tipahi Street. This pipeline has been designed to cope with a Q_{100} design flow event. Further sections of culvert upgrade are under investigation for Vanguard Street and for the box culvert between the intake at Victory School down and Toi Street.

The York Stream from Victory School to the sea is fully enclosed in a large box culvert installed in the 1980s/90's. A new flow recorder was installed in this culvert in 2019. This is being used to validate the catchment flood model. Flows in excess of the open channel/ box culvert capacities would flow overland through the lower Bishopdale/Vanguard Street/St Vincent Street areas to Saltwater Creek. The focus of the current investigations is on how these secondary flows could be reduced.

Managing Stream Floods

Computer models of the following streams and rivers were developed in 2016/17, and updated in 2020/21 to guide the development of a risk based response to flooding as well as provide flood overlays for the Whakamahere Whakatū Nelson Plan: Whangamoa River, Wakapuaka River, Hillwood Stream, Todd Valley Stream, Oldham Creek, Maitai River, Brook Stream, York Stream, Jenkins Creek, Arapiki Stream, Poorman Valley Stream, Orchard Stream and Orphanage Stream. These catchment flood models incorporate the latest HIRDS v4 storm rainfall data that was released in 2018

Further modelling is proposed to update these models with more recent LIDAR survey (2020/21), the latest sea level rise projections (NZ SeaRise 2022) and the New Zealand Vertical Datum 2016. In addition, catchment flood models will be completed for Saxton Creek.

These models have shown that large sections of the existing channels are not able to cope with greater than present day Q_{20} flows. Further work is proposed under this Plan to identify the capacity of each stream/river channel by reach. The results of this work will allow Council to better define a risk based response to flooding and support future upgrade programmes and wider community flood response measures.

Property owners have a statutory obligation under the New Zealand Building Code to prevent surface water from a Q_{50} flood event entering buildings for which a building consent is sought under clause E1 of the New Zealand Building Code. Where streams run through private undeveloped land, the responsibility for upgrading the river or stream rests with the landowner to complete prior to any proposed land development.

4.1.2. Asset condition

Condition Assessment

Historically asset monitoring to determine condition has been subjective, based on local knowledge and experience. Nelson City Council now has procedures to assess and report on asset condition of stream culverts via closed circuit television (CCTV) and failure mode analysis.

The cost of undertaking condition assessment can be relatively expensive and is unlikely to provide a degradation curve that can be statistically supported. The need for inspection of assets with long economic lives will in the future be based on consequence of failure (criticality), remaining life and asset condition (structural and

service grades). This will be further investigated through a renewal strategy for the Flood Protection Activity.

Current Position on Condition Assessment

Presently the following simple approach to condition assessment is being used: Whenever the maintenance contractor is working on culvert repairs a condition report is made and entered into the Asset Management System. It is anticipated that this database will be used to plot developing problem areas on a city wide basis and allow relationships between culvert types, construction techniques, age, slope and geology to be developed.

Likewise channel repairs can be tracked through the INFOR database of work orders and a similar picture developed of higher risk areas, including stream bank protection assets such as gabion baskets or timber retaining walls.

The asset management system will be used as part of an Optimised Decision Making process. The level of sophistication will increase as the condition data base is developed.

Table 4-10 below details an estimate of the condition of the reticulation.

Table 4-10: Condition of Components Estimates (as % of total)

	Very Good %	Good %	Moderate %	Poor %	Very Poor %	Total
Stream Intakes	10	40	20	20	10	7
Stream Culverts	10	20	40	10	20	0.85 km
Constructed Channels	5	30	20	20	25	0.4 km
Stream bank protection structures	20	20	20	20	20	32.9 km
Condition rating as per the New Zealand infrastructure Asset Grading Guidelines 1999 1 = Very Good 2 = Good 3 = Moderate 4 = Poor 5 = Very Poor						

Asset condition assessments to be done:

- Ongoing field maintenance condition feedback
- Asset failure records
- Culvert sampling programmes
- Specific inspections and condition rating of assets

Confidence rating in attributes, condition and performance

The Council generally has moderate confidence (50% estimated to minor accuracies) in the processes for the attributes data, condition and performance of assets within the flood protection activity as indicated in Table 4-13 below.

Table 4-11: Confidence Rating in Attributes, Condition and Performance

Attribute	All Data Estimated	Significant Data Estimated	50% Estimated	Minor Inaccuracies	Accurate	Comment
Attributes						
Culvert diameter/ dimensions Size						The data was captured using photogrammetry in 1994 and progressively delivered over the following three years. Nelson City Council staff carried out accuracy checks on the co-ordinate data supplied, searched all the engineering plans and field books for information on pipe alignment, material and age and entered this information into the Geographical information system.
Invert levels						
Material						
Install Date						
Location						
Culvert Length						
Condition - Structural						
Stream Intakes						For instance York Stream intakes
Culverts						
Manholes						Limited inspections to date.
Constructed Channels						Example is Brook Stream concrete lined channel
Tide Gates						Example is Saltwater Creek flood gate on Haven Road
Condition – Service (Performance)						
Stream Intakes						Can be affected by debris blockages
Culverts						
Manholes						Limited inspections to date.
Constructed Channels						
Tide Gates						

4.1.3. Asset valuations

The replacement costs of the flood protection assets are $56m at March 2024 as detailed in Table 4-12 below.

Note that Saxton Creek Stage 4 works have not been included in this valuation as the works are due to be completed in mid-2024.

Valuation Method

Valuations are completed on a bi-annual cycle. Every second year a full revaluation is completed of all assets held by Council, which is completed by reviewing all assets and valuing them based on recent costs for similar work. This work is peer reviewed by WSP-OPUS Consultants Ltd. For the intervening years an Indexed revaluation is completed based on the previous year's full revaluation and a factor of recognised

price increase advised by WSP-OPUS after allowing for known asset additions and disposals. In addition major assets, (large culverts, in-stream dams) are revalued by OPUS on a replacement value basis. The Depreciated Replacement Value is used to calculate the straight line depreciation over the remaining useful life.

Table 4-12: Flood Protection Asset Valuation

	March 2024			
Asset Category	**Quantity**	**Replacement Value (RV)**	**Depreciated Replacement Value (DRV)**	**Depreciation (Annual)**
	km/units	**($)**	**($)**	**($)**
FLOOD PROTECTION		**56,008,285**	**33,944,143**	**507,415**
Mains > 600mm	1.09	6,499,568		
Culverts	0.85	4,918,658		
Channels	0.04	214,114		
Bank Protection	66.644[7]	38,692,241		
Stream intakes	7	52,712		
Manholes	12	102,232		
Outfalls	6	90,502		
Detention basins	4	5,434,023		

The March 2024 full replacement valuation of the flood protection assets is:

Flood Protection: $56,008,285.

4.1.4. Historical data

Expenditure trends for the past four years are shown in Section 6 – Financial Summary.

4.2. Operations and maintenance plan

Operations and Maintenance strategies set out how the flood protection activity will be operated and maintained on a day-to-day basis to consistently achieve the optimum use of assets and meet levels of service. Operations and Maintenance activities fall into the following categories, each having distinct objectives and triggering mechanisms:

Operations - Activities designed to ensure efficient utilisation of the assets, and therefore that the assets achieve their service potential and the network is capable of meeting required levels of service. Operational strategies cover activities such as energy usage, control of mechanical and electrical plant, inspections and service management.

[7] Bank Protection Assets expressed in square metres

Photo: Maire Stream intake

Maintenance - Maintenance strategies are designed to enable existing assets to operate to their service potential over their useful life. This is necessary to meet levels of service, achieve target standards and prevent premature asset failure or deterioration. There are two types of maintenance:

- Programmed - A base level of maintenance carried out to a predetermined schedule. Its objective is to maintain the service potential of the asset system. This includes inspection and maintenance actioned as a result of condition or performance evaluations of components of the Flood Protection system. Its objective is to avoid primary system failure
- Reactive Maintenance - Maintenance carried out in response to reported problems or system defects, including blockages associated with storm events. Its objective is to maintain day-to-day levels of service.

As part of the programmed maintenance strategy an annual inspection of the rivers and streams occurs in October each year (weather permitting). This inspection identifies the annual scheduled maintenance programme required for each river or stream.

4.2.1. Operations and maintenance plan

Maintenance Planning

Currently the asset maintenance is a mix of programmed and reactive. Progressing towards advanced activity management planning techniques for critical components is considered appropriate through application of programmed maintenance to the widest area of components required to ensure the safe and efficient operation of the network. This approach allows for maximising the useful life of an asset while minimising the consequences of unforeseen failures.

Method of Delivery

The operation and maintenance of the Nelson City Council Flood Protection activity is carried out using a combination of Nelson City Council staff and external contractors consisting of:

- Utilities business unit for Supervision (Nelson City Council).
- NELMAC Limited for all reticulation operations and maintenance (CCTO).
- External contractors for specialist activities such as closed circuit television, condition assessment, design of works, and major overhauls of mechanical equipment.

4.2.2. Operations and maintenance strategies

Day to day operation and maintenance of the network is carried out by contractors with specific requirements set out in the Operation & Maintenance of Utility Services contract. It is anticipated that in future separate contracts will cover stormwater and flood protection assets.

Level of Service Implications

The flood protection network must be intact and functioning in order to deliver the required levels of service. Reactive maintenance must be carried out promptly to rectify any significant system failures. Programmed maintenance must be carried out as an on-going activity to ensure that downtime is minimised. This is achieved by carrying out maintenance before it becomes reactive.

Demand Implications

With increasing demand there will be an increase in total variable costs particularly as urban catchments expand, more runoff occurs due to intensification, and more stormwater is transported and pumped to streams and rivers.

Risk Implications

Stream Intakes, culverts, stopbanks, stream and river grade control structures and bank protection assets must all be maintained, kept secure and protected from natural hazards so that they can continue to function through an emergency albeit at a reduced level of service.

Accumulation of silt and debris in the lower lying parts of the stream and river network is an on-going issue. This occurs due to low hydraulic grade and is a problem which is likely to be exacerbated by sea level rise.

Lifecycle Implications

Operations and maintenance is the longest period of the asset lifecycle and ongoing maintenance is necessary to ensure that the design life of the asset is achieved.

Table 4-13: Operations and Maintenance Strategies

Strategy	Objective/ Description
Maintenance	
Programmed Maintenance	Programmed Maintenance will be carried out in terms of defined routine maintenance items and triggers for these activities to be carried out. This is contracted to NELMAC under a Schedule of Utilities Projects Maintenance Contract which includes: • Detention basins – Quarterly Inspections • Stream Intakes (Schedules A, B and C) - Monthly or as required • Stream gravel traps – Annual inspections and clean out of gravel • Control gates and tidal flaps – Monthly Inspection • River and Streams Inspection Walkovers - Annual The rivers and streams walkovers occurs in October each year (weather permitting) and issues are logged in a Collector App. This informs the annual scheduled maintenance programme required for each watercourse under the Flood Protection Activity. Inspections cover: Bridge, weir, culvert, pipe outlets, energy dissipaters, bank and bed protection (rock, timber, gabions etc), accumulation of aquatic weeds and barriers to fish passage are also identified. Annual maintenance includes removal of trees, shrubs and grasses where necessary to maintain flood capacity.
Reactive Maintenance	Remedial maintenance will be undertaken as quickly as practically possible to restore an asset to a satisfactory condition after a failure or other unsatisfactory condition has been detected.
Redesign and Modification	Redesign may be necessary if an asset or system does not meet its operational objective. Similarly, modifications may be necessary to improve the operating characteristics. Redesign and modifications will be undertaken in a methodical manner generally supported by a business case to ensure alternative options are considered and optimum decisions made.
Operations	
Operations	Operational activities will be undertaken via NELMAC unless specialised advice is required. Staff will be responsible for the determination and optimisation of planned and unplanned works, work methods and maintenance scheduling to achieve the target service standards.
Physical Works Monitoring	Audits of work will be carried out to verify compliance with standards set out in the appropriate contract.
Operation of Utilities	Utilities such as flood gates will be operated in terms of defined parameters and standards set out in the operations and maintenance contract.
Incident management	Effectively respond to and manage incidents to ensure system availability and service continuity, and mitigate adverse effects. Maintenance staff and contractors are expected to effectively manage minor incidents. Nelson City Council staff will become involved in serious incidents.
System control and monitoring	Utilise Supervisory Control and Data Acquisition systems to monitor operation of the flood protection facilities. The Supervisory Control and Data Acquisition system provides surveillance of the operation of water levels and flows within the stream and river network and provides alarms when equipment fails or when operating parameters are exceeded. The Supervisory Control and Data Acquisition system also records operating data from the pumping stations.

4.2.3. Summary of future costs

Refer to section 6 - Financial Summary for Financial Projections. Operational expenditure is comprised of Base expenditure, Unprogrammed and Programmed expenditure. Base expenditure includes fixed costs such as programmed maintenance and insurance. Unprogrammed expenses comprise reactive maintenance. Programmed expenses include a range of assessments and strategy development.

Projected Operational expenses for flood protection in the range $500k to $800k per annum over the next 10 years, excluding staff costs, depreciation and Loss of Service Potential.

4.3. Renewal/Replacement plan

Capital Renewal /Replacement

Renewal is a capital expenditure on major work that restores, rehabilitates, replaces or renews an existing component to its original capacity. This includes:

- Works that do not increase the design capacity of the asset but restores them to their original size, condition capacity, etc.
- The replacement component of augmentation works which increase the capacity of the asset, i.e. that portion of the work which restores the assets to their original size, condition, capacity etc;
- Reconstruction or rehabilitation works involving improvements and realignment.
- Renewal and/or renovation of existing assets, restoring the assets to a new or fresh condition consistent with the original asset.

Work over and above restoring an asset to original capacity or performance is a creation/acquisition/ augmentation expenditure that increases the level of service. However if the additional cost is within 10% of the renewal cost then the total cost will be treated as renewal expenditure.

4.3.1. Renewal identification and strategies

Assets can fail from various modes other than the normally recognised physical, failure or breakage.

Condition assessment is a typical failure mode assessment activity.

To evaluate cost and obsolescence as failure modes it is necessary to capture the asset's operating and maintenance cost information, and to compare this with the lifecycle cost expectations.

As condition assessment and maintenance histories are built up, these will be used in determining renewal priorities.

Level of Service Implications

It is necessary to renew in-stream structures, stream culverts, and tide gates before they impact on levels of service.

Demand Implications

Renewals will be sized to allow for future demand. Where the increase in cost is greater than 10% relative to replacement of an existing asset, then the difference will be funded from creation/acquisition/augmentation expenditure.

Risk Implications

There is a risk to life, property and business' financial income by not undertaking renewals of in-stream structures such as grade control, energy

dissipators, concrete-lined channels, stream intakes and culverts and detention basin structures Lifecycle Implications

Stream culverts and in-stream structures must be renewed before maintenance costs become excessive. Decisions made at the time of renewal have an impact on the whole lifecycle costs of the asset.

For the purpose of developing asset renewal programmes the flood protection assets have been separated into "discrete" and "non-discrete" assets.

- "Discrete" assets are assets such as stream detention basins, sections of concrete-lined channel, stream bank protection structures and energy dissipators which are separately identifiable, accessible and which can readily be inspected.
- "Non-discrete" assets are assets such as buried stream culverts which are part of an extensive network, are generally below ground and which cannot readily be inspected (other than by techniques such as excavation and closed circuit television).

A renewal strategy will be developed to cover the flood protection network including: stream intakes, culverts, in-stream detention basins, stopbanks and stream bank protection structures including: Gabion baskets, concrete and timber retaining walls, grade control structures, energy dissipators and fish passage structures.

Table 4-14: Renewal Strategies

Strategy	Objective/ Description
Identification of Renewal Needs	To avoid a concentration of asset renewals in a short window of time, when they all reach the end of their life, renewals are set by: 1) Critical assets just before they fail. 2) Others after three unexpected overflows (same locality) or multiple blockages in five years (same stream culvert/fitting material or location). 3) When the level of service is no longer met owing to diminished capacity or excessive damage. 4) Alignment with other utility renewals or upgrades 5) Alignment with roading upgrades. Stream culverts in poor condition will be programmed for replacement prior to or in conjunction with the road works. 6) Alignment with other Council projects. 7) Potential development in the city that requires an increase in network capacity. The identification of renewal needs may also be identified by location and or materials through condition reports, maintenance records (asset failure and expenditure history), natural hazard risk, request for service (RFS) records, and observations of public, staff and contractors.
Project options	Decision Criteria (see Appendices) are weighted. Then Business Options which consider benefits (aligned with the Decision Criteria), dis-benefits, cost, timescale and risks are compared to determine whether to proceed with a renewal or which renewal option to take.
Prioritisation of Renewal Projects	Decisions on renewal works consider the short and long-term effects on the operating and structural integrity of the system
Design	Renewal works constructed each year are generally designed in advance as with other Capital Projects. Renewal works are designed and undertaken in accordance with Nelson City Council Land Development Manual standards for flood protection infrastructure (refer to stormwater chapter on NTLDM 2020) . Low impact urban design is used where appropriate. Investment is made in new technologies to rehabilitate existing assets where appropriate, for example by re-lining a culvert, or installing a headwall on a stream intake, rather than excavate and replace. The design of open channels allows for flood flows, enhanced natural characteristics and the wider community recreational use of the area
Deferred Renewals	The quantity and impact of deferred renewals (if any) is tracked The Council recognises that although the deferral of some items will not impede the operation of many assets in the short term, repeated deferral will create a future Council liability.

4.3.2. **Summary of future costs**

Refer to the section 6. Financial Summary for Financial Projections

Deferred Renewals

Under Flood Protection there are deferred renewals for gabion baskets, which are assessed during stream walkovers on an annual basis. There are a small number of culverts that have exceeded their expected base lives. Stream culverts are largely concrete pipe or box culverts. Armco culverts may be at a higher risk of failure, as observed in the Saxton Creek at Main Road Stoke in 2022.

Operational funding is provided specifically for condition and performance assessments under this Plan, with priority given to critical assets and assets which have exceeded their expected base lives.

Infrastructure strategy

The thirty year infrastructure strategy sets out the longer term renewal forecast for flood protection assets. The overarching strategy is based on renewing the network just in time to avoid disruption to the service and as demands of growth or other asset renewals offer opportunities to meet level of service requirements, and/or reduce both cost and community disruption.

4.4. Creation/Acquisition/Augmentation plan

Creation/Acquisition/Augmentation is a capital expenditure on works that create a new asset that previously did not exist, or upgrade to improve an existing asset. They may result from growth, social or environmental needs, levels of service. This includes:

- Expenditure which purchases or creates a new asset (not a replacement) or in any way improves an asset beyond its original design capacity.
- Upgrading works which increase the capacity of the asset including for future growth demand.
- Construction works designed to produce an improvement in the standard and operation of the asset beyond its present capacity.

Asset development and asset renewal can occur simultaneously. The purpose of asset renewal is to prevent a decline in the service potential of the assets whereas asset development is concerned with the service improvements, measured by asset performance and/or condition.

The Creation/ Acquisition/ Augmentation works programme for the next 10 year period is based on the following:

- Implementation of new flood management plans
- Upgrade of stream or river network capacity and/or assets to service future development or intensification areas
- Investment in fish passage, riparian shading or other in-stream initiatives that improve aquatic habitat.
- Installation of flood gates on stormwater outlets to reduce backflow via the stormwater or culverted stream network into low-lying basin areas.
- Creation of new hydraulic models for the assessment of stream and river overflows
- Installation of monitoring instrumentation for stream and river flood levels and flows.

4.4.1. Selection criteria

Level of Service Implication

The Creation/ Acquisition/ Augmentation works are to address level of service issues where there is no existing network or where the existing network is under-capacity. Works will be identified and prioritised following analysis undertaken for flood management plans in the various catchment areas of the city.

Demand Implications

The capital works proposed will address the need for increased network capacity and/or detention to reduce stream and river flows. New stream channels are not expected to be implemented, although in some cases localised stream re-alignments may be appropriate, where long-term environmental improvements will arise. Risk Implications

The capital works proposed address the need to decrease the risk to the city from inadequate response to flooding, in relation to the distribution, performance and condition of the flood protection assets.

Lifecycle Implications

Decisions made to construct a capital project will have implications for the life of the asset, as will subsequent design decisions. Optimised decision making will therefore be used to identify and prioritise all potential solutions for flood protection projects over $0.5million value. These decisions will be supported by a business case with decision criteria generally following the templates in Appendix E.

Selection Strategy

Table 4-15: Selection Strategy

Criteria	Objective / Description
Identification of Upgrade Needs	Asset upgrade needs are identified from analysis of: • Demand forecasts • System performance monitoring • Asset condition and estimated remaining life • Network modelling of system capacity requirements • Risk assessments (Risk Management Plan) • Flood management Plans, and • Customer service requests. A provisional forward capital works programme is maintained and updated at least annually.
Upgrade Project Categorisation	Upgrade Projects will be separated into projects to close service gaps and projects required to accommodate growth. Upgrade projects to close service gaps are generally funded entirely by Nelson City Council. However larger projects such as Saxton Creek Stage 4 have received co-financing from Central Government. Upgrade projects to accommodate growth may be partly or wholly funded through Development Contributions. The Saxton Creek upgrade is an example of a project that enabled significant subdivision to occur in a previously flood susceptible area.
Prioritisation of Upgrade Projects	Upgrade projects are justified and prioritised using a risk based process undertaken for flood management planning. In determining the requirement for capital or asset upgrade works the short and long-term effects on the operating and structural integrity of the system are considered, together with any forecast increase in loading upon the system. Decisions on priorities for new works and renewal of assets for the flood protection network are based on the following: • Known problem areas with flooding or inundation issues • New growth and intensification areas • Primary flow conduits – reticulation, rivers and streams • Secondary flow paths • Criticality of assets • Multiple network project (e.g. incorporating road work, sewer crossings, • Amenity improvements (such as shared paths along watercourses) • Improved environmental outcomes, such as making room for the river.
Project Approval	A long-term upgrade programme is prepared from projects meeting the assessment criteria, and all projects are approved through the Long Term Plan or Annual Plan process. Scheduled projects meeting assessment criteria not funded are listed on the forward works programme for the following year.

4.4.2. Capital investment strategies

The table below sets out the strategies used for developing capital works programmes for the flood protection system. These strategies are intended to progressively close gaps between target service standards (taking account of demographic and economic growth projections) and the current service capability of the asset system.

Table 4-16: Creation/Acquisition/Augmentation Strategies

Strategy	Objective / Description
Project Design	All asset upgrade works will be designed and constructed in accordance with NTLDM 2020 that promotes design solutions for the flood protection system based on: • Holistic catchment-based management approach that aims to reduce risk of harm to people/ property, and improve values associated with freshwater resources, including riparian management and in-stream habitat values. • Integrated design approach which aligns desired flood management objectives with amenity, recreation, ecological and cultural values in freshwater and marine environments • Design solutions that are robust, durable, efficient to operate and easily maintained. The standardisation of designs and specifications will be considered in the interest of facilitating replacement and operational simplicity. • An affordable whole of life operations, maintenance, replacement and renewal programme that is clearly described and costed. • Consideration of all feasible options, including non-asset demand management options and the use of second-hand plant. • A resilient network that performs well against the risks associated with natural hazards, and incorporates an appropriate level of redundancy. • Shared use of open space areas and road reserves, where agreed with the relevant activity managers, to enhance the value of adjoining property and neighbourhood values as a whole. • Consideration of nature-based solutions where these provide an effective flood mitigation response that aligns with the Goal of the Flood Protection Activity. • Economics of the various options. • Consideration of the likelihood that design options will achieve the desired benefits.
Future Development	Identifies sufficient, feasible development capacity in short, medium and long term and the location, timing and sequencing of infrastructure to support it.
Gifted (Vested) Assets	The risk, cost and benefits of accepting any new privately funded assets constructed in association with property development will be considered on a case by case basis in approval decisions. Such assets will be accepted into public ownership when satisfactorily completed in accordance with approvals given. Council will not contribute to the cost of such work unless there are exceptional service standard or equity issues.

4.4.3. Summary of future costs

Refer to the section 6. Financial Summary for Financial Projections

Capital expenditure on flood protection is in the range $4.5M - $5.0M per annum over the first 4 years of the plan, and from $4.5M - $6.5M from years 5 – 10. Approximately 50% of capital funding over the first 4 years of the Plan is allocated to flood recovery projects associated with the August 2022 flood event. Major upgrades on the Maitai River, Jenkins Creek and Poormans Valley Stream coinciding in the same years. These catchments have been identified as a priority for flood mitigation response based on flood risk.

4.5. Disposal plan

The disposal plan recognises that there can be activities and costs associated with the decommissioning and disposal of assets which are no longer required as part of the flood protection system. In some situations there can be revenue resulting from asset disposal (such as bridge or culvert removal and re-use).

Table 4-17: Disposal strategies /residual use

Strategy	Objective/ Description
Asset Disposal	Assess each proposal to dispose of surplus or redundant assets on an individual basis, subject to the requirements of the relevant legislation. Asset disposal will comply with the requirements of the Local Government Act 2002 and in particular the requirement for councils to retain a capability to provide for flood management. Redundant culverts are removed where their alignment clashes with replacement culverts or backfilled where their existence is considered dangerous. This is to ensure collapse does not occur. Possible use of abandoned culverts for telecommunication ducts is reviewed on a case by case basis. Currently Chorus and Network Tasman lease access to abandoned gas mains and abandoned water and wastewater pipes.
Residual Use	Mechanical equipment such as pumps that have been replaced will be reused for parts or sold as scrap metal unless it is considered to have genuine resale value. In this case, the piece of surplus equipment will be sold with income directed to the Nelson City Council account. As of June 2023, there are no pumps deployed within the flood protection network, however, pumps are utilised on a temporary basis for by-pass pumping around in-stream works areas.
Residual Value	The residual value (if any) of assets, which are planned to be disposed of, will be identified and provided for in financial projections. Abandoned stream culverts have possible future value for other purposes (such as ducting for cabling). As the extent of this value (if any) is uncertain it is not recognised in the asset valuation.
Record of Abandonment	When a stream, river or coastal asset is abandoned or replaced the Geographic Information System (GIS) and fixed asset register are updated. A system of job number creation and asset identification is used to document this process.

5. Risk Management Plan

This section describes the risk management procedures in place for the operation, maintenance and development of flood protection assets. Applying risk management procedures enables decisions to be made about the best use of limited resources to achieve Council's objectives to manage risks relating to the flood protection activity in the most efficient and cost effective way.

Threats and opportunities are assessed against the objectives and levels of service set out in this plan. Risk management is not simply about uncertain events with a downside (such as financial loss or legal proceedings). The process can also be used to identify and decide on the merits of uncertain opportunities for the Council to do things more innovatively, sustainably and effectively.

5.1. Critical assets

5.1.1. How critical assets are identified and managed

Critical assets are defined as those which have a high consequence of failure. Similarly, critical failure modes are those which have the highest consequences[8]. By identifying critical assets and critical failure modes, Council can target and refine investigative activities, maintenance plans and capital expenditure plans at the critical areas. Examples would include development of condition assessment programmes, and prioritisation of renewals.

Critical assets can be targeted for a more detailed risk analysis approach to understand the cause and probability of failure. Whilst they will have a high consequence of failure, they do not necessarily have a high likelihood of failure. Generally the failure of critical assets is considered to be unacceptable given the difficulty of repair and/or the strategic role they play, as this would result in a major disruption or inability to achieve one or more levels of service.

Council has undertaken a criticality assessment for physical assets under the Stormwater Activity, but this only covered a part of flood protection assets (specifically stream culverts). This was undertaken as part of a wider Natural Hazards Risk Assessment for the 3 Waters Infrastructure within the city. For this assessment a criticality matrix was developed to align as closely as practical with the Council's corporate consequence matrix. The range of impacts criteria included:

- Safety
- Health
- Asset Performance / Service Delivery
- Environmental / Historical / Cultural
- Financial
- Political / Community / Reputational
- Proximity of Asset to other Infrastructure
- Critical Facilities (Serviced by asset)

A 5 scale criticality rating was adopted to reflect consequence of asset failure:

1 = Insignificant (17% of Stormwater network)

[8] International Infrastructure Management Manual 2015 (Section 3.2.4)

2 = Minor (54% of Stormwater network)

3 = Moderate (12% of Stormwater network)

4 = Major (17% of Stormwater network, SW pumping stations, detention dams)

5 = Extreme (0% of stormwater network, large detention dams)

The asset criticality assessment table, and draft mapping of stormwater and flood protection network criticality is included in the Appendix J to this plan. Whilst the assessment related primarily to stormwater assets, the stream and river corridors are included, generally under a criticality rating score of 4 (Major consequence of asset failure). There is scope to refine this assessment and increase granularity to the level of specific flood protection assets along the stream and river network.

The process to identify critical assets was undertaken in a GIS type workspace through the application of geo-spatially linked rules, but this exercise also requires the application of professional judgement based on experience, considering the consequence of failure and lifelines evaluation to identify critical assets.

Assets that have been assessed as critical assets (Extreme or Major potential consequence of failure) within this activity are:

- Detention Basins and their associated outlets
- Stream intakes and culverts (culverts under roads may be transport assets)
- Concrete lined channels
- Stopbanks and flood walls
- Stream and river bank retaining structures: Gabion baskets, timber and concrete retaining walls. These are not always Council owned assets, as they may have been installed by a land owner.
- All urban sections of rivers and streams are considered as critical in terms of the need to prevent or remove blockages. Natural channels are not however counted as assets because they do not have a finite life expectancy, and they are not depreciated in the way built assets are.

Flood Protection assets that have lower criticality include:

- Rock armoured sections of channels generally have lower criticality than other forms of fixed retaining structure, as repair work is generally possible at lower cost.
- Gravel traps are useful for maintaining downstream flood carrying capacity, but these regularly fill during large flood events due to the volume of gravel transported.
- Grade control structures may have a lower consequence of failure in the short term, but failure of these assets may present a risk to assets (such as retaining structures, pipe crossings in bed of channel) upstream if stream or river bed degradation occurs.

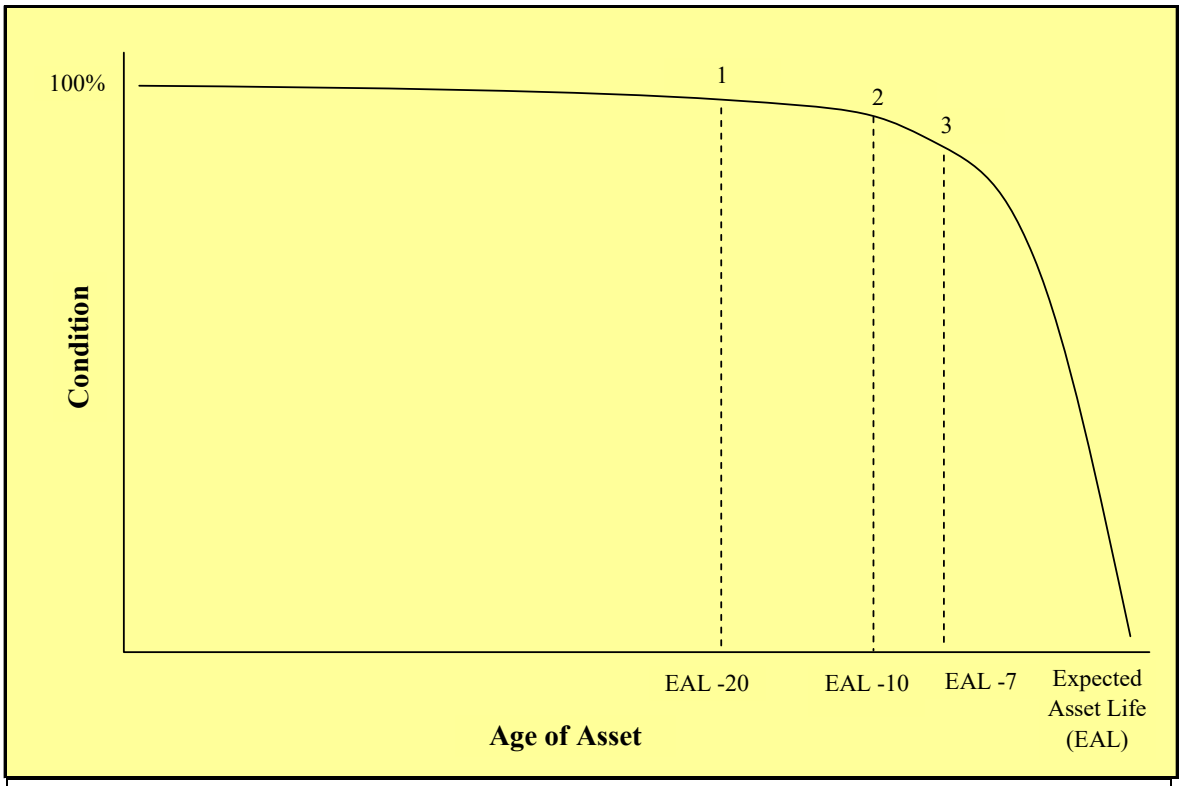
For risk management purposes, critical assets should be identified separately and assessed in greater detail as part of the activity management planning process.

By contrast non-critical assets are relatively quickly and easily repaired or replaced and their failure does not disrupt a significant number of customers.

Monitoring and intervention strategies are therefore quite different for both categories of asset. Critical assets attract a greater level of monitoring and ongoing condition assessment, with physical investigations taking place at a much earlier stage. Conversely non-critical assets can be expected to undergo a higher level of repair before complete replacement is considered.

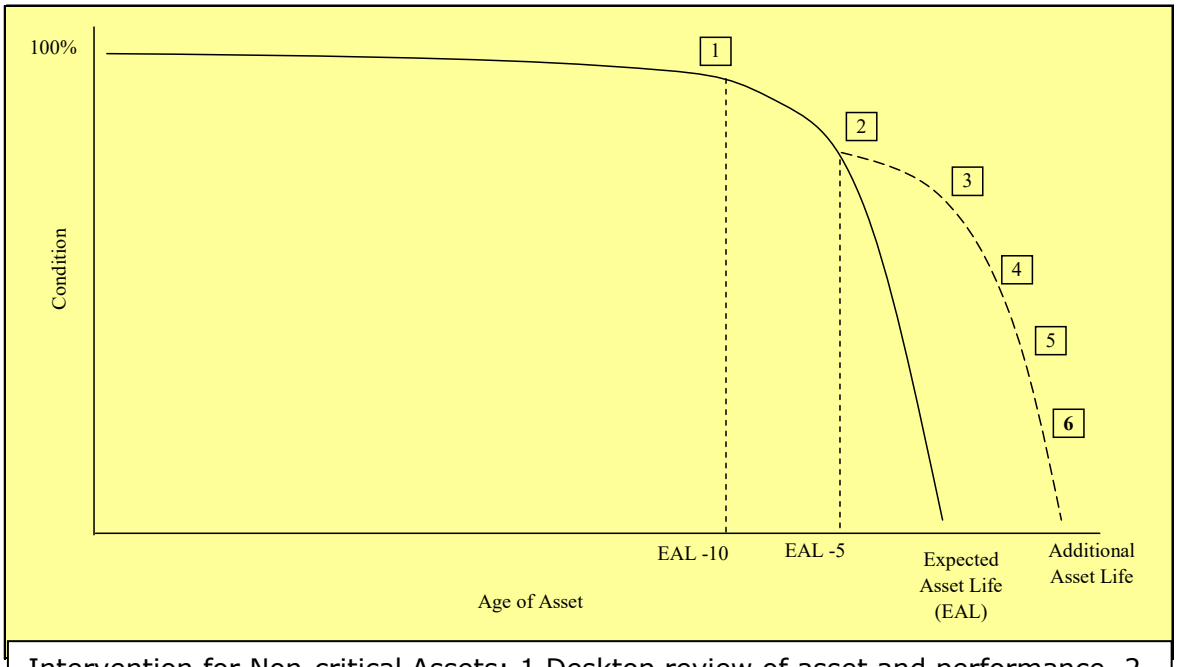
The following shows the nature and timing of interventions for both critical and non-critical assets.

Figure 5-1: Interventions for Critical Assets



Intervention for Critical Assets: 1 Desktop review of asset and performance supported by closed circuit television inspection, 2 Physical inspection of asset and performance review. 3 Replacement initiated.

Figure 5-2: Interventions for Non-Critical Assets



Intervention for Non-critical Assets: 1 Desktop review of asset and performance, 2 Physical inspection of asset with closed circuit television review and decision made on extending expected asset life, 3 Repair, 4 Repair, 5 Repair. 6 Replace asset.

The effect of criticality on an asset is highlighted in the following areas:

- Operation and maintenance planning
- Proactive or scheduled maintenance
- Priorities for collecting and determining the required level of reliability of data for Asset Management systems
- Priorities for undertaking condition assessments
- Adjusting economic lives with respect to renewal profiles
- Prioritising/Deferring renewals
- Prioritising expenditure
- Prioritising levels of service reviews

Asset criticality is currently being integrated into the ongoing operation, maintenance, renewals and capital programmes for this activity. This includes incorporation of asset criticality into the decision making framework used to prioritise renewals and level of service upgrades under the Flood Protection Management Plans, as well as updating inspections and programmed maintenance schedules for assets.

5.2. Risk assessment

5.2.1. Approach for assessing risks

The Council's risk management policy provides for assessing risk by:

- Clearly identifying the objectives for which achievement may be uncertain

- Identifying events which could make the achievement of one or more objectives uncertain
- For each event, using best available information (including considering the quality of that information and the controls already in place to manage the risk) to estimate the scale of consequence for an objective if the event happened and estimating a corresponding likelihood. Consequences and likelihoods are estimated using the Council's agreed risk criteria. See Appendix M Risk Register - Appendix Table M-1.
- Selecting the likelihood consequence combination from the council's criteria giving the largest risk for the event.

As this Plan is developed it will progressively apply the criteria required by the Council's updated risk management policy (formally adopted in August 2017 and updated in 2022/23) to managing risks. These criteria follow principle (g) of the international standard codifying good risk management practice (ISO 31000:2009) and tailor this generic process to the Council's specific circumstances. It is the organisation's intention to progressively align the risk management practices used in asset management with Council's Policy and Criteria and to apply generally accepted good practice.

Alignment with the new framework is in progress. The identified and assessed risks are not all derived by this process. Some are historical and may be based on a different framework and may have been ranked using criteria other than those adopted by the Council in August 2017.

5.2.2. **Top risks and how these will be managed**

The level of risk established from the assessment process is compared with the Council's residual risk tolerance as set out in Appendix Table M-4 of the Council's risk criteria. The table sets out priorities for action and at what level of Council any decisions should be taken to either accept (tolerate) the risk or take further actions to manage the risk to achieve a more acceptable risk level.

In many cases risks have already been acted on by officers in the course of the normal work of managing this activity and no further action is required.

In other cases specific decisions may be required to either accept the current level of risk or place actions in this plan to reduce the level of risk.

Table 5-1 provides a summary of areas of high corporate risk which relate to the flood protection activity, and some information about how these are treated. Many of these risks also relate more broadly to 3 Waters activities. There are also risks that relate to Infrastructure Group activities generally, for instance R00249 that relates to decisions on aspects of asset management being inconsistent with advice in AMPs.

Table 5-1: Summary of High Risks (Corporate) for the Flood Protection Activity

Risk #	Risk Title	Control / Treatment	Treatment Description	Likelihood	Severity	Rating
R00239	Significant change in governing framework for 'Local Water Done Well'	MC00215	- Processes and procedures. Promap. - Annual review of Asset Management Plans - 3 year development. - Succession plans - Handover period	Possible	Major	HIGH
		MC00917	- Project stages for managing organisational change			
		MC00918	Staff training to enhance resilience for those likely to be impacted by 3-waters changes - First round of training, "Managing people through change" and "Coping with Change", rolled out in quarter three of 2021-22.			
R00242	Lack of resources to complete indicative business cases	MC00211	- Review workloads - Offload to Capital Projects where they have an available PM - Pay for external resources to PM.	Likely	Major	HIGH
R00249	Decisions about asset maintenance/ development/ replacement made ignoring advice in AMPs (e.g. politicized 'pet projects')	MC00226	- Ensure elected representatives and Senior Leadership Team are well informed with regard to necessity and scope of projects and the content of AMP's. - Workshop AMP development with Council.	Likely	Moderate	HIGH
R00251	Operational - One or more operated assets do not comply with resource consents	MC00235	- Processes for RMA compliance and reporting. - Independent contractor monitoring and reporting - Alarm systems, level indicators. - External audits.	Possible	Major	HIGH

R00256	Contractors do not meet required health and safety standard	MC00268	- Contractor reports to Council - Council reviews H&S systems - Audits of H&S systems	Possible	Major	HIGH
R00692	Lack of Staff (NCC) and operator (Nelmac) experience/resilience	MC01012	- Employ experienced people where possible. - Employ appropriately qualified and skilled staff. - Competitive pay and conditions should be competitive.	Possible	Major	HIGH
R00693	Climate Change /Sea Level Rise	MC01013	- Nelson Tasman Emergency Management Plan. - Emergency procedures manual and exercises. - Programmes related to resilience/adaptation underway - Continue to develop criticality and natural hazards understanding with a view to progressing to the development of solutions (that will minimise the risk of failure due to a natural hazard event) in order of priority	Possible	Major	HIGH

5.2.3. **Activity Specific risks and how these will be managed**

There are a number of medium level operational risks identified for the flood protection activity as follows:

- **Flood event where reticulation/ open channel has insufficient capacity**: This risk relates to the capacity of the network in a large Q20/ Q50 or Q100 flood event. Existing controls are:
  - Inspect and maintain existing capacity. Respond to damage after event. Upgrade sections to capacity identified through risk-based approach
  - Civil Defence and Emergency Management Response.

- **Flood event after period of inadequate maintenance:** This risk relates to the capacity of open channels, including watercourses, and the condition of structures especially intakes within the channels. The risk may be elevated due to accumulation of debris resulting in blockages. Existing controls are:
  - Regular inspections and maintenance programme of public drain sections.
  - Emergency Procedures Manual. Civil Defence and emergency management response.
  - Culverts, intakes and outfalls regularly monitored and maintained under service providers maintenance contract

- **Flood event coinciding with high tide:** Existing controls are:
  - Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response. Stormwater pumping systems at Tahunanui and The Wood in the event of major river overflows. The remaining risk is insured.
  - Sensitivity analysis to assess risk. Sensitivity analysis undertaken by Tonkin + Taylor in 2020 identified that Q100 flood levels predicted in 2130 for the CBD and The Wood were not particularly sensitive to a tidal level between MHWS-6 and the lowest high tide occurring on an annual basis.

- **Earthquake risk to assets**: This relates to the failure of flood protection assets such as detention dams, stream culverts, flood gates, stopbanks and stream bank retaining structures An extremely large and rare seismic event may lead to structural failure of the Maitai Water Supply dam (which would potentially lead to the discharge of a large volume of water into the Maitai River and cause extensive flooding in the city). Existing controls are:
  - Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.
  - Respond to damage after event.
  - Regular inspections and maintenance programme.
  - Initiation of programmes that increase the resilience of flood protection assets to earthquake risk. Refer to potential risk issue 2 below.

Potential Risks

Risks can be seen to arise from many areas of the Nelson City Council, both in the physical aspect for assets and business risks. Many of the potential risks relate to the issues identified for this activity in the Executive Summary:

Issue 1: Unless additional capacity is allowed for, the level of service provided by existing flood protection assets will progressively reduce over time due to more intense storms and sea level rise projected with climate change.

Issue 2: Damage to flood protection assets from natural hazards.

Issue 3: The risk of flood protection asset failures will increase over time unless assets are maintained, renewed, upgraded or adapted (eg. nature-based solutions).

Issue 4: Meeting new freshwater objectives and standards set under future freshwater plans drafted to meet the National Policy Statement for Freshwater Management (NPS-FM), and the National Environmental Standard for Freshwater Management (NES-FM).

The implications associate with each issue is laid out below.

Issue 1: Unless additional capacity is allowed for, the level of service provided by existing flood protection assets will progressively reduce over time due to more intense storms and sea level rise projected with climate change.

It is anticipated that climate change effects will expose assets to higher levels of risk in future, as the capacity of some assets will be exceeded due to increased storm rainfall intensity and sea level rise.

Climate change is an evolving area of research and as such involves significant assumptions with associated uncertainties. Council seeks to limit the impact of those uncertainties by relying on expert guidance from Central Government and science providers such as NIWA. Risk management is also undertaken by programming capital works in a staged fashion. As a starting point, future upgrades of the flood protection network will seek to accommodate predicted future flows at 2090, which is consistent with NTLDM 2020 standards. A challenge for central Nelson's flood management is low-lying areas of reclaimed land in the central city. As with other utilities, the flood protection activity is likely to be impacted by sea level rise because the outlet of river and stream channels is in many instances the sea or tidal margins and the channel flow is essentially gravity based. The river and stream estuaries flow through lower lying areas of the city which generally have level terrain. The low bed level grades reduce in-channel velocity allowing deposition of gravels and silt to occur. Achieving a specific level of service for flood protection in these areas will become more challenging if current sea level projections eventuate.

The LTP 2018 - 2028 signalled that Council will prioritise catchments for flood management planning based on their risk profile. This is undertaken through updated catchment modelling and development of Flood Management Plans for priority catchments. The Maitai catchment is the first to be assessed and high level strategic options for flood management were developed for consultation in 2020/21. Options for addressing the flooding risk to urban properties are being considered for five broad time bands: Current day, 2050, 2070, 2090, and 2120-30. Detailed design for upgrading works ideally set a framework for protecting against future flood risk at

2090. However, in some instances it is not feasible or cost effective to provide such long term protection. In these instances structures are designed to be adaptable where possible, so that they can be modified in future to extend their useful life.

Issue 2: Damage to flood protection assets from natural hazards.

Council has undertook a preliminary a review of natural hazards risks to stormwater and flood protection assets through the 3 Waters Natural Hazards Assessment referred to above. Natural hazards spatial layers held by Council were overlaid on asset attribute data (including asset criticality grades) to inform the risk assessment for these assets. This generated a shortlist of highly critical at risk assets, although most of these were stormwater assets. It is anticipated that a similar method can be adopted for flood protection assets to provide the basis for developing resilience improvement projects.

Recent work by Council has focussed on natural hazards that might impact on the city, in particular:

- Direct damage from earthquake shaking and fault rupture
- Damage from liquefaction in susceptible areas
- Damage from Tsunami
- Damage from Flooding and river / stream bank scour.
- Coastal hazards: Coastal erosion and inundation (storm surge)
- Impact of potential climate change and sea level rise

The Bibliography in Appendix B includes natural hazards assessments relevant to Nelson, including those used for the 3 Waters Natural Hazards Risk Assessment.

Issue 3: The risk of flood protection asset failures will increase over time unless assets are maintained, renewed, upgraded or adapted (eg. nature-based solutions).

Council proposes to develop a flood protection renewal strategy to address the increasing level of anticipated renewals anticipated from the 2050s onwards, and to identify renewals required earlier due to poor condition. This will include more regular assessments of critical assets (including larger stream culverts and sections of stream bank retaining and other in-stream structures. Upgrades to the flood protection network are proposed to be prioritised for the following catchments under this Plan:

- Maitai River
- Brook Stream
- York Stream
- Jenkins creek
- Poormans Valley Stream

The Stormwater Flood Management Plans will incorporate flood risk assessments based on river / stream network, as well as watercourse assessments to identify ecological and physical issues and constraints within the receiving environment. Preference will be given to nature-based solutions where they provide a similar level of flood mitigation at a comparable cost to conventional methods

Issue 4: Meeting new freshwater objectives and standards set under future freshwater plans drafted to meet the National Policy Statement for Freshwater Management (NPS-FM), and the National Environmental Standard for Freshwater Management (NES-FM).

The Whakamahere Whakatū Nelson Plan will need to give effect to new national policies on freshwater, which is likely to result in higher standards for freshwater quality and protection of natural habitat. Funding is provided in this Plan to improve gravel management so as to reduce the impact of regular gravel clearance from streams and rivers. These activities will be undertaken in partnership with the Science and Environment team so that data acquisition and analysis is coordinated, and that new sites complement the existing State of the Environment monitoring network managed by that team.

Risk summary

The significant risks for this activity are associated with the following:

- Flood events resulting in major stream and river channel overflows, and secondary flow paths
- Asset failure (structural failure and blockages)
- Encroachment of development on streams, rivers and floodplains.
- Risk of compromising amenity, recreation and ecological values, particularly in-stream values
- Increasing gravel deposition due to upstream catchment land use change, harvesting activities and sea level rise affecting estuaries.
- Over-extraction of gravel or natural processes may lead to stream bed degradation, that may undermine stream bank retaining structures and other assets along the stream corridor.
- Landslips resulting in significant input of debris and gravel into stream and river channels. This may result in reduced channel capacity and more frequent flood overflows.

The Asset Risk Register needs to be further developed to a component level to be confident that the risk has been appropriately evaluated. This is necessary as different assets lend themselves to different treatment options. These treatment options may include:

- Accepting risk i.e. do nothing, monitor
- Develop strategies to monitor, analyse and manage the level of risk
- Improvement Action Plans relating to specific assets or activities
- Capital investment to reduce the level of risk
- Increased maintenance
- Early replacement or culvert upgrade
- High level of procedures, decision making process, contingency plans and operation and maintenance manuals

These treatment options may increase operating and depreciation costs but offset the high level of risks associated with failure of assets or failure to meet levels of service. If the improvements or actions indicated in the action plans are implemented then the level of risk is considered to be at an acceptable level for the ongoing operation of the Nelson City Council asset.

5.3. Infrastructure resilience approach

Important outcomes for this activity are the resilience of assets, and resilience of urban areas to flooding, both now and in the future. As outlined in Section 1.2 – Climate Change, this is particularly relevant in the context of projected climate change as risks associated with flooding are anticipated to increase over time.

5.3.1 A Resilience approach:

Resilience is commonly defined as the capacity for 'bouncing back faster after stress, enduring greater stresses, and being disturbed less by a given amount of stress'. However, major risks are often systemic in nature, and a system may demonstrate resilience not by returning exactly to its previous state, but instead by finding different ways to carry out essential functions. The following capabilities contribute to system resilience[9]:

- Adapt to changing contexts
- Withstand sudden shocks
- Recover to a desired equilibrium, either the previous one or a new one, while preserving the continuity of its operations.

While risks tend to focus on the negative consequences from uncertainty, the concept of resilience encourages us to grasp opportunities and innovate to reduce our exposure and vulnerability to the impact from shocks and stresses as they occur.

Development of resilient infrastructure:

Current advice from both the Ministry for the Environment and the National Institute for Water and Atmospheric studies is that climate change will lead to a greater number of extreme weather events into the future with the prospect of more flooding, particularly in the lower areas of the city that are subject to sea level rise. The following measures are being taken to promote the resilience of flood protection assets:

- Where practicable, design of flood protection assets based on 2090 storm rainfall data assuming the more conservative RCP 8.5 climate scenario and using the latest version of the High Intensity Rainfall Design System developed by NIWA (HIRDS v4, 2018).
- Use of catchment flood models for the major river and stream systems to identify channel capacity for both present day and future time bands. These models also identify the secondary flow paths which result from channel overflow.
- Development of Flood Management Plans that consider both present day and future climate and sea level rise, and prioritise response option combinations based on evolving risk over time.
- Increase natural hazards resilience of assets to wider network hazards such as earthquake fault line rupture and liquefaction. Much of this work is expected to focus on the in-stream detention dams, and stopbanks across the city, in particular in mapped liquefaction susceptible areas and fault corridors. The work will link with similar projects in the stormwater, wastewater and water supply activities.

[9] World Economic Forum (2013), pp38-39

- Development of a GIS based collector application to better record identified issues with the flood protection network, so that these can be better analysed and addressed through either maintenance or capital programmes.
- Incorporating adaptable design for new assets where practical, for instance designing the foundation of stopbanks to enable future raising of the structure as and when sea level rise or higher stream flows resulting from climate change require a higher level of service to be achieved.

Development of Resilient Urban Areas:

Generally there will be a need for flood protection infrastructure where urban development exists. The planning of future urban development presents an opportunity to avoid or minimise flood risk, and is therefore an important part of the process to increase the resilience of urban areas generally.

A background document by the Ministry of Business, Innovation and Employment (MBIE) identified lessons on resilience after the Christchurch earthquakes, noting that "land-use planning legislation needs to better recognise natural hazards", and that "decision-making frameworks need to give adequate weight to the risks of natural hazards, particularly in areas of existing development"[10]

Similarly, a report by the Parliamentary Commissioner for the Environment in 2015 noted that: *'It is inevitable that both central and local government will begin to face pleas for increasing financial assistance. The highest costs will come from large scale managed retreat.'* The same report highlights that in many parts of the country it would only take 300mm to 400mm of sea level rise for a coastal inundation event which currently would be expected to occur on average every 100 years (similar to Cyclone Fehi), to occur on average annually. This applies to the situation for Nelson.

The Ministry for the Environment issued Interim Guidance in mid-2022 which recommends the adoption of five New Zealand wide sea level projection scenarios for use in coastal hazard, vulnerability/risk assessments and adaptation planning, and provides transitional minimum values for sea level rise for four broad categories of development to be used in planning:

- Avoid hazard risk for coastal subdivision, greenfield developments and major new infrastructure by using sea level rise over more than 100 years and the SSP 8.5 H+ scenario.
- Adapt to hazards by conducting risk assessment using a range of scenarios and using the dynamic adaptive pathways approach for changes in land use involving intensification. Apply the SSP 8.5 H+ scenario where adaptive pathways planning has not been completed.
- Apply the SSP 8.5M scenario at 2130 for existing coastal development and asset planning; and
- Apply the SSP 8.5M scenario at 2080 for non-habitable short-lived assets with functional need to be at the coast and either low-consequences or readily adaptable (including services).

Where appropriate, Nelson City Council will follow this approach to factor future sea level rise into its technical assessments of climate change related hazards and to formulate minimum ground and floor level requirements for low lying sites in the Inundation Practice Note and the Whakamahere Whakatū Nelson Plan. The predictions

[10] Ministry of Business, Innovation and Employment (2015) pg6

for sea level rise, flooding, and storm surges will be monitored on an ongoing basis to ensure that Council's future planning documents reflect the most up to date predictions.

5.3.2 Refining the risk based approach to prioritise responses

A risk based approach is expected to better align the probability and consequences of flood events with community values for streams and rivers and the affordability of flood control schemes.

The flood models that have been developed allow Council to better estimate the likely cost to the community of flood events and also model possible response scenarios. These response options will also need to consider a range of criteria such as environmental, social, legislative, reputational and cultural when deciding on the appropriate options to address flooding.

The main priority in the first three years of this Plan is to further develop the Maitai River flood response options, progress public consultation on the options, initiate a design process for the preferred options, and seek funding assistance to implement the options. Other urban catchments that will be prioritised include: Brook Stream, York Stream, Jenkins Creek, and Poorman Valley Stream. Atawhai catchments impacted by the August 2022 flood event will have funding allocated to resilience projects under the Flood recovery programme that extends from 2022/23 to 2027/28.

Under this Plan, Council also intends to extend the Flood Protection activity to rural catchments. Subject to public engagement through the Long Term Plan, Council will allocate funding for river maintenance, river management plans and level of service upgrades in rural catchments over the course of this Plan.

5.3.3 Insurance

Nelson City Council has insurance cover for the Wastewater, Water & Stormwater services, staff and property as detailed in Table 5-1 below. The insurance cover is updated on a regular basis following valuations to ensure the insurance cover is appropriate for its purpose. Flood Protection assets that were previously counted as stormwater assets are covered under this insurance.

Table 5-1: Flood Protection Insurance Provisions

Components / Items	Marsh Top of the South collective				Aon SI collective
	Public Liability	Professional Indemnity	Buildings and Contents	Motor Insurance	
Stream Bank Protection assets					✓
Flood Protection detention basins					✓
Staff	✓	✓			
Council Vehicles				✓	
Private property damage related to flood damage	✓				
✓ Indicates coverage by that particular insurance type					

Aon South Island (SI) collective

Nelson City Council is a member of an Aon South Island collective of councils.

In the event of a natural disaster, the insurance cover will generally cover 40% of the reinstatement cost of infrastructure assets that have been damaged and declared for cover by the Aon SI collective.

The Aon SI collective is a shared program limit, Council has a sub-limit of $180 million plus AICOW – Additional Increased Cost of Working – this allows for additional costs to be paid over and above normal operating costs during a loss. 2020 insurance catastrophe modelling indicated the $180m limit is adequate.

5.3.4 Emergency Management

Emergency Management

Local Authority Responsibility

Section 64 of the Civil Defence Emergency Management Act 2002 requires Local Authorities to:

64 Duties of local authorities

(1) A local authority must plan and provide for civil defence emergency management within its district.

(2) A local authority must ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency"

When a serious emergency event occurs an Incident Management Team (IMT) is activated to lead Council's response, to ensure a clear decision making structure. The

lead role of incident manager is filled by a member of Nelson City Council's Senior Leadership Team, and the other IMT members generally include the applicable manager(s) according to the type of event. More staff are added depending on the scale and complexity of the event.

Local Emergency Management Arrangements

Nelson Tasman Emergency Management Group is a joint committee of both Nelson City Council and Tasman District Council.

The Nelson Tasman Emergency Management Group Plan provides for an 'all hazards' approach to emergency management planning and activity within Nelson and the Tasman District. The Nelson Tasman Emergency Management Group Plan states the Emergency Management structure and systems necessary to manage those hazards, including the arrangements for declaring a state of emergency in the Group's area. The Group Plan is the primary instrument whereby the community identifies and assesses its hazards and risks, and decides on the acceptable level of risk to be managed and how it is to be managed.

Lifelines Responsibility

Section 60 of the Civil Defence Emergency Management Act 2002 requires Local Authorities to support lifeline utilities as follows:

60 Duties of lifeline utilities

Every lifeline utility must—

ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency

Nelson City Council is a member of the Nelson Tasman Emergency Management Group Lifelines committee.

Nelson Tasman Emergency Management and Nelson City Council Emergency Response Plans

The following documents are available for guidance:

- Nelson Tasman Emergency Management Group Plan
- Nelson City Council Emergency Procedures Manual

Table 5-2: Risk Reduction, Readiness, Response and Recovery Status

Activities Required	Description	Flood Protection Status
Risk Reduction	Identifying hazards, describing risks, and taking actions to reduce the probability or consequences of potential events.	Asset Management Risk Register Utilities Asset Improvement Register Flood Management Plans
Readiness	Planning and preparation required to equip agencies and communities to respond and recover.	Emergency procedures manual and exercises.
Response	Addressing immediate problems after an emergency.	Emergency procedures manual and exercises. Operations and maintenance response by contractors (Nelmac and Fulton Hogan)
Recovery	Addressing the long-term rehabilitation of the community.	Nelson-Tasman Emergency Management Group, Nelson City Council

5.3.5 Interconnectivity Effects

Interconnectivity or interdependence between different utilities during and after a disaster is of utmost importance. In the event of failure, access is necessary to visit a site and provide power for recovery or removal of debris. To enable effective and efficient recovery of lifelines from an event which disrupts their service, dependencies on other lifelines must be understood and where necessary, mitigated against.

Tables 5-3 and 5-4 summarise interdependencies between lifelines sectors during business-as-usual and major disaster events where disruption is expected to roads and electricity networks. The ratings presented in this section are illustrative only – obviously the extent of dependence in a response and recovery situation will depend on the specific scenario. The total dependency scores clearly illustrate the importance of electricity, roads, fuel and telecommunications to the other sectors, with air transport, VHF and broadcasting becoming more important in a major disaster event.

Table 5-3: Interdependency Matrix – Business as Usual

The degree to which the utilities listed to the right are dependent on the utilities listed below	Roads	Rail	Sea Transport	Air Transport	Water Supply	Wastewater	Stormwater	Electricity	Gas	Fuel Supply	Broadcasting	VHF Radio	Telecomms	Total Dependency
Electricity	1	2	3	3	3	3	2		2	2	3	3	3	30
Roads		3	3	3	2	2	2	2	2	3	2	2	2	28
Fuel	2	3	3	3	2	2	2	2	2		2	2	2	27
Tele-comms	2	2	2	2	2	2	2	2	2	2	2	3		25
Water Supply	1	1	1	2		3	1	1	1	1	1	1	2	16
VHF Radio	2	2	2	2	1	1	1	1	1	1	1		1	16
Stormwater	2	1	1	2	1	1		1	1	1	1	1	1	14
Wastewater	1	1	1	2	1		1	1	1	1	1	1	1	13
Rail	1		1	1	1	1	1	1	1	1	1	1	1	12
Sea Transport	1	1		1	1	1	1	1	1	1	1	1	1	12
Air Transport	1	1	1		1	1	1	1	1	1	1	1	1	12
Gas	1	1	1	1	1	1	1	1		1	1	1	1	12
Broadcasting	1	1	1	1	1	1	1	1	1	1		1	1	12

Table 5-4: Interdependency Matrix – During / Post Disaster Event

The degree to which the utilities listed to the right are dependent on the utilities listed below	Roads	Rail	Sea Transport	Air Transport	Water Supply	Wastewater	Stormwater	Electricity	Gas	Fuel Supply	Broadcasting	VHF Radio	Telecomms	Total Dependency
Fuel	3	3	3	3	3	3	3	3	3		3	3	3	36
Roads		3	3	3	3	3	3	3	3	3	2	2	3	34
Tele-comms	3	2	2	2	3	3	3	3	3	2	2	3		31
Electricity	1	2	3	3	3	3	2		2	2	3	3	3	30
VHF Radio	2	2	3	3	2	2	2	2	2	2	2		2	26
Broadcasting	2	2	2	2	2	2	2	2	2	2		2	2	24
Air Transport	2	1	1		2	2	2	2	2	2	2	2	2	22
Water Supply	1	1	1	2		3	1	1	1	1	1	1	2	16
Stormwater	2	1	1	2	1	1		1	1	1	1	1	1	14
Wastewater	1	1	1	2	1		1	1	1	1	1	1	1	13
Rail	1		1	1	1	1	1	1	1	1	1	1	1	12
Sea Transport	1	1		1	1	1	1	1	1	1	1	1	1	12
Gas	1	1	1	1	1	1	1	1		1	1	1	1	12

3: Required for Service to Function,
2: Important but can partially function and/or has full backup,
1: Minimal requirement for service to function.

Electricity Supply

The electricity lines suppliers are Network Tasman Ltd and Nelson Electricity Ltd.

Energy supply is currently via a contract with Genesis.

Water NZ

Nelson City Councils membership of WaterNZ give it access to a wide pool of expertise both during times of emergency and in general.

Succession Planning

Succession planning within any business is considered necessary to reduce the risk associated with staff leaving the organisation. Succession planning allows institutional knowledge to be passed on, and promotes continuity of organisational culture.

Currently succession planning is largely by way of multiple staff members involved in administering the activity and detailing strategies for the future in activity management plans.

In order to ensure greater effectiveness there is a need to improve planning and recording of strategies over the next three years. The separation of Stormwater from Flood Protection provides an opportunity to customise the Activity Management Plans for each activity.

6. Financial summary

This Section sets out financial statements, funding strategy, depreciation forecast and charges for the Flood Protection Services in Nelson City.

The Local Government Act 2002 (Part 6 Subpart 3) requires local authorities to manage their finances "prudently and in a manner that promotes the current and future interests of the community. This implies compliance with applicable Financial Reporting Standards, which include Public Benefit Entity International Public Sector Accounting Standards (PBE IPSAS).

This Plan provides the basis for meeting these requirements.

6.1. Financial statements and projections

Definition of Expenditure Categories

All expenditure on infrastructure assets falls into one of the following categories:

- Capital Expenditure
  - Renewals / Replacement expenditure
  - Creation/Acquisition/Augmentation
    - Capital increased level of service
    - Capital growth
- Operations and Maintenance Expenditure
  - Base Expenditure
  - Unprogrammed expenses
  - Programmed expenses

Tables 6-1 and 6-2 set out the projected capital and operational expenditure for this activity over the 10 years of this Plan. Major projects are listed below:

- Current/Ongoing Major Projects
  - Saxton Creek Upgrade (Expected completion 2023/24)
  - Maitai Flood Mitigation Project
  - Flood Recovery Programme (Gravel removal)
  - Flood Recovery Programme (Stream bank erosion)
  - Flood Recovery Programme (River Stream Improvements)

- New Projects
  - Todds Valley Stream Upgrades
  - Oldham Creek Upgrades
  - Jenkins Creek Upgrades
  - Brook Stream Catchment Improvements
  - Wakapuaka Flats Drainage Upgrades
  - Rural Rivers Upgrades

Table 6-1: Projected Capital Expenditure 2024 – 2034

Account	2024/25 AMP (2024/34)	2025/26 AMP (2024/34)	2026/27 AMP (2024/34)	2027/28 AMP (2024/34)	2028/29 AMP (2024/34)	2029/30 AMP (2024/34)	2030/31 AMP (2024/34)	2031/32 AMP (2024/34)	2032/33 AMP (2024/34)	2033/34 AMP (2024/34)
6520 Flood Protection	**3,422,000**	**5,205,500**	**4,470,000**	**3,970,000**	**4,620,000**	**5,955,000**	**6,435,000**	**5,255,000**	**4,705,000**	**5,865,000**
Capital Growth	**55,000**	**335,500**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
652076903704. IAF Flood Gate Upgrade	55,000	335,500	0	0	0	0	0	0	0	0
Capital Increased LOS	**3,367,000**	**4,870,000**	**4,470,000**	**3,970,000**	**4,520,000**	**5,855,000**	**6,335,000**	**5,155,000**	**4,605,000**	**5,665,000**
652078102509. Trafalgar Park and Hathaway Tce	0	0	0	100,000	100,000	500,000	50,000	0	0	0
652079101100. Capital: York Stream Channel Upgrade	0	0	0	0	0	0	0	100,000	150,000	150,000
652079101178. Maitai flood management	300,000	500,000	500,000	1,000,000	1,000,000	1,500,000	2,000,000	2,000,000	2,000,000	2,000,000
652079102073. Capital: Oldham Creek	0	0	0	100,000	100,000	500,000	500,000	500,000	500,000	50,000
652079103444. Coastal Inundation Modelling	80,000	0	0	0	100,000	100,000	0	0	0	0
652079103447. Coastal Erosion Modelling	50,000	0	0	0	100,000	50,000	0	0	0	0
652079103450. Coastal Response Strategy Implementation	0	0	0	0	100,000	200,000	200,000	500,000	800,000	1,000,000
652079111088. Capital: Todds Valley Stream upgrade	0	0	0	100,000	150,000	1,000,000	1,000,000	100,000	0	0
652079111387. Brook Stream fish passage	0	0	100,000	100,000	100,000	100,000	0	0	0	0
652079112625. Jenkins & Arapiki (airport) - Flood Protection	167,000	1,200,000	500,000	50,000	0	0	0	0	0	0
652079112690. Minor Flood improvement prgm	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	50,000
652079112721. Wakapuaka Flats Stormwater Network Upgrade	150,000	150,000	0	0	50,000	100,000	250,000	100,000	0	0
652079112867. Orchard Stream	0	0	0	0	0	0	30,000	100,000	150,000	200,000
652079112868. Jenkins Stream stormwater upgrade	0	0	200,000	150,000	500,000	500,000	500,000	250,000	0	0
652079112969. Poormans Stream	0	0	0	0	0	0	100,000	150,000	150,000	1,500,000
652079113409. Orphanage Stream Flood Management Stage 2	0	0	0	0	100,000	400,000	400,000	100,000	0	0
652079113600. Flood Recovery Channel Bank protection	1,600,000	1,100,000	1,000,000	300,000	0	0	0	0	0	0
652079113615. Flood Recovery 2022 River Stream Improvements	500,000	1,250,000	1,600,000	1,550,000	1,550,000	0	0	0	0	0
652079122964. Saxton Creek Stage 4 Upgrade	200,000	0	0	0	0	0	0	0	0	0
652079902052. Brook Stream Catchment Improvements	100,000	400,000	300,000	150,000	150,000	100,000	500,000	500,000	100,000	0
652079902103. Inventory of Urban Streams	100,000	150,000	150,000	100,000	150,000	150,000	150,000	100,000	100,000	100,000

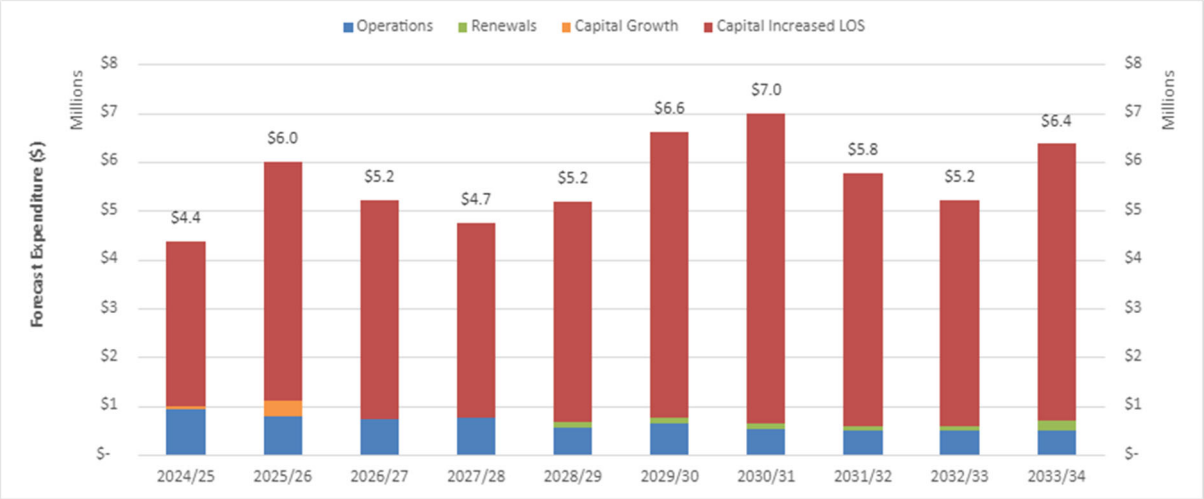
Account	2024/25 AMP (2024/34)	2025/26 AMP (2024/34)	2026/27 AMP (2024/34)	2027/28 AMP (2024/34)	2028/29 AMP (2024/34)	2029/30 AMP (2024/34)	2030/31 AMP (2024/34)	2031/32 AMP (2024/34)	2032/33 AMP (2024/34)	2033/34 AMP (2024/34)
652079902657. Flood Mitigation	80,000	80,000	80,000	80,000	80,000	65,000	65,000	65,000	65,000	65,000
652079902872. Rural Rivers	0	0	0	100,000	100,000	500,000	500,000	500,000	500,000	500,000
652079902962. Secondary Flow Paths	0	0	0	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Renewals	**0**	**0**	**0**	**0**	**100,000**	**100,000**	**100,000**	**100,000**	**100,000**	**200,000**
652073113379. Channel Bank Renewal	0	0	0	0	100,000	100,000	100,000	100,000	100,000	200,000

Table 6-2: Projected Operational Expenditure 2024 - 2034

Account	2024/25 AMP (2024/34)	2025/26 AMP (2024/34)	2026/27 AMP (2024/34)	2027/28 AMP (2024/34)	2028/29 AMP (2024/34)	2029/30 AMP (2024/34)	2030/31 AMP (2024/34)	2031/32 AMP (2024/34)	2032/33 AMP (2024/34)	2033/34 AMP (2024/34)
6520 Flood Protection	**979,090**	**825,128**	**774,175**	**811,048**	**612,734**	**691,450**	**583,168**	**541,168**	**541,168**	**541,168**
Base Expenditure	**199,768**	**244,768**	**242,768**	**253,584**	**254,200**	**284,838**	**255,465**	**255,465**	**255,465**	**255,465**
652020100625. Mtce: Wakapuaka Land Drainage	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
65202017. After Hours Duty Officer	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
652020301128. Flood Protection Monitoring Sites	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
65202031. Flood Protection Open Channel Programmed Maintenance	56,050	56,050	56,050	61,866	62,482	73,120	63,747	63,747	63,747	63,747
652020312318. Mtce: Environmnt Monitor Strms	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500
652020312558. Rural Open Channel Programmed Maintenance	0	40,000	40,000	40,000	40,000	60,000	40,000	40,000	40,000	40,000
65202637. Insurance	67,218	67,218	67,218	67,218	67,218	67,218	67,218	67,218	67,218	67,218
65202670. Weather Forecasting	0	0	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
65202710. Legal Fees	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
65202720. Valuation Fees	5,000	10,000	5,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Unprogrammed Expenses	**177,322**	**178,360**	**179,407**	**180,464**	**181,534**	**222,612**	**183,703**	**183,703**	**183,703**	**183,703**
652030102312. Reactive maintenance CCTV	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
65203031. Open Channel Reactive Maintenance	103,722	104,760	105,807	106,864	107,934	129,012	110,103	110,103	110,103	110,103
652030312558. Rural Open Channel Reactive Maintenance	68,600	68,600	68,600	68,600	68,600	88,600	68,600	68,600	68,600	68,600
Programmed Expenses	**602,000**	**402,000**	**352,000**	**377,000**	**177,000**	**184,000**	**144,000**	**102,000**	**102,000**	**102,000**
652040311444. Flood Management Detention Pond Maintenance	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
652040313619. Flood Recovery 2022 - Gravel Removal - Loan Funded	500,000	300,000	250,000	200,000	0	0	0	0	0	0
65204032. Condition and Performance Assessments	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
652040323445. Beach profile surveys	0	0	0	0	0	42,000	42,000	0	0	0
652040323446. Coastal structures condition Assessment	0	0	0	35,000	35,000	0	0	0	0	0
652043100800. River management Projects	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000
65204372. Capex investigation, options, testing, engagement	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000
652047302857. Flood Management Assets Renewal Strategy	0	0	0	40,000	40,000	40,000	0	0	0	0
652047601593. Flood Management asset mgmt support	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Figure 6-1 below indicates that the significant proportion of capital works programme is associated with LOS requirements.

Figure 6-1: Flood Protection Budgets – Ten Years

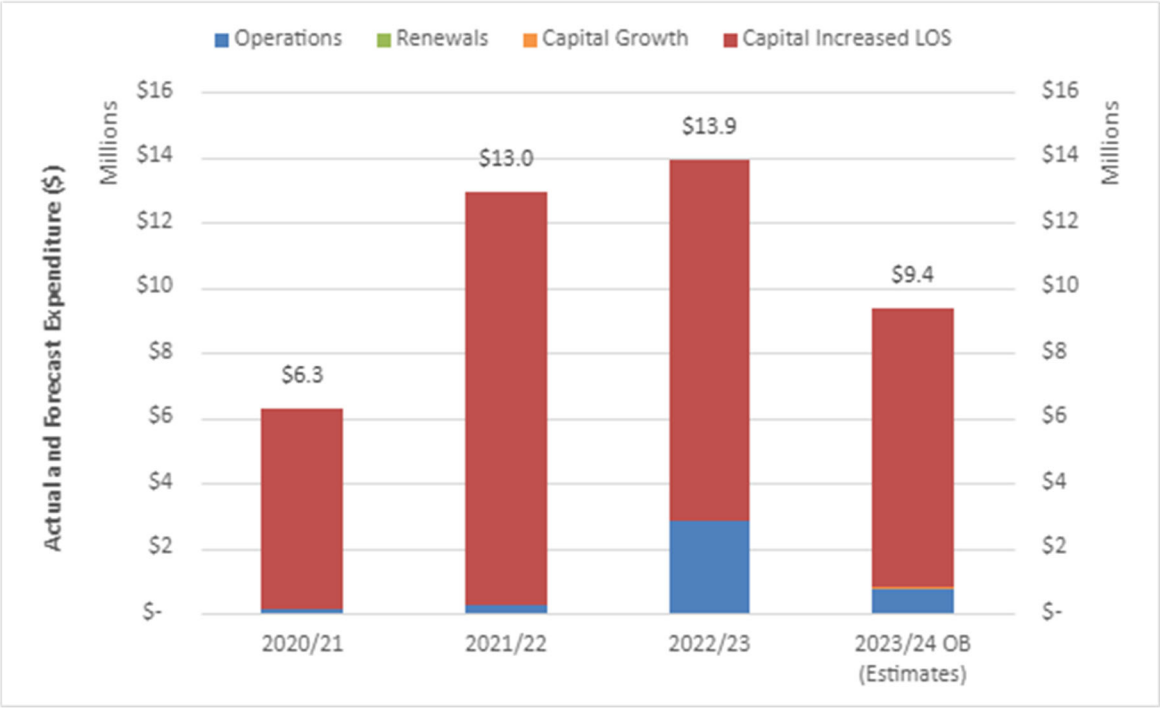


6.1.1. Trends from the previous 4 years

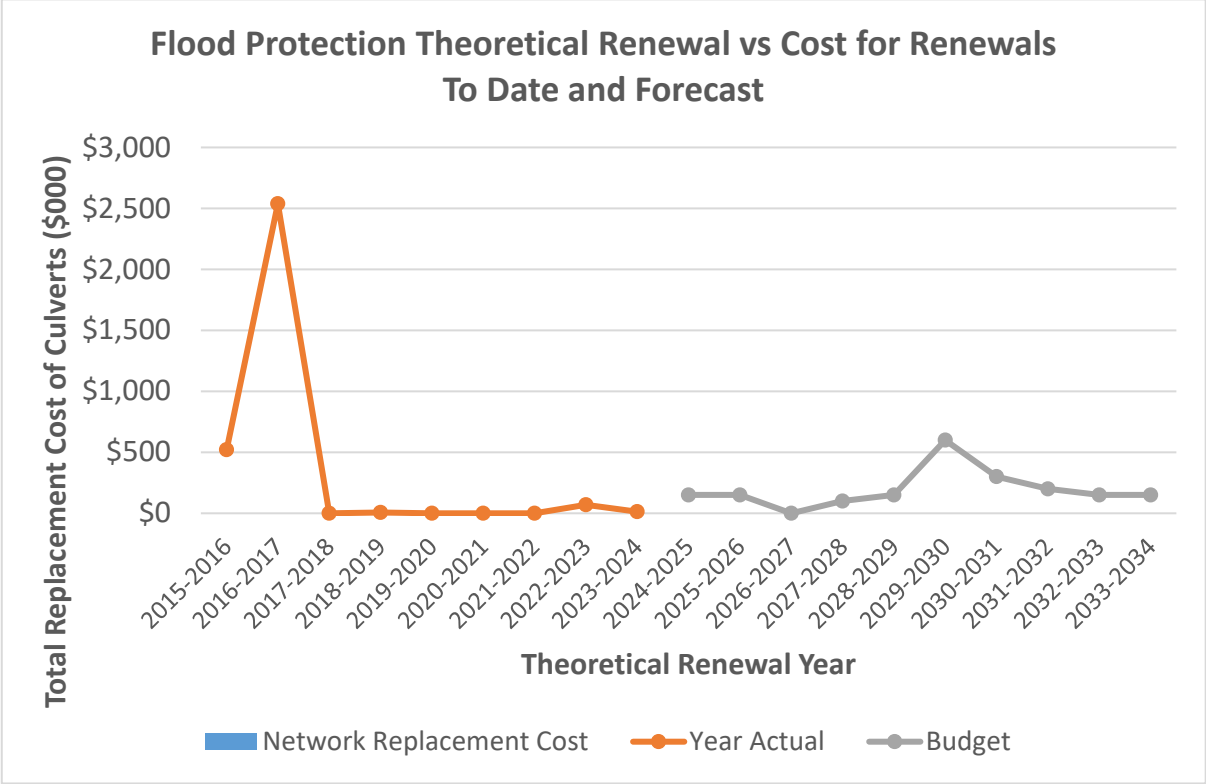
Figure 6-2 outlines expenditure over recent years. Vested assets are excluded.

The high expenditure in 2021/22 and 2022/23 was associated with the Saxton Creek Stage 4 upgrade.

Figure 6-2: Recent Expenditure on Flood Protection



Theoretical Renewal Year vs Cost for Renewals to Date and Forecast



6.2. Funding strategy

In determining how activities will be funded, local authorities are required to take the following into consideration:

- The contribution to achieving Community Outcomes (strategic alignment)
- Beneficiaries of each activity (beneficiary/user pays principles)
- The period over which benefits from the activity will occur (intergenerational equity issues)
- The extent to which identifiable individuals contribute to the need to incur expenditure (exacerbator and user pays principles)
- The costs and benefits of funding the activity compared to other activities (cost/benefit, prioritisation principles)
- The impact of funding the activity on the wellbeing of the community (ability to pay principles)

REVENUE AND FINANCING POLICY – FLOOD PROTECTION

Distribution of Benefits

The community benefits anticipated from this activity are:

- Management of river, stream and coastal flooding contributes to public health and safety and maintains quality of life

- Enhances amenity and property values
- Individual benefits
- Security of access is improved
- New development is designed to be flood resilient

The Costs and Benefits of Funding the Activity Distinctly from Other Activities

The funding arrangements for the Flood Protection Activity will be confirmed through the Long Term Plan process. It is proposed that the activity be funded from a general rate across the District. This would then include both urban and rural properties. Whilst the benefits of funding Council's flood protection activity apply primarily to those residents and property owners in areas exposed to flood risk, there is also a benefit to the general public who may work in, or travel through these areas.

The funding arrangements for Flood Protection would then be different from those for the Stormwater activity, which is applied to those areas where Council provides a stormwater system. Therefore Council uses a fixed rate as the most equitable form of funding for the stormwater activity.

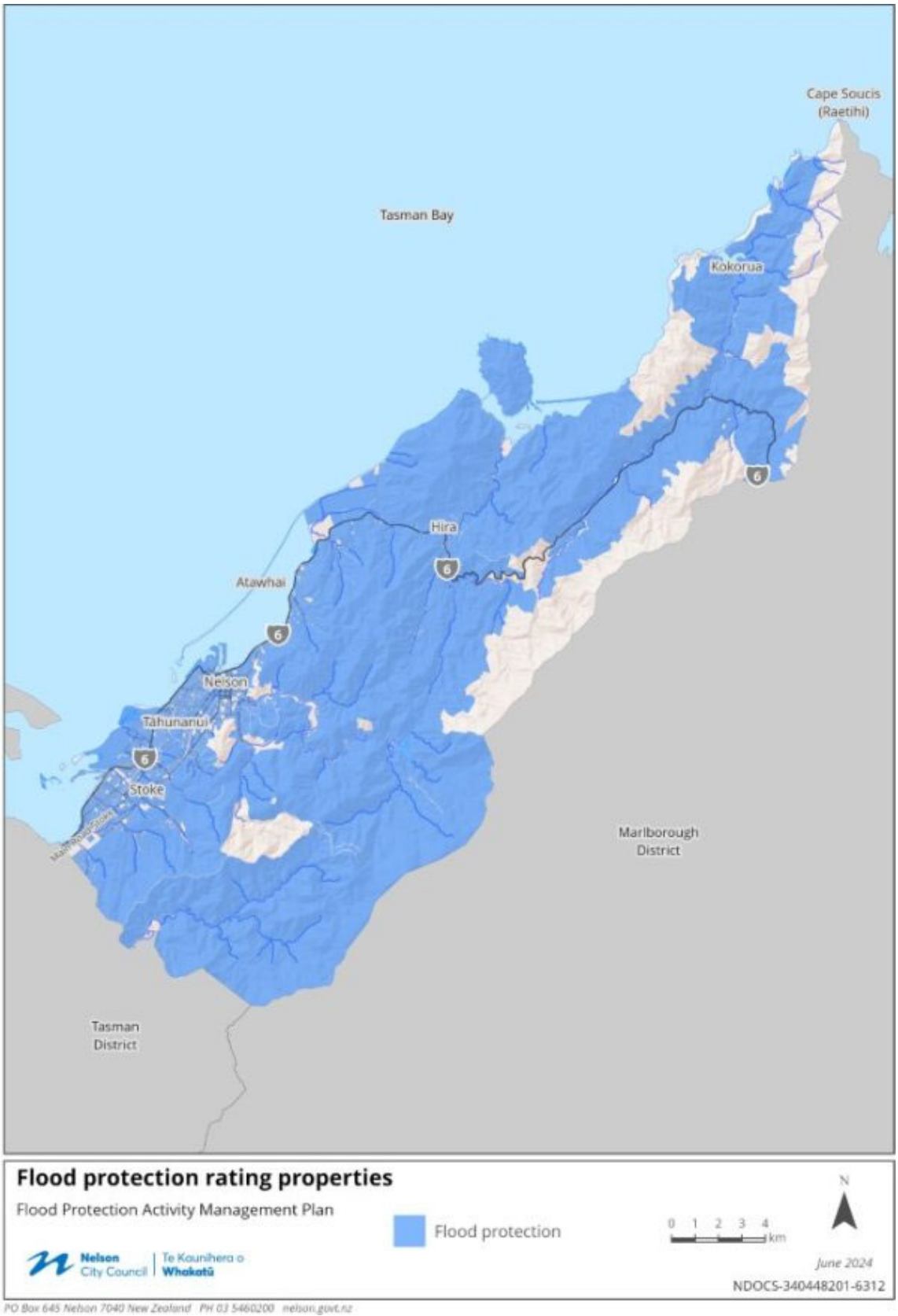
In previous years a separate fixed rate under section 16 of the Local Government (Rating) Act 2002 has been levied to recover the funding required by Council for both Stormwater and Flood Protection services. It has been payable by all ratepayers other than properties in excess of 15 Ha throughout the city, and all properties east of Gentle Annie saddle. The figure below shows the properties where a stormwater / flood protection rate is currently levied.

See Nelson City Council Long Term Plan 2021/31 for unit definition and details.

Creation/Acquisition/Augmentation

Nelson City Council will review funding requirements and strategies to achieve equitable funding of upgrade works through development contributions.

Figure 6-3: Properties where a fixed flood protection rate is levied



6.3. Valuation forecasts

The forecast of depreciation relates to the current value and base life of existing flood protection assets.

Historically, the estimated depreciation of flood protection assets, based on expected asset life, has exceeded the value of flood protection renewals. The reason for this is that where the renewal of a flood protection asset such as a culvert is required, it will generally be replaced by an asset with greater capacity which is considered as a level of service improvement, rather than a renewal. Figure 6-1 shows investment in level of service improvements.

6.4. Key assumptions made in financial forecasts

Council is required to identify the significant forecasting assumptions it has made in preparing its ten year Long Term Plan. Assumptions are necessary to allow Council to plan for expenditure and costs over the next ten years. They are the best reasonable assessment made on the basis of currently available information.

The Nelson Long Term Plan details possible and actual significant forecasting assumptions and uncertainties relating to Nelson City Council activities. As well as the general assumptions that apply as the basis for forecasting budgets across Council's work, the following assumptions apply specifically to the flood protection activity:

Typical useful lives from the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines (from National Asset Management Support 2006 Edition) have been used as a guide in determining base lives. However the manual generally provides insufficient detail for our asset components and so Nelson City Council experience from the renewals of its assets has been used to vary these base lives. The Lifecycle section of this plan provides detail of asset lives.

Where an asset has exceeded its nominated base life, a residual life of 5 years is assumed.

Where feasible and practicable, flood protection assets will be designed for a Q100 event at 2090 with roads and overland flow paths providing for larger events.

Council expects that a storm event with more than Q50 rainfall would be very likely to cause major flood damage, which would have to be managed by Emergency Management systems. This has been borne out by the damage sustained during the August 2022 flood, which exceeded a Q50 flood in the Maitai River.

No new environmental legislation will be imposed during the next decade that would require a specific level of service for flood protection assets. Any such legislation would require a review of the risk based approach for this activity. Council will consider the implications of upgrading channels and flood ways to convey a Q100 flood flow at 2090 when assessing upgrades.

No significant effects on flood protection structures are expected within the next 10 years from climate change-induced sea level rise; however, such effects are expected to arise in the longer term. Factors such as climate change and population growth will receive increased analysis as the Infrastructure Strategy is reviewed in future years.

A policy was developed for deciding how the ownership of stormwater assets on legal road is split between roading and stormwater. This ownership structure will also apply to streams and rivers. The general rules are as follows:

- All manholes located on stream culverts that are flood protection assets are also flood protection assets.
- Culverts crossing a legal road which have open channel on both sides are roading (Large roading culverts crossing legal roads are recorded in OBIS as transport structures), other stream culverts are flood protection assets.
- Culverts which convey larger streams that run parallel to legal road are generally flood protection assets. However there are a few exceptions such as the 160 metre box culvert on the Jenkins Creek adjacent to the SH6, which is a Waka Kotahi (Formerly NZTA) asset.
- Large culvert networks and waterways that follow the road are generally roading assets though these are maintained by the Utilities team where the requirement is to maintain the waterway capacity. Large utility culverts are recorded in OBIS as a utilities structure to enable transport review and management of the traffic loadings.

6.5. Forecast reliability and confidence

Table 6-3 below details the possible and actual significant forecasting assumptions and uncertainties relating to the Nelson City Council flood protection system.

Table 6-3: Significant Forecasting Assumptions and Uncertainties

No.	Assumption	Degree of Risk or Uncertainty	Likely Impact if the Assumption is (or is Not) Realised or is Not Acceptable
1	Interest rates for new loans raised or existing debt refinanced during the years 24 - 34 are forecasted in the range of 4.85 – 5.21%.	Low	Level of debt is moderate. Interest costs are not expected to vary significantly.
2	Growth is based on projections combining Statistics New Zealand and commissioned demographic analysis data.	Low	Any significant increase in the growth may require upgrading of reticulation to occur at an earlier stage than presently proposed.
3	The actual remaining lives of assets will not, on average, deviate significantly from those contained in the asset valuation.	Medium	Changes in estimated asset lives could lead to significant changes in asset renewal projections, depreciation and renewal budgets.
4	The replacement values are a realistic cost and have taken into consideration engineering fees, resource consents etc.	Medium	Replacement values have gone through a review process, however market prices have increased in recent years.
5	Contingency on Upgrade/capital cost estimates are as follows: Strategic Business Case: 50% Indicative Business Case : 30% Delivery/Construction: 10 - 15% Projects of unusual complexity or presenting landowner / regulatory issues that cannot be quantified and such that estimating with accuracy is difficult, may lie outside these figures.	Medium	Costs of upgrades are estimated only, and may exceed budgeted amounts.
6	Depreciation based on estimated useful lives not on condition of in-stream assets.	Medium	If condition assessments indicate that Councils mains have decreased useful lives, depreciation presently taken will be less than that required for replacement. However the cost of renewals has historically been lower than depreciation.

7. Asset Management Practices

The goal of infrastructure asset management is to:

"Deliver the required level of service, in the most cost effective manner, through the management of assets for present and future customers."

A formal approach to the management of assets is essential in order to provide services in the most cost-effective manner, and to demonstrate this to customers and other stakeholders. The benefits of improved asset management are:

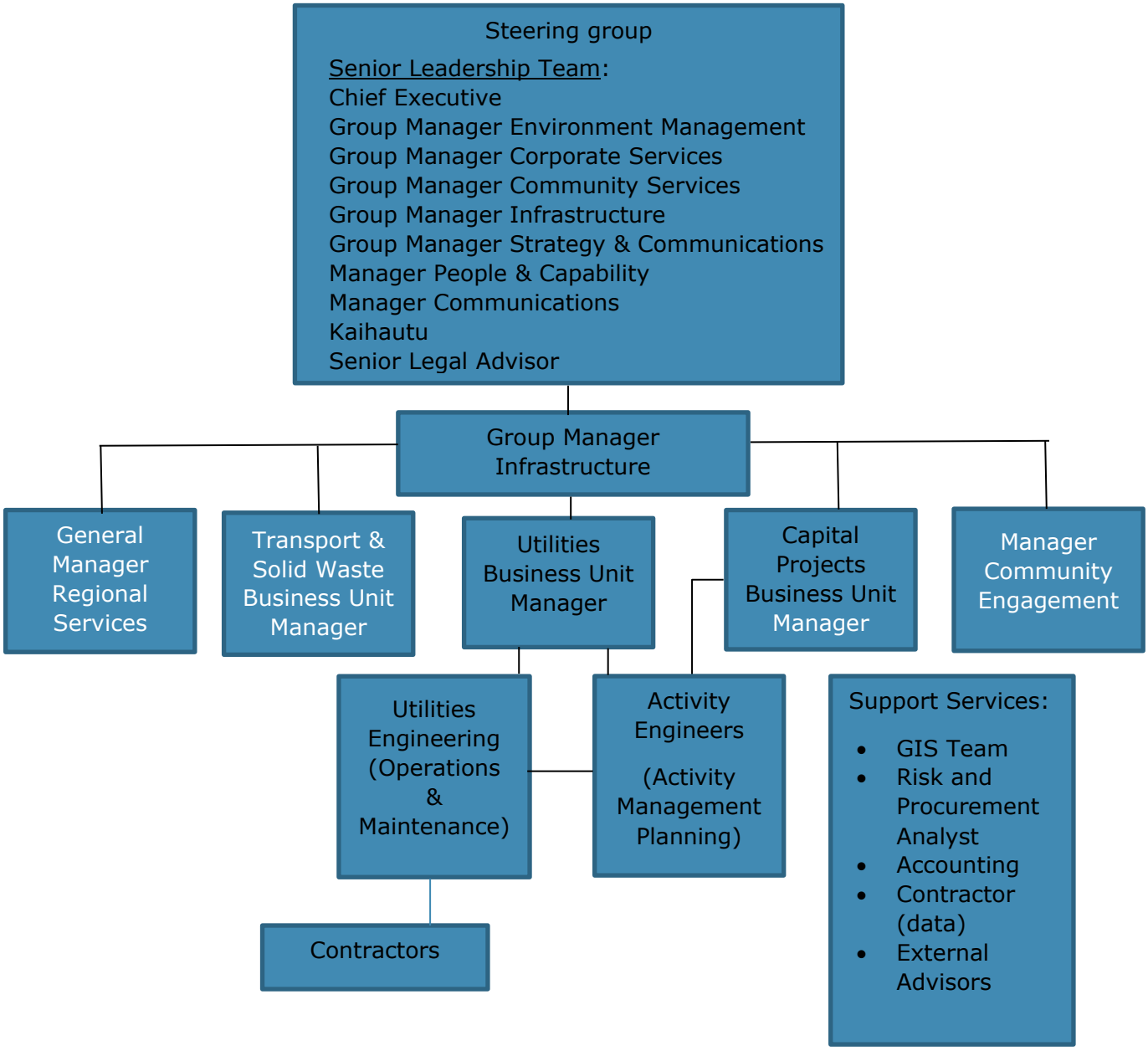
- Improved governance and accountability
- Enhanced service management and customer satisfaction
- Improved risk management
- Improved financial efficiency
- More sustainable decisions

The key elements of Activity Management are as shown below:

Figure 7-1: Activity Management Key Elements

7.1. Asset management leadership and structure

Figure 7-2: Activity Management Leadership and Structure



7.2. Management systems

A management system is defined as the set of procedures an organisation needs to follow in order to meet its objectives.

Table 7-1: Management Strategies

Strategy	Objective/ Description
Strategic Planning	
Human Resources	Develop the professional skills of the staff through adequate training and experience Personal Development Plans will be agreed with staff each year and staff are encouraged to belong to appropriate professional bodies and to attend appropriate conferences, seminars and training courses. Succession planning is undertaken by Council to reduce the risk associated with staff leaving the organisation. This has been recently demonstrated through the creation of two Utilities management positions for Operations and Activity Management. Due to the increasing workload around flood management, and the separation of Flood Protection from Stormwater, it is proposed to recruit additional staff to enable these activities to be run separately, and for the Flood Protection Activity to be extended to rural areas.
Strategic Alignment	This Plan will support the achievement of relevant Community Outcomes for Nelson City Council, as set out in the Long Term Plan. The intended contribution of the Nelson City Council flood protection service to the achievement of Community Outcomes is shown in Section 2 of this Plan.
Service Levels	A clear statement of the flood protection services provided and standards to be achieved that support the stated community outcomes are shown in Section 2 of this Plan.
Sustainable Management	Ensures all planning for the flood protection activity is compatible with sustainable management principles. Nelson City Council will pursue ways of limiting the use of natural resources including energy, valued landscapes, natural heritage and adverse effects on waterways.
Data Management and Utilisation	
Network modelling	Complete computer-based hydraulic models of the stream and river network . Computer models of the network enable Nelson City Council to: Determine accurately the existing capacity of the system Identify inadequate sections of the system Determine the impact of further development on the system Identify system upgrading requirements
Data Collection	Data collection programmes (condition, performance, asset registers) closely aligned with business needs will be operated in accordance with documented quality processes Data collection, maintenance and analysis are expensive and it is important that programmes and techniques are cost effective and consistent with business needs. Systematic processes will be introduced for the collection and upgrading of essential data based on asset criticality including: - Asset attribute information - Asset performance data - Asset condition data.
Geographical Information System Data	Geographical information system data will be the subject of defined quality assurance processes. Nelson City Council has quality processes to ensure that all data entered to the Geographical information system meets defined quality standards and supports Asset Management through connectivity with the asset register and Asset Management data.
Business Processes	

Strategy	Objective/ Description
Activity Management Plan Updates	This Plan remains a strategic 'living' document and will be updated as required and reviewed at three yearly intervals to coincide with the Long Term Plan. The scope of the review will be influenced by changes in Community Outcomes for Nelson City Council, service standards, improved knowledge of assets, corporate strategy/ policy and process.
Risk Management	Risk Management is an essential part of Asset Management. Flood Protection activity risks will be managed by implementing the Risk Register including risk controls for the flood protection activity to maintain risk exposure at acceptable levels. Risk controls include maintaining appropriate insurance cover, emergency response planning, condition monitoring of critical assets, preventative maintenance, use of Supervisory Control and Data Acquisition (SCADA), operations manuals, review of standards and physical works programmes.
Infrastructure Asset valuation	Perform valuations in a manner that is consistent with national guidelines and Nelson City Council corporate policy for valuation cycles which are carried out every 1-3 years to reflect financial activity and align with the Long Term Plan requirements. Asset valuations are the basis for several key asset management processes including asset renewal modelling and financial risk assessments. Valuations of the flood protection assets will be carried out based on data from the Asset Management System to ensure audit ability and alignment with other processes.
Monitoring	
Level of Service Standards	Continue with the monitoring procedures to ensure the activity is contributing to the community outcomes as stated and that internal controls (service requests, operational contract requirements) are also monitored and managed
Asset Performance	The performance of assets are monitored as an input to asset renewal and asset development programmes. The Monitoring includes: Customer service requests Asset failure records Asset Maintenance records Compliance with Resource Consents Critical asset audits Supervisory Control and Data Acquisition Legislative compliance.
Financial Management	
Budgeting	This Plan is intended to provide sufficient detail to provide the basis for those 10 year projections. 30 year budget projections are also undertaken for the Infrastructure Strategy.
Financial management	Manage the activity budget in accordance with statutes and corporate policy. This involves: Economic appraisal of all capital expenditure Annual review of Activity Management Plan financial programmes Recording of significant deferred maintenance and asset renewals Continuous monitoring of expenditure against budget.
Sustainable Funding	Ensure the flood protection activity is managed in a financially sustainable manner over the long term. The financial requirements for the provision of the flood protection activity in a sustainable manner, and to acceptable standards, will be identified and provided for in the budgets. These financial requirements include: Management of the flood protection activity Operation and maintenance of the flood protection assets Asset replacement Asset development to ensure that the ability of the flood protection activity to deliver an acceptable level of service.

Quality Management

The quality management system is process management based on a quality cycle. It is aligned with ISO 9000, and benchmarked against this standard each year. The focus of the Quality Management programme is to improve the effectiveness and efficiency with which Nelson City Council delivers services to the community; ensuring processes deliver their required outcomes, which are aligned with community outcomes and organisational goals. Required outcomes are typically defined in terms of the core key performance areas - customer satisfaction, legislative compliance, and management of resources (budget and staff time), and employee engagement.

Figure 7-3: Quality Management Lifecycle

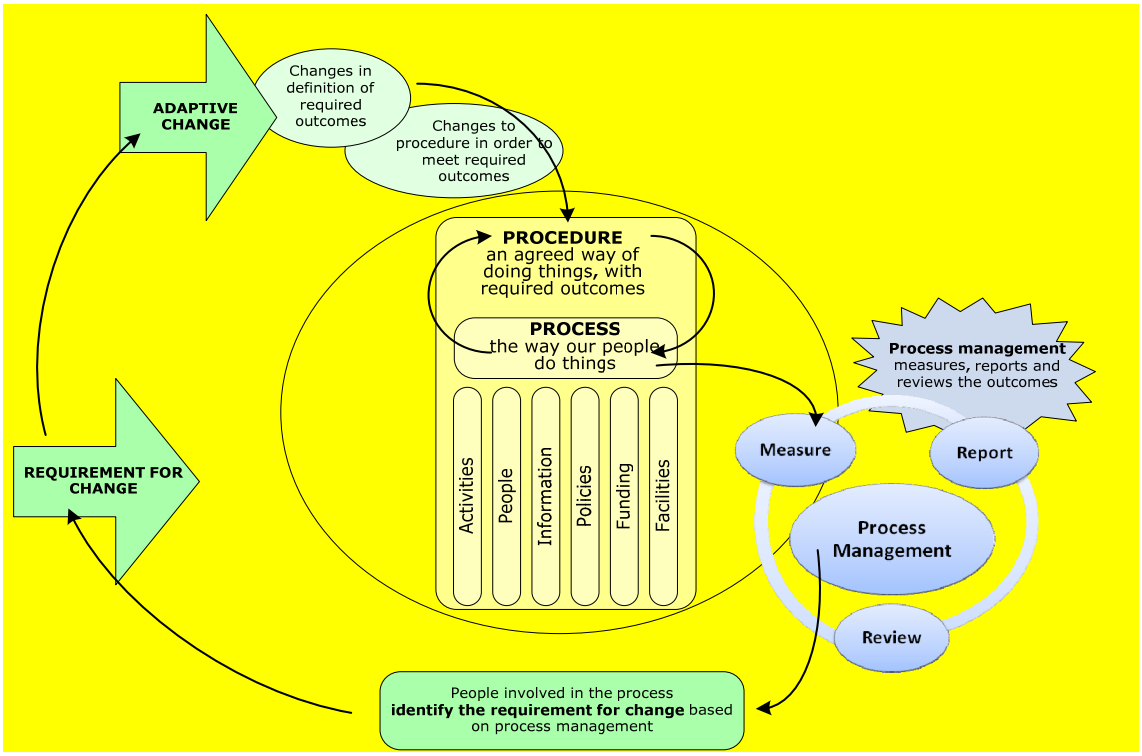


Table 7-2: Quality Management System

1: Define the Process: Document the Procedure
NCC's Quality Management system (QMS) is a process-based approach. A process is a set of interrelated or interacting activities which transforms inputs into outcomes. Required outcomes are achieved more efficiently when activities and related resources are managed as a process. *A procedure is an agreed way to carry out a process. A procedure includes and defines:* **Required outcomes from the procedure (most important)** • Definition of the required outcome forms the "quality" standard for the process   ○ Agreement of the required outcomes tells us what would success look like (our KPIs) • We need to ensure that required outcomes are recorded so that they can be measured later - not just what needs to be achieved, but when, and how many, and what exceptions **People involved in the procedure (equally important)** • Definition of all of the people involved in all aspects of the process, including the customer, those "doing stuff", those "accountable for stuff" and any suppliers directly involved in the process • Are the people involved the most effective, most efficient way to do this? **Activities comprising the procedure** • Defining all the activities required and undertaken to achieve the required outcomes

1: Define the Process: Document the Procedure

- Are all the activities undertaken necessary, are they in the right order, are the right people doing them, is this the most effective, most efficient way to do this?

Enablers that support the procedure

- The enablers of the process include things like information (and information systems), policies (and culture), funding and facilities. These should be documented as part of the process

Documenting the procedure (activities involved, who does what when, what funding and resources are required) provides a *written procedure* to support the process.

Processes work together to form end-to-end procedures:

Managing interrelated processes improves the organisation's effectiveness and efficiency in achieving its objectives. This means consideration of how processes interrelate to form end-to-end procedures with overall outcomes. The outputs from one procedure often form the trigger for the next procedure. End-to-end procedures have their own required outcomes.

2: Manage the procedure: Measure, Report and Review

Measuring whether the procedure is being followed and whether outcomes are being met This enables us to apply a factual approach to decision making and to the need for change.

- Measure how the process is going – is the procedure being followed – are interim goals being met? Measure the outputs of the process – were these met and did these meet the required outcomes?

Reporting tells us whether procedures are being followed and outcomes being met

- We need to not just know whether outcomes are being met, but to "know that we know"
- Reporting gives us options for remediation or consequences of non-conformity

The procedures and the outcomes are subject to review by those responsible and accountable for the process

- Why did we really do this? What did we think we would gain? Did we get that result?
- Are we doing the right things? Are we doing them the right way, and are we doing this consistently? Are we getting them done well? Are we getting the benefits?
- Review provides a tool for continual improvement of the process by re-examination and change to the required outcome, or by change in the process to achieve the required outcome

3: Improve the procedure: Requirement for Change, then Adaptive Change

Procedure are subject to adaptive improvement to the process and the required outcomes.

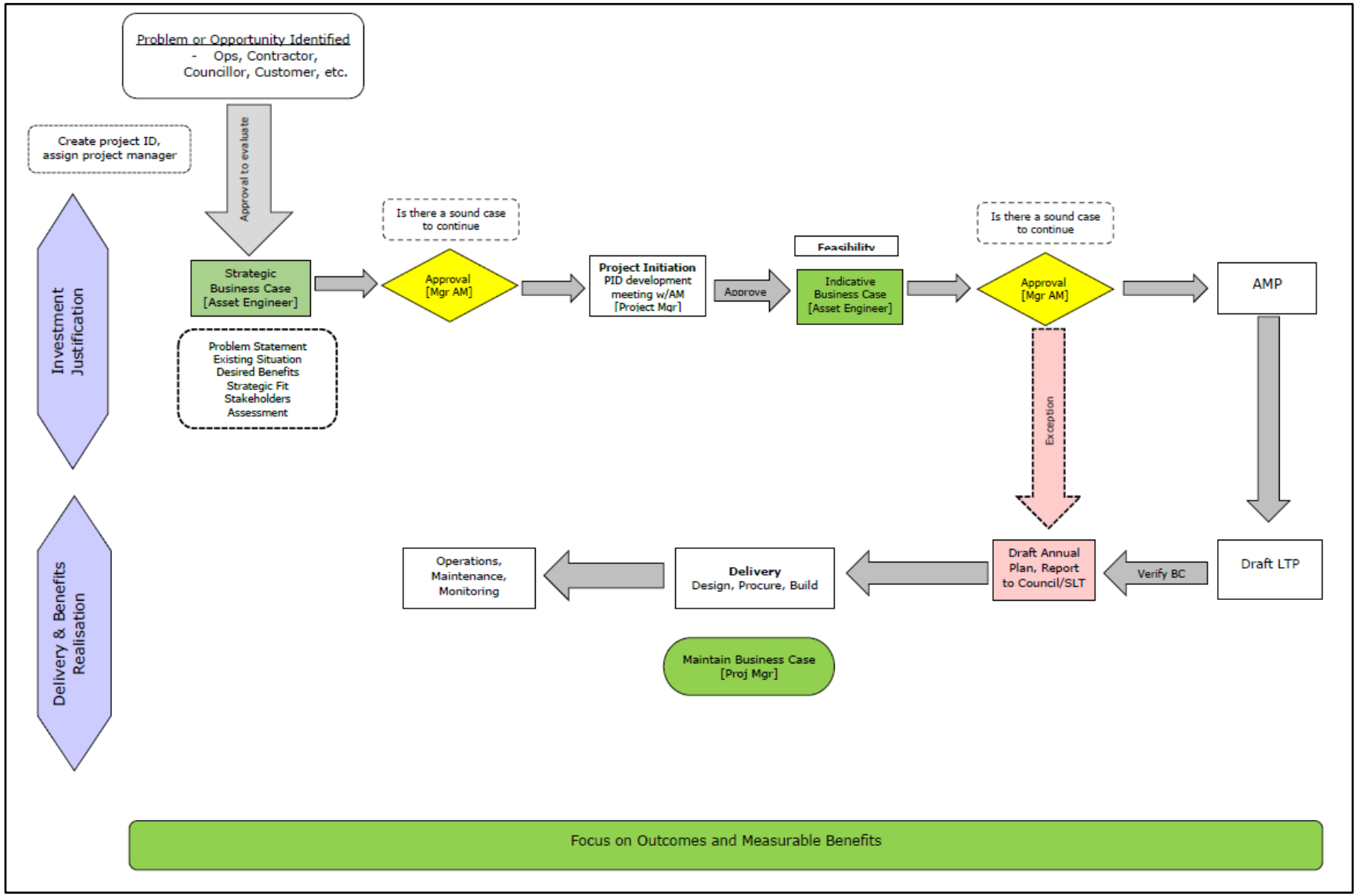
People involved with processes identify and initiate change:

- Are the required outcomes still required? Is there a requirement for change?
- Are the activities and people defined in this process the best way to achieve these outcomes?
- Are things being done in the right order, and by the right people, in the right places? Is the process being followed? Does everyone do it the way that we've agreed?
- Is there anything listed that isn't contributing? Is there something that would contribute more?

Project management

NCC processes for project management require that time, cost, and quality/scope objectives are agreed before project delivery begins. Project management is focussed on ensuring that the desired benefits, as per the agreed business case, are delivered. Project management processes are based on the principles of the PRINCE2™ method. Fiscal approvals, and change approvals are in line with Council delegations and Officer delegated authority.

Figure 7-4: Business case process



7.3. Information systems

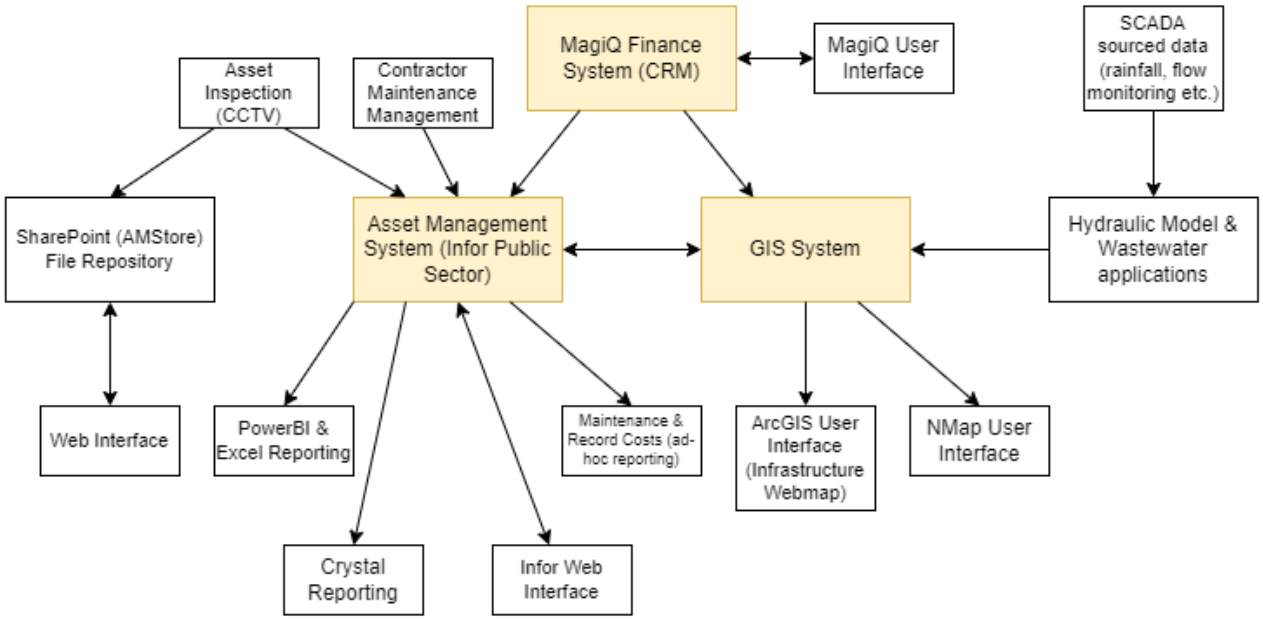
Asset Management Information Systems provide an understanding of assets to optimise lifecycle costs, identify required work, record completed work and cost of work. It benefits general management, long-term planning and data analysis.

All asset information is stored in Infor and linked with GIS.

An overview of the asset information system is depicted below. The warehousing of specific data and further development of reporting will assist in management of the assets.

The Council has a number of information systems (Infor, MagiQ, SCADA System Platform, Network Model, Azure database and closed circuit television for internal pipe inspections) that are integrated to varying degrees. The integration of these systems is considered to assist in the optimisation of operations, renewals and the ongoing development of the flood protection activity.

Figure 7-5: Asset Information Systems



Asset Improvement Register (ongoing AM practice)

The Asset Improvement Register is used to capture, store, and share discussions, thoughts and concerns with regard to asset performance and improvement

Integrated Accounting, Financial, Electronic Purchase Order, and Service Request Systems

Accounting is currently carried out to Generally Accepted Accounting Principles to comply with the Local Government Act 2002 and Public Benefit Entity International Public Sector Accounting Standards (PBE IPSAS). The Nelson City Council uses integrated computer software supplied by MagiQ. The General Ledger is linked to packages that run Debtors, Creditors, Banking, Rates, Fixed Assets, Invoicing, Water Billing, Job Costing, and Payroll. Internal monthly financial reports are generated by Council significant activity and sub-activity categories although real time data is

available at any time. External financial reports by significant activity are published in the annual report.

Service requests record customer questions, enquiries, and complaints.

Electronic Document and Records Management System (EDRMS)

Nelson City Council uses Objective as its electronic document and records management system.

Geographical Information System

Geographical information system was implemented in 1994 with data captured using photogrammetry (1994) and progressively developed over the following years. Nelson City Council staff carried out accuracy checks on the geographical co-ordinate data supplied, searched all the engineering plans and field books for information on pipe alignment, material and age and entered this information into the Geographical information system.

Accuracy Limitations

The data captured by photogrammetry was required to be accurate to within a tolerance of +/- 0.3m. In inaccessible areas, it was not considered economic to search for buried fittings. Instead, the best estimated position was entered and the accuracy limitation flagged. Similarly, only limited fieldwork has been done to confirm the pipe material and sizes. The accuracy of this information is verified through time by asset data collection procedures.

Maintenance of GIS data

Procedures are in place to update new data into the Geographical information system.

Council's Engineering Standards require that any work on a Council flood protection asset must be proposed to Council by means of an engineering plan for approval and an "As-built" record submitted at the completion of works.

Data on assets associated with renewal and upgrade capital are updated into the asset register by Nelson City Council Engineering, GIS and Finance staff.

Closed Circuit Television

Currently, Closed Circuit Television (CCTV) condition inspections are carried out by an external contractor as required for verifying the condition of pipes. A programme is currently being put in place to ensure that CCTV inspection records are linked to the Infor system, and accessible to staff via a web based mapping application.

Asset management Recording System - Infor

The use of the Infor system has enabled the following:

- Customer enquiries being logged directly and sent immediately to the contractor for action.
- Contractor directly enters resolution confirmation at completion of job.
- Tracking of expenditure on assets to allow assets that have a disproportionately high maintenance cost to be identified - upgrade or renewal can then be prioritised.

Nelson City Council principal contractor Nelmac has a live interface with Infor. Any work associated with unscheduled maintenance is entered into Infor work order by the contractor. Completed work orders form the basis of the contractors' payment.

There are known issues with the existing implementation of Infor surrounding the work order processes including a lack of reporting to trend results and alerts for operational issues. The work order processes and data captured by the contractor and/or Nelson City Council staff can be refined to ensure the needs of all levels of management are met.

ProMap

ProMap is Nelson City Council's procedures library. The library includes records of the corporate risks for all Activities, procurement procedures and other processes.

Supervisory Control and Data Acquisition System

The Supervisory Control and Data Acquisition system (SCADA) provides surveillance of the certain stream flow recorders installed by NCC Utilities.

All of the Nelson City Council's strategic utility components are monitored remotely, at Civic House or by duty staff using laptop computers at home, utilising a telecommunication system.

This system has given Council the ability to ascertain faults and instigate repairs without affecting service to the consumer and has significantly increased efficiency and reliability of the utility schemes. This function has become critical to the operation of the network and has been supported by Council's in house Information Management team up to now. There is a need to upgrade this package so that it is made more accessible, and at the same time consider how the technical requirements can be accommodated with the essentially office based computer network used by the majority of Council staff.

Appendix G details the over view of the SCADA system. The system is used for:

- Monitoring the operation of sites
- Reporting, trending and analysing historical data
- Alarm monitoring (operators are informed of alarms via text messages to mobile phones)
- Some control functions

Monitoring of water, wastewater and stormwater and flood protection systems by the Councils SCADA system has grown to the point that without this system, maintaining the existing levels of service would be difficult. SCADA has significantly increased efficiency and reliability of the utility schemes and is a critical system in Council's operation.

7.4. Service delivery models

Maintenance contracts have been reviewed and grouped to provide a good balance between price and quality, and use either prequalification or price/quality supplier selection methods. The methods used to procure capital projects will differ depending on the size of the project, but will be either lowest price or price/quality.

Council maintains an in-house professional services capability balanced with external consultants as required to achieve best value for money. Additional professional services are sometimes required.

8. Plan improvement and monitoring

This section provides details on planning for monitoring the performance of the Plan.

8.1. Status of activity management practices

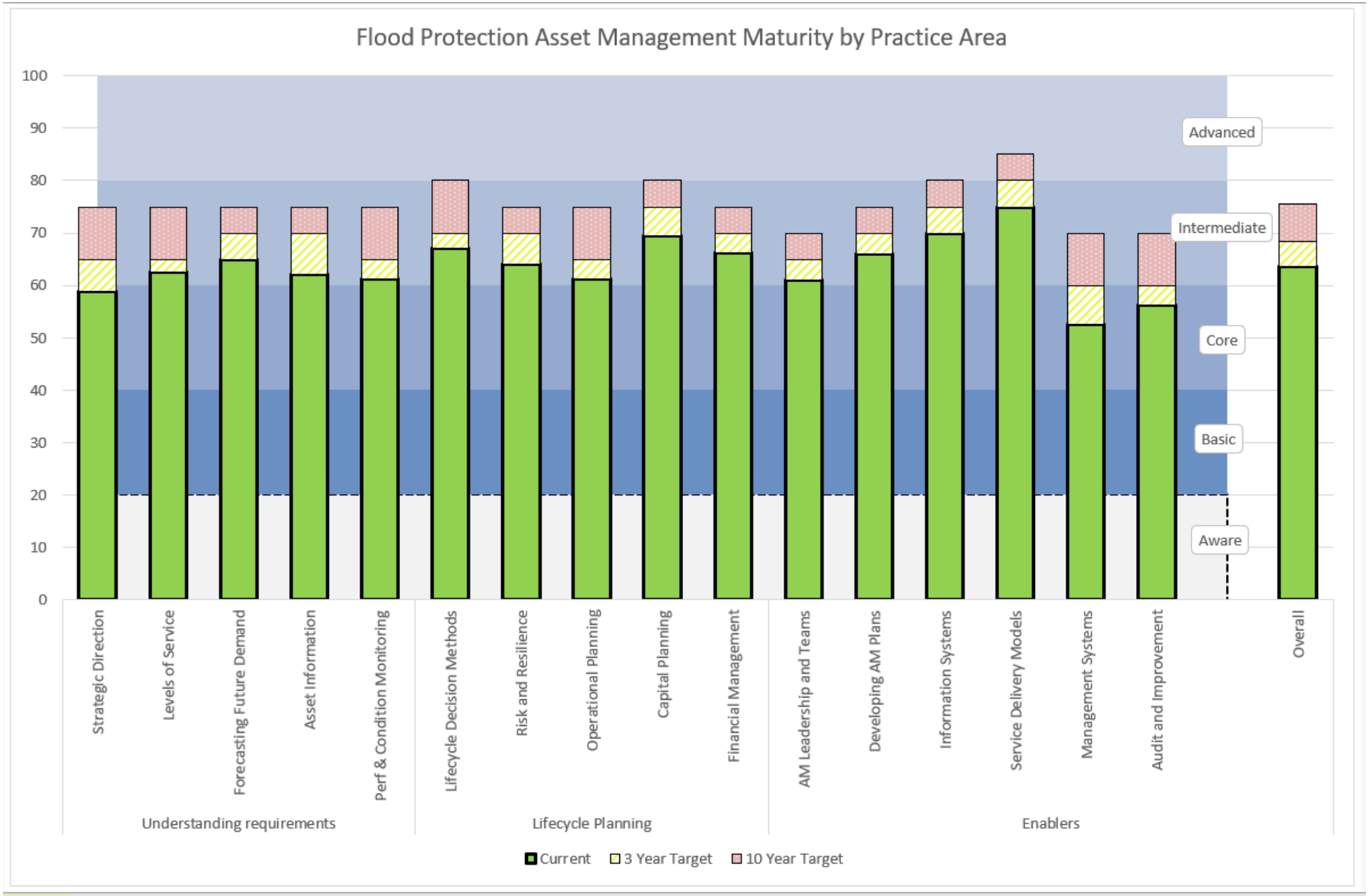
The status of activity management (AM) processes, systems and data for Council flood protection systems is shown in Figure 8-1. This figure is based on the grading framework given in Appendix Table D-1 'Gap Analysis and Appropriate Practice'.

Updates to the 2021 - 2031 Activity Management Plan (AMP) Gap Analysis and Appropriate Practice scores have been made for this Plan, and this includes separating out Stormwater and Flood Protection Maturity scores. Across the 16 IIMM competency descriptors, asset management maturity assessed for the 2021 – 2031 Stormwater and Flood Protection AMP was at a 'core' level for 6 descriptors, and at an 'intermediate' level for 10 descriptors. Whilst there are both downwards and upwards adjustments made to competency scores relative to 2021 - 2031 AMP, the overall maturity assessment for Flood Protection has maintained asset management maturity at a 'core' level for 6 descriptors, and at an 'intermediate' level for 10 competency descriptors. Commentary on the 3 competency category areas is provided below:

- **Understanding requirements**: This category includes 5 descriptors with 3 at core maturity and 2 at intermediate maturity level. All 5 descriptors are assesse to be close to the threshold between core and intermediate Maturity level. Key achievements are the river and stream catchment flood models and mapping released in August 2021 and subsequent updates, the coastal hazard mapping, and the flood hazard provisions that are currently being integrated into the NRMP through the Housing Plan Change 29. Demand management is also considered for all new developments in line with standards in the NTLDM 2020, and IPN 2019.
- **Lifecycle Planning:** This category includes 5 descriptors with 4 assessed to be at the 'intermediate' maturity level, and 1 at core maturity level. Operational arrangements for flood protection are at high end of the core maturity range. Emergency Management arrangements, including flood warning and evacuation planning need to be put in place to increase this to intermediate. Additionally more specific asset information is required for in-stream structures such as retaining walls and bed grade control.
- **Enablers:** This category includes 6 descriptors with 3 at 'core' maturity and 3 at 'intermediate' maturity level. Whilst adjustments to scores have been made, there is no change to descriptor maturity levels from the 2021 - 2031 AMP.

Target maturity for 3 year and 10 year periods has been updated. Target maturity of 70% - 75% ('Intermediate' maturity) over the next ten years has been set for 12 of the descriptors, with higher target level of 80% - 85% set for the other 4 descriptors. This represents an reduction in target levels relative to the 2021 - 2031 AMP which is due to Flood Protection assets and processes being less well established than those for Stormwater.

Figure 8-1: Current and desired state of AM processes and systems



8.2. Improvement programme

An important component of this Plan is the recognition that it is a "live" document in need of monitoring, change and improvement over time.

Council has been working with iwi, seeking their input into this Activity Management Plan. Some changes have been included in this Plan following their feedback, however, other matters require further thought. Council will consider the wider feedback raised as part of the review of its Asset/Activity Management Policy during 2024/25 and in work on the next iteration of the Activty Management Plans.

To enable future LOS targets to be achievable, additional data, modelling and analysis are to be carried out over the next ten years. Targets for the long term will be considered and consulted on in conjunction with the Long Term Plan process.

Table 8-1: Improvement Programme

Area of AM Practice	Improvement Programme	Priority	Responsibility	Funding status
	Expand sustainable practice throughout the flood protection activity, including giving consideration to nature-based solutions at the investigation and optioneering stages of a project.	2	Activity Management	On-going
	Progress towards 'Te Ao Maori' Improvement themes – Continuous Improvement Over Time. Understand how 'Te Ao Maori' Improvement themes can be integrated into the Flood Protection Activity Management	1	Activity Management	Staff cost with support costs
	Improve iwi engagement and engagement processes in the Flood Protection Activity Planning	1	Activity Management & Operations	Staff cost and Support costs
	Improve linkage to Environmental Activity & Transport Activity Management Plans including creating a chart to show the links	2	Activity Management	Staff cost
	Review levels of service (especially in relation to sustainability & freshwater values)	2	Activity Management	Staff cost
	Develop Risk Management Plans (Statutory Requirement for the stormwater activity but this may also apply to flood protection)	2	Activity Management	Budgeted

Area of AM Practice	Improvement Programme	Priority	Responsibility	Funding status
	Complete computer flood modelling for streams and rivers, including updates for 2021 LIDAR and new sea level rise projections released in 2022.	1	Activity Management	Budgeted
	Complete a Flood Protection renewal strategy to manage the bow wave of renewals expected from the 2060's onwards	3	Activity Management	Budgeted
	Review condition assessments and improve accessibility of this information. Condition assessments of in-stream structures are not as well captured as pipe assets.	2	Operations	Staff cost
	Ongoing refinement of lifecycle decision making and financial forecasts, including review of asset life expectancy for flood protection assets	2	Activity Management	Staff cost
	Develop Flood Management Plans for critical assets such as open channels, streams and rivers taking into consideration future climate change, and the potential to implement nature-based solutions	3	Activity Management	Budgeted
	Improve accuracy of data through review and modification of collection, storage, and auditing	3	Operations	Staff cost
	Update urban stream status (either stormwater or flood protection). Update GIS asset ownership to align with this policy.	2	Activity Management	Staff and consultant cost

1	1 – 3 years
2	4 – 5 years
3	6 – 10 years

8.3. Monitoring and review procedures

The Plan will be reviewed annually and updated at least every three years to coincide with the Annual and Long Term Plans and to support improved decision making, updated asset information, and policy changes that may impact on levels of service. The Plan will be improved throughout its life cycle as further information about flood protection assets are collected including condition, performance and service delivery data. Council is committed to advanced data collection and management systems that will allow for a greater appreciation of the performance and condition of the Council assets. To date, condition of in-stream structures and stopbanks has received less attention than the piped network, although critical issues have generally been identified successfully through annual stream and river inspections, as well as through inspections undertaken following a large flood event.

Internal Review

Internal reviews will be undertaken every three years to assess the effectiveness of the plan in achieving its objectives.

Statutory Audit

The Local Government Act requires that an independent, annual audit of the operations of the Nelson City Council be carried out.

8.4. Performance measures

Benchmarking

Benchmarking (trending) of the activity through Audit NZ, Local Government NZ and Water NZ benchmarking initiatives is carried out at the request of these organisations to give increased understanding of:

- The efficiency and efficiency variations of individual activities.
- Effects of any programmes instigated by the Plan.
- Operating costs over range of individual activities.

Refer to Appendix H for 2018/19 benchmarking of stormwater performance criteria, many of which apply to the Flood Protection activity.

How the effectiveness of this Plan will be measured

The effectiveness of this Plan will be monitored by the following procedures:

- Financial expenditure projections prior to year end.
- Reporting of variations in the adopted annual plan budgets against the original activity management plan forecasts
- Resource consent monitoring as required by consents
- Operations and Maintenance reports
- Completion of major projects that contribute to the objective of this Plan.

The continued monitoring of these procedures and ongoing analysis will result in:

- Optimisation of expenditure through the asset lifecycle
- Service levels actively monitored and reported on
- Management of risk and control of failures

Appendices

APPENDIX A: GLOSSARY OF TERMS

Appendix Table A-1: Glossary

Term	Definition
Activity	The work undertaken on an asset or group of assets to achieve a desired outcome.
Advanced Asset Management	Asset management which employs predictive modelling, risk management and optimised renewal decision making techniques to establish asset lifecycle treatment options and related long term cash flow predictions. (See Basic Asset Management.)
Annual Plan	The Annual Plan provides a statement of the direction of Council and ensures consistency and co-ordination in both making policies and decisions concerning the use of Council resources. It is a reference document for monitoring and measuring performance for the community as well as the Council itself.
Annual Report	The audited report published annually (by 30 November) which provides information on how the Local Authority has performed with respect to its policies, objectives, activities, targets, budgets and funding proposals.
Asset	A physical facility of value which enables services to be provided and has an economic life greater than 12 months.
Asset Management	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.
Activity Management Plan	A plan developed for the management of one or more infrastructure activities that combines multi-disciplinary management techniques (including technical and financial) over the lifecycle of the asset in the most cost effective manner to provide a specified level of service. A significant component of the plan is a long term cash flow projection for the activities.
Asset Management Strategy	A strategy for asset management covering, the development and implementation of plans and programmes for asset creation, operation, maintenance, renewal, disposal and performance monitoring to ensure that the desired levels of service and other operational objectives are achieved at optimum cost.
Asset Management System	A system (usually computerised) for collecting analysing and reporting data on the utilisation, performance, lifecycle management and funding of existing assets.
Asset Management Team	The team appointed by an organisation to review and monitor the corporate asset management improvement programme and ensure the development of integrated asset management systems and plans consistent with organisational goals and objectives.
Asset Register	A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, construction, technical and financial information about each.
Asset	A physical component of a facility which has value, enables services to be provided and has an economic life of greater than 12 months.
Benefit Cost Ratio (B/C)	The sum of the present values of all benefits (including residual value, if any) over a specified period, or the life cycle of the asset or facility, divided by the sum of the present value of all costs.
Business Plan	A plan produced by an organisation (or business units within it) which translate the objectives contained in an Annual Plan into detailed work plans

Term	Definition
	for a particular, or range of, business activities. Activities may include marketing, development, operations, management, personnel, technology and financial planning.
Cash Flow	The stream of costs and/or benefits over time resulting from a project investment or ownership of an asset.
Components	Specific parts of an asset having independent physical or functional identity and having specific attributes such as different life expectancy, maintenance regimes, risk or criticality.
Condition Monitoring	Continuous or periodic inspection, assessment, measurement and interpretation of resulting data, to indicate the condition of a specific component so as to determine the need for some preventive or remedial action.
Consequence	The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.
Critical Assets	An asset where failure would have significant consequences, either in the ability of the system to provide service to customers or the effect on the environment.
Current Replacement Cost	The cost of replacing the service potential of an existing asset, by reference to some measure of capacity, with an appropriate modern equivalent asset.
Deferred Maintenance	The shortfall in rehabilitation work required to maintain the service potential of an asset.
Demand Management	The active intervention in the market to influence demand for services and assets with forecast consequences, usually to avoid or defer CAPEX expenditure. Demand management is based on the notion that as needs are satisfied expectations rise automatically and almost every action taken to satisfy demand will stimulate further demand.
Depreciated Replacement Cost (DRC)	The replacement cost of an existing asset after deducting an allowance for wear or consumption to reflect the remaining economic life of the existing asset.
Depreciation	The wearing out, consumption or other loss of value of an asset whether arising from use, passing of time or obsolescence through technological and market changes. It is accounted for by the allocation of the historical cost (or revalued amount) of the asset less its residual value over its useful life.
Economic life	The period from the acquisition of the asset to the time when the asset, while physically able to provide a service, ceases to be the lowest cost alternative to satisfy a particular level of service. The economic life is at the maximum when equal to the physical life however obsolescence will often ensure that the economic life is less than the physical life.
Facility	A complex comprising many assets (e.g. a water treatment plant, recreation complex, etc.) which represents a single management unit for financial, operational, maintenance or other purposes.
Frequency	A measure of the rate of occurrence of an event expressed as the number of occurrences of an event in a given time.
Geographic Information System (GIS)	Software which provides a means of spatially viewing, searching, manipulating, and analysing an electronic data-base.
GUI	Graphical User Interface is a particular case of user interface for interacting with a computer which employs graphical images in addition to text to represent the information and actions available to the user.

Term	Definition
IMS	Hansen IMS software - Asset Management software product purchased as result of PAMS project.
InTouch	The brand of Graphical User Interface (GUI).
Infrastructure Assets	Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the continuing replacement and refurbishment of its components. The network may include normally recognised 'ordinary' assets as components.
Level of service	The defined service quality for a particular activity (i.e. sewerage) or service area (e.g reduction of wastewater overflows) against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost.
Life	A measure of the anticipated life of an asset or component; such as time, number of cycles, distance intervals etc.
Life Cycle Cost	The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, rehabilitation and disposal costs.
Maintenance Plan	Collated information, policies and procedures for the optimum maintenance of an asset, or group of assets.
Maintenance Standards	The standards set for the maintenance service, usually contained in preventive maintenance schedules, operation and maintenance manuals, codes of practice, estimating criteria, statutory regulations and mandatory requirements, in accordance with maintenance quality objectives.
Maintenance	All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal.
Multi-Criteria Analysis	Analysis technique that takes a range of criteria into account which are both qualitative and quantitative and reflect the social, cultural, economic, and environmental characteristic of the project outcomes.
Nature-based Solutions (NbS)	NbS involves actions to protect, restore and manage ecosystems and their functions, either stand-alone interventions or in conjunction with engineered solutions, that result in increased human well-being as well as environmental benefits
NZPIM	New Zealand Gravity Pipe Inspection Manual - National manual for inspecting and scoring stormwater pipes. Published by Water New Zealand - Fourth Edition 2019.
Operations & Maintenance Expenditure	The cost of operating and maintaining assets. Operations and Maintenance Strategies expenditure does not alter the value of an asset and is not included in the asset valuation.
Objective	An objective is a general statement of intention relating to a specific output or activity. They are generally longer term aims and are not necessarily outcomes that managers can control.
ODRC - Optimised Depreciated Replacement Cost	The Optimised Replacement Cost after deducting an allowance for usage to reflect the remaining life of the asset.
Operation	The active process of utilising an asset which will consume resources such as manpower, energy, chemicals and materials. Operation costs are part of the life cycle costs of an asset.

Term	Definition
Optimised Renewal Decision Making	An optimisation process for considering and prioritising all options to rectify performance failures of assets. The process encompasses Net Present Value analysis and risk assessment.
Optimised Replacement Cost	The minimum cost of replacing an existing asset by another asset offering the same utility most efficiently. The optimisation process adjusts the value for technical and functional obsolescence, surplus assets or over-design.
Outcome	The end result for the community which Council hopes to achieve.
Output	Services, actives or goods produced by Council which contribute to achieving an outcome.
Performance Measure	A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other target. Performance indicators commonly relate to statutory limits, safety, responsiveness, cost, comfort, asset performance, reliability, efficiency, environmental protection and customer satisfaction.
Performance Monitoring	Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards.
Rehabilitation	Works to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification. Generally involves repairing the asset using available techniques and standards to deliver its original level of service (i.e. heavy patching of roads, slip-lining of sewer mains, etc.) without resorting to significant upgrading or replacement.
Renewal	Works to upgrade, refurbish, rehabilitate or replace existing facilities with facilities of equivalent capacity or performance capability.
Renewal Accounting	A method of infrastructure asset accounting which recognises that infrastructure assets are maintained at an agreed service level through regular planned maintenance, rehabilitation and renewal programmes contained in an activity management plan. The system as a whole is maintained in perpetuity and therefore does not need to be depreciated. The relevant rehabilitation and renewal costs are treated as operational rather than capital expenditure and any loss in service potential is recognised as deferred maintenance.
Repair	Action to restore an item to its previous condition after failure or damage.
Replacement	The complete replacement of an asset that has reached the end of its life, so as to provide a similar, or agreed alternative, level of service.
Risk	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and the likelihood of a particular risk.
Risk Assessment	The overall process of risk analysis and risk evaluation.
Risk Management	Risk Management is the systematic application of management policies, procedures and practices to the tasks of identifying, analysing, evaluating and monitoring those risks that could prevent a Local Authority from achieving its strategic or operational objectives or Plans or from complying with its legal obligations.
Routine Maintenance	Day to day operational activities to keep the asset operating (replacement of light bulbs, cleaning of drains, repairing leaks, etc.) and which form part of the annual operating budget, including preventative maintenance.
Service Potential	The total future service capacity of an asset. It is normally determined by reference to the operating capacity and economic life of an asset.

Term	Definition
Strategic Plan	Strategic planning involves making decisions about the long term goals and strategies of an organisation. Strategic plans have a strong external focus, cover major portions of the organisation and identify major targets, actions and resource allocations relating to the long term survival, value and growth of the organisation.
Unplanned Maintenance	Corrective work required in the short term to restore an asset to working condition so it can continue to deliver the required service or to maintain its level of security and integrity.
Upgrading	The replacement of an asset or addition/ replacement of an asset component which materially improves the original service potential of the asset.
Valuation	Estimated asset value which may depend on the purpose for which the valuation is required, i.e. replacement value for determining maintenance levels or market value for life cycle costing.

Appendix Table A-2: Acronyms

Term	Definition
AV	Average flow
BOD	Biochemical oxygen demand
CCTV	Close circuit television
CDEM	Civil Defence Emergency Management
FAR	Fixed asset register
FDS	Nelson Tasman Future Development Strategy
GAAP	Generally Accepted Accounting Principles
IAP	Intensification Action Plan
IPN	Inundation Practice note (2019)
KPI	Key Performance Indicators
LA	Local Authority
LGA	Local Government Act
LID	Low impact design
LAPP	Local Authority Protection Programme Disaster Fund
LDM	Land Development Manual 2010 (Superseded by NTLDM 2020)
LTP	Long Term Plan
MCA	Multi-Criteria Analysis
NAMS	National Asset Management Steering Group
NPV	Net present value
NTLDM	Nelson Tasman Land Development Manual 2020
NZPIM	New Zealand Gravity Pipe Inspection Manual – 4th edition, 2019
QA/QC	Quality Assurance and Quality Control
RCRRJ	Reinforced concrete rubber ring joint pipe
SCADA	Supervisory control and data acquisition

APPENDIX B: BIBLIOGRAPHY

Appendix Table B-1: Bibliography – Flood Protection

Title	Date	Author
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York Stream Intake Improvements – Feasibility & Options	2017	Cameron, Gibson & Wells Ltd
Saxton Creek Catchment Improvement Plan	2012	M Mollow, P Lawless, Lawless Edge
Orphanage Stream Catchment Improvement Plan	2012	M Molloy, P Lawless, Lawless Edge
Poorman Stream Catchment Improvement Plan	2011	M Molloy, P Lawless, Lawless Edge
Jenkins Creek Catchment Improvement Plan	2012	M Molloy, P Lawless, Lawless Edge
Tahunanui Stream Care Project: Final Report	2005	P Lawless, Lawless Edge
Stoke Streams Rescue, Final Project Report: Jenkins Creek, Poorman Valley Stream, Orphanage Stream & Saxton Creek	2013	L Hall, NCC
Arapiki Stream Upgrade: Options report	2001	M Crundwell, OPUS
Nelson City Council Habitat Enhancement Opportunities for Inanga in Jenkins, Orphanage, Poorman Valley and Saxton waterways	2011	M Rutledge, Tiakina Te Taiao
A spotlight fish survey of Orphanage Creek in relation to potential fish passage barriers. Prepared for Nelson City Council	2007	J Hay, R Young, Cawthron report 1284
Freshwater fauna, habitat and fish passage assessment Arapiki Stream Nelson	2001	Orbit Environmental

APPENDIX C: ASSET DATA AND OVERVIEW

Appendix Table C-1: GIS List of Code Definitions used by Nelson City Council

CATEGORY	CODE	DESCRIPTION
Type	1/2P	HALF PIPE
Type	BNKL	BANK LEFT
Type	BNKR	BANK RIGHT
Type	BOX	BOX CULVERT
Type	BRDBX	BRIDGE BOX
Type	BRDGP	BRIDGE PIPE
Type	CHAM	CHAMBER
Type	CNTR	CENTRELINE
Type	CONN	CONNECTION
Type	CONT	CONTINUITY
Type	CULV	CULVERT
Type	CULVB	CULVERT BOX
Type	CULVP	CULVERT PIPE
Type	DETN	DETENTION
Type	DISH	DISH CHANNEL
Type	DTCH	DITCH
Type	ENCS	ENCASED IN MATERIAL
Type	GRAV	GRAVITY FLOW
Type	LATL	LATERAL
Type	NAPP	NOT APPLICABLE
Type	POLY	POLYTHENE FORMED BOX
Type	POND	POND
Type	RVR	RIVER
Type	SLEV	SLEEVE AROUND PIPE
Type	STPB	STOPBANK
Type	STRM	STREAM
Type	SWAL	SWALE
Type	UNKW	UNKNOWN
Material	ALUM	ALUMINIUM
Material	ARMC	ARMOUR-COIL
Material	ASPH	ASPHALT
Material	BLBT	BLUE BRUTE PIPE
Material	BRCK	BRICK
Material	CI	CAST IRON
Material	CIDT	CAST IRON - DUCTILE
Material	CIPT	CAST IRON - PITCAST
Material	CISP	CAST IRON - SPUN
Material	CNIL	CONCRETE - INSITU FORM LINED
Material	PRFC	CONCRETE - PERFORATED
Material	CONC	CONCRETE
Material	COPR	COPPER
Material	DICL	DUCTILE IRON CONC LINED
Material	DRNC	DRAINAGE COIL
Material	DTRPL	DEEP TRAP LARGE
Material	EWRE	EARTHENWARE

Material	FGLS	FIBREGLASS
Material	FLDT	FIELD TILES
Material	GABN	GABION WALL
Material	GALV	GALVANISED
Material	HDPE	POLYETHYLENE - HIGH DENSITY
Material	MDPE	POLYETHYLENE - MEDIUM DENSITY
Material	OTHR	OTHER – Add comments
Material	POLE	POLE CONSTRUCTION
Material	PE1H	POLYETHYLENE - 100MM
Material	PVC	POLYVINYL CHLORIDE
Material	uPVC	UNPLASTICISED POLYVINYL CHLORIDE
Material	ROCK	ROCK ARMOURING
Material	SEAL	CHIPSEAL
Material	SOIL	NATURAL / SEMI NATURAL EARTH
Material	STCL	STEEL - CONCRETE LINED
Material	STNY	STEEL - NYLON COATED (Used in pump stations)
Material	STPL	STEEL - PITCH LINED
Material	TIMB	TIMBER CONSTRUCTION
Owner	NCC	NCC (UTILITIES)
Owner	NEAS	NCC Easement (UTILITIES)
Owner	NRDG	NCC Roading
Owner	NRES	NCC Reserve
Owner	NSRV	NCC Engineering (UTILITIES)
Owner	NWST	NCC Solid Waste
Owner	OPOW	Other - Power Utility
Owner	OPRT	Other - Nelson Port Company
Owner	ORAA	Other - Regional Airport Authority
Owner	ORSS	Other - Regional Sewer Scheme
Owner	OTDC	Other - Tasman District Council
Owner	OTEL	Other - Telecom Utility
Owner	OTST	Other - Transit NZ
Owner	OUKN	Other – Unknown
Owner	PASS	Private Assumed
Owner	PCOM	Private Common
Owner	PEAS	Private Easement
Owner	PVTE	Private

APPENDIX D: GAP ANALYSIS AND APPROPRIATE PRACTICE

Table D1-1 below indicates the current and desired Asset Management level and performance in the ten areas of Asset Management for the Flood Protection services.

Appendix Table D-1: GAP Analysis and Appropriate Practice

Flood Protection					Maturity Levels										
Reference	Question	IIMM Descriptors			Aware Ad hoc processes, minimal documentation	Basic Process and documentation in development	Core Main process components developed and documented	Intermediate Process complete, optimisation developing	Advanced Optimised process in place, documentation complete.	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap
		Process Development and Documentation														
		Coverage (assets, people, frequency)			Rarely	Occasionally	Often	Usually	Always							
		Section	Questions	Why	0-20	25-40	45-60	65-80	85-100							
eference	uestion	Section	Questions	Why	0-20	25-40	45-60	65-80	85-100	lement	Score (o	urrent Sc	Target (3 yrs)			
Understanding and Defining Requirements																
IIMM 2.1	1	**Establishing Strategic Direction**	To what extent has your organisation's AM Policy and AM Strategy been articulated, approved, communicated and acted on? How consistent is this policy and strategy with current government policies?	The AM Policy supports an organisation's strategic objectives. It articulates the principles, requirements and responsibilities for asset management (AM). It articulates the objectives, practices and action plans for AM improvement, audit and review processes. The AM Policy and Strategy may be incorporated into the AM Plan.	Corporate awareness of the benefits of AM.	Corporate expectation expressed in relation to development of AM Plans and AM objectives.	AM Policy and AM Objectives developed, aligned to corporate goals and strategic context.	AM System scope is defined and documented. Strategic context (internal, external, customer environment) analysed and implications for the AM System documented in the Strategic AM Plan.	AM Policy and Strategy fully integrated into the organisation's business processes and subject to defined audit, review and updating procedures.			58.75	65	75		
		Strategic context (internal / external) analysed and AM implications understood.								25%	55					
		AM Policy sets out AM expectations, objectives and accountabilities								25%	55				New Activity distinct from Stormwater	
		The organisation's AM System / Framework is defined								25%	60					
		Strategic, tactical and operational goals are aligned across the organisation								25%	65					
IIMM 2.2	2	**Defining and Measuring Levels of Service**	How does your organisation determine what is the appropriate level of service for its customers and then ensure that asset performance is appropriate to those service levels?	Levels of service are the cornerstone of asset management and provide the platform for all lifecycle decision making. Levels of service are the outputs a customer receives from the organisation, and are supported by performance measures. One of the first steps in developing asset management plans or processes is to find out what levels of service customers are prepared to pay for, then understand asset performance and capability to deliver those requirements.	Level of service requirements generally understood but not documented or quantified.	Asset contribution to organisation's objectives and some basic levels of service have been defined. Customer Groups defined and requirements informally understood.	Levels of service and performance measures in place covering a range of service attributes. Annual reporting against performance targets. Customer Group needs analysed.	Level of service and cost relationship understood. Customers are consulted on significant service levels and options.	Customer communications plan in place. Levels of service are integral to decision making and business planning.			62.5	65	75		
		Customer engagement to understand level of service requirements.								25%	55				Done through LTP & Annual Plan. Engagement on Maitai Flood Risk and Options is planned	
		Levels of service and performance measures defined								25%	75				Defined in AMP and LTP	
		Measurement and reporting occurs, including analysis of trends.								25%	70				Integrated in Customer Service reports	
		Level of service and cost relationship analysed.								25%	50				Not done for changes to L.O.S.	Flood reduction options to be costed.
IIMM 2.3	3	**Forecasting Future Demand**	How robust is the approach your organisation uses to forecast demand for its services and the possible impact on its asset portfolios?	This AM activity involves estimating demand for the service over the life of the AM plan or the life of the asset. Demand is a measure of how much customers consume the services provided by the assets. The ability to predict demand enables an organisation to plan ahead and meet that demand, or manage risks of not meeting demand.	Future demand requirements generally understood but not documented or quantified. Demand forecasts based on mathematical analysis of past trends and primary demand factors.	Demand forecasts based on experienced staff predictions, with consideration of known past demand trends and likely future growth patterns.	Demand Forecasts based on robust projection of a primary demand factor (eg: population growth) and extrapolation of historic trends. Risk associated with demand change broadly understood and documented. Demand management considered as an alternative to major project development	A range of demand scenarios is developed (eg: high/medium/low). Demand management is considered in all strategy and project decisions.	Risk assessment of different demand scenarios with mitigation actions identified.			65	70	75		
		Historical demand / consumption of services recorded and trends analysed history recorded								20%	70					
		Demand factors identified and analysed								20%	65					
		Demand forecast models developed								20%	65				Present day and future flood hazard has been identified for FDS areas	
		Demand management strategies identified and impacts on future demand quantified								20%	65				Achieved through standards in the IPN relating to flood resilience of new developments	To be reviewed in light of Climate Adaptation legislation
		Risk associated with demand uncertainty understood, scenarios are developed and managed								20%	60				Demand and awareness of risk have increased in light of the August 2022 and May 2023 floods	
IIMM 2.4	4	**Collecting Asset Information (Asset Knowledge)**	What sort of asset-related information does the organisation collect, and how does it ensure the information has the requisite quality (accuracy, consistency, reliability)?	Asset data is the foundation for enabling most AM functions. Planning for asset renewal and maintenance activities cannot proceed until organisations know exactly what assets they own or operate and where they are located	Asset information in combination of sources and formats. Awareness of need for asset register.	Basic physical information recorded in a spreadsheet or similar (e.g. location, size, type), but may be based on broad assumptions or not complete.	Sufficient information to complete asset valuation (basis attributes, replacement cost and asset age/ life) and support prioritisation of programmes (criticality). Asset hierarchy, identification and attribute systems documented. Metadata held as appropriate.	A reliable register of physical, financial and risk attributes recorded in an information system with data analysis and reporting functionality. Systematic and documented data collection process in place.	Information on work history (type and cost, condition, performance, etc. recorded at asset component level. Systematic and fully optimised data collection programme with supporting metadata.			62	70	75		
		Asset hierarchy defined and data requirements for each level of the hierarchy specified.								20%	50				Flood Protection assets less well documented than stormwater assets	Condition assessments planned
		Basic physical information captured against assets (age, material, type, etc)								20%	60				Flood Protection assets less well documented than stormwater assets	Condition assessments planned
		Spatial / location information recorded or links to GIS from asset register (if separate)								20%	70				Flood Protection assets less well documented than stormwater assets	Condition assessments planned
		Asset age / life / replacement cost recorded at asset level (information for valuation / renewals)								20%	70				Flood Protection assets less well documented than stormwater assets	Condition assessments planned
		Asset criticality data recorded at asset level								20%	60				Flood Protection assets less well documented than stormwater assets	Condition assessments planned
IIMM 2.5	5	**Monitoring Asset Performance and Condition**	How does the organisation measure and manage the condition of its assets?	Timely and complete condition information supports risk management, lifecycle decision-making and financial / performance reporting.	Condition and performance understood but not quantified or documented.	Adequate data and information to confirm current performance against AM objectives.	Condition and performance information is suitable to be used to plan maintenance and renewals to meet over the short term.	Future condition and performance information is modelled to assess whether AM objectives can be met in the long term. Contextual information, such as demand, is used to estimate likely performance.	The type, quality and amount of data are optimised to the decisions being made. The underlying data collection programme is adapted to reflect the assets' lifecycle stage.			61.25	65	75		
		Condition and performance monitoring programmes established								25%	65				Criticality defined, remaining life defined, budget allocated to condition and performance assessment.	
		Condition data captured in asset register								25%	55				System under development	
		Performance data captured in asset register (eg: service outages)								25%	60				New KPI in LTP relates to stopbank asset performance	Define LoS for each stopbank in the network (flow capacity)
		Works costs recorded at asset level								25%	65					

Flood Protection

Reference	Question	IIMM Descriptors / Section	Questions	Why	Maturity Levels: Aware / Basic / Core / Intermediate / Advanced	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap
		Process Development and Documentation			Ad hoc processes, minimal documentation / Process and documentation in development / Main process components developed and documented / Process complete, optimisation developing / Optimised process in place, documentation complete.							
		Coverage (assets, people, frequency)			Rarely / Occasionally / Often / Usually / Always							
		Section	Questions	Why	0-20 / 25-40 / 45-60 / 65-80 / 85-100							
Reference	Question	Section	Questions	Why	0-20 / 25-40 / 45-60 / 65-80 / 85-100	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap
Lifecycle Decision Making												
IIMM 3.1	6	**Lifecycle Decision Methods**	How does your organisation go about making decisions on the replacement or refurbishment of existing assets or investment in new ones?	Decision techniques provide the best value for money form an organisation's expenditure programmes. These techniques reveal strategic choices, and balance the trade off between levels of service, cost and risk. ODM is a formal process to identify and prioritise all potential asset and non-asset solutions with consideration of financial viability, social and environmental responsibility and cultural outcomes.	AM decisions based largely on staff judgement. / Corporate priorities incorporated into decision making. / Formal decision making techniques (MCA / BCA), are applied to major projects and programmes, where criteria are based on the organisations' AM objectives. / Formal decision making and prioritisation techniques are applied to all operational and capital asset programmes within each main budget category. Critical assumptions and estimates are tested for sensitivity to results. / AM objectives/targets are set based on formal decision making techniques, supported by the estimated costs and benefits of achieving targets. The framework enables projects and programmes to be optimised across all activity areas. Formal risk-based sensitivity analysis is carried out.			67	70	80		
		Good information available to support AM decisions.				20%	65				Development of catchment flood models and Decision matrix	Flood Management Plans; Flood Protection renewal strategy planned
		Options developed and analysed (including 'do nothing')				20%	75				In place for Capital investment only	
		Agreed frameworks / techniques applied to support decision making				20%	70				Business case format	
		Decision frameworks are aligned to strategic objectives / levels of service				20%	70				Refer to Business Case Decision Criteria	
		Sensitivity analysis / scenario testing used to assess robustness of result				20%	55					
IIMM 3.2	7	**Managing Risk and Resilience**	How does your organisation manage the interplay between business risks and asset-related risks?	Risk management helps identify higher risks, and identify actions to mitigate those risks. This process reduces the organisation's exposure to asset related risk, especially around critical assets, and drives renewal and rehabilitation programmes and decision making.	Risk management is identified as a future improvement. Risk framework developed. / Critical services and assets understood and considered by staff involved in maintenance / renewal decisions. / Critical assets and high risks identified. Documented risk management strategies for critical assets and high risks. / Resilience level assessed and improvements identified. Systematic risk analysis to assist key decision-making. Risk register regularly monitored and reported. Risk managed and prioritised consistently across the organisation. / Resilience strategy and programme in place including defined levels of service for resilience. Formal risk management policy in place. Risk is quantified and risk mitigation options evaluated. Risk is integrated into all aspects of decision making.			64	70	75		
		Risk policy / framework in place				20%	80				Corporate framework in place	
		Risks are identified and recorded in risk register.				20%	80				Risk register exists for Flood Protection Activity	
		Risk actions are identified, monitored and reported.				20%	55					Risk Management Plan
		Strategy for management of critical assets in place				20%	50				Critical assets identification for Flood Protection needs further work	Risk Management Plan
		Assessments of network resilience to major hazards				20%	55				Network resilience tested during Aug 2022 and May 2023 flood events.	Extend natural hazard assessment
IIMM 3.3	8	**Operational Planning**	How does your organisation manage the cost effective performance of its key business assets over time (e.g. in terms of utilisation, availability, fitness for purpose)?	Effective operational strategies can mitigate risk, defer the need for asset renewals and minimise service downtime following asset failures. Planning for business continuity and full utilisation of assets are key factors in good asset management processes.	Operational processes based on historical practices. / Operating Procedures are available for critical Operational Processes. Operations Organisational structure in place and roles assigned / Operating Procedures are available for all Operational Processes. Operational Support Requirements are in place. / Risk and Opportunity Planning completed. Operational objectives and intervention levels defined and implemented. Alignment with Organisational Objectives can be demonstrated. / Continual improvement can be demonstrated for all operational processes. Comparison with ISO 55001 requirements complete.			61.25	65	75		
		Operational programmes and processes are developed and optimised				25%	65				Contractor stream assessments are annual and get documented on collector app	Condition assessments needed for specific asset types eg. gabion walls and timber retaining walls.
		Operational objectives and intervention criteria are defined				25%	65				Contractor stream assessments are annual and get documented on collector app	Need to identify channel bed levels to be maintained.
		Emergency response arrangements are in place and tested				25%	55				Flood evacuations in Aug 2022 were not timely; Evacuation plans not in place	Flood Warning System for Maitai to be put in place. Evacuation Plans need to identify the properties to be evacuated for specific % AEP events
		Operational performance is monitored and improvements identified				25%	60					Improve monitoring of KPI
IIMM 3.4	9	**Capital Investment Planning**	What processes and practices does the organisation have in place to plan and prioritise capital expenditure?	Capital investment include the upgrade, creation or purchase of new assets, typically to address growth or changes in levels of service requirements, or for the periodic renewal of existing assets, to maintain service levels. Agencies need to plan for the long term asset requirements relative to future levels of service. The decision on whether to create a new asset is typically the time when there is the most opportunity to impact on the potential cost and level of service. Cabinet expects all capital-intensive agencies to disclose 10 year capital intentions and make appropriate use of the better business cases methodology for programmes and individual investment proposals.	Capital investment projects are identified during annual budget process. / There is a schedule of proposed capital projects and associated costs for the next 3-5 years, based on staff judgement of future requirements. / Projects have been collated from a wide range of sources and collated into a project register. Capital projects for the next three years are fully scoped and estimated. A prioritisation framework is in place to rank the importance of capital projects. / Formal options analysis and business case development has been completed for major projects in the 3-5 year period. Major capital projects for the next 10-20 are conceptually identified and broad cost estimates are available. / Long-term capital investment programmes are developed using advanced decision techniques such as predictive renewal modelling.			69.5	75	80		
		Capital projects are identified and recorded in a register				20%	80					
		Capital projects are scoped and costs estimated for inclusion in budget forecasts				30%	70				Business cases completed for projects > $500k	
		Capital projects are prioritised within and between activities and work areas				25%	70				Currently guided by flood modelling and field data; Tends to be reactive	Complete Flood Management Plans
		Renewal forecasts are modelled based on age, condition, performance				25%	60				Reduced from 2021 AMP. Condition assessments focussed on damage following Aug 2022 flood rather than specific assets.	Condition assessments of specific assets required.
IIMM 3.5	10	**Financial Management**	How does your organisation plan for the funding of its future capital expenditure and asset-related costs?	Poor financial management can lead to higher long run life cycle costs, inequitable fees and charges, and financial "shocks". Good collaboration between financial and asset managers is important, especially in relation to long term financial forecasts and asset revaluations. Asset valuation is required by International Accounting Standards, and can be used in lifecycle decision making. Robust financial budgets are a key output of any asset management planning process.	Financial planning is largely an annual budget process, but there is intention to develop longer term forecasts. / Assets re-valued in compliance with financial reporting and accounting standards. 10 year financial forecasts are based on extrapolation of past trends and broad assumptions about the future. Expenditure categories compliant with FRS. / Asset revaluations have a 'B' grade data confidence 10 year+ financial forecasts based on current comprehensive AMPs with detailed supporting assumptions / reliability factors. / Asset revaluations have a 'B' grade data confidence 10 year+ financial forecasts based on current comprehensive AMPs with detailed supporting assumptions / reliability factors. / Asset revaluations have an 'A' grade data confidence. 10 year + financial forecasts based on comprehensive, advanced AM plans with detailed underlying assumptions and high confidence in accuracy. Advanced financial modelling provides sensitivity analysis, demonstrable whole of life costing and cost analysis for level of service options.			66.25	70	75		
		Budget categorisation supports analysis of asset-specific financial requirements				25%	60					
		Long term financial forecasts are developed				25%	65					
		Assets are revalued in accordance with financial reporting standards				25%	75					Wider range of tendered rates
		Supporting assumptions and forecasting methodologies are documented and auditable.				25%	65					Wider range of reference material

Asset Management Enablers																	
IMM 4.1	11	**Asset Management Leadership and Teams**	What is the level of organisational commitment to asset management? How is this reflected in existing organisation structure, responsibilities and resourcing of AM competencies?	Effective asset management requires a committed and co-ordinated effort across all sections of an organisation.	Leadership is supportive of AM.	AM functions are carried out by small groups. Roles reflect AM requirements.	Position descriptions incorporate AM roles. AM coordination processes established. Ownership and support of AM by leadership. Awareness of AM across most of the organisation.	Organisational structures support AM. Roles reflect AM resourcing requirements and reflected in position descriptions for key roles. Consistent approach to AM across the organisation. Internal communication plan established.	Roles reflect AM requirements and defined in all relevant position descriptions. Formal documented assessment of AM capability and capacity requirements to achieve AM objectives. Demonstrable alignment between AM objectives, AM systems and individual responsibilities			61	65	70		
		Leadership supports and actively advocates investment in AM.								20%	65				Renewals tend to get cut where economies need to be found.	
		AM roles and role interfaces are defined.								20%	65					Improve job description and organisational structure
		Resources (internal and external) to support an effective 'AM System' are in place.								20%	65				Resources allocated are due to increase	Utilities operations engineer to be recruited specifically for Flood Protection
		All staff understand AM and their role / contribution to the AM System.								20%	60				Staff resource limited and approach tends to be reactive	
		AM capability requirements are reviewed and provided								20%	50				No change from 2021 AMP	
IMM 4.2	12	**Developing AM Plans**	How does your organisation develop, communicate, resource and action its asset management plans?	An asset management plan is a written representation of intended capital and operational programmes for it's new and existing infrastructure, based on the organisations understanding of demand, customer requirements and it's own network of assets.	Stated intention to develop AM Plans	AM Plans contains basic information on assets, service levels, planned works and financial forecasts (5-10 years) and future improvements.	AM objectives are defined with consideration of strategic context. Approach to risk and critical assets described, top-down condition and performance assessment, future demand forecasts, description of supporting AM processes, 10 year financial forecasts, 3 year AM improvement plan.	Analysis of asset condition and performance trends (past/future), customer engagement in setting levels of service, ODM/risk techniques applied to major programmes. Strategic context analysed with risks, issues and responses described.	Evidence of programmes driven by comprehensive decision making techniques, risk management programmes and level of service/cost trade-off analysis. Improvement programmes largely complete with focus on ongoing maintenance of current practice.			66	70	75		
		AMP development includes relevant staff and stakeholders								20%	60				Limited stakeholder involvement in AMP development	More trend analysis to optimise decision making
		AMP content in line with IIMM								20%	70				AMP structure consistent with IIMM	
		AMP document is of good quality, readable for target audience								20%	65				Main limitation is length and specific asset information.	Improve use of AMP content to be more user friendly and appropriate
		AMPs are integration with other business processes / plans								20%	60					Requires better integration of AMP development process
		AMPs are communicated to / approved by Council / Executive/ key stakeholders								20%	75				Council approves draft and final versions	More iwi input needs to be sought on AMP development
IMM 4.3	15	**Establishing and Maintaining Management Systems**	How does your organisation ensure that it's asset management processes and practices are appropriate and effective?	When AM processes are part of a Quality Management system the organisation is able to operate consistent and reliable processes,, provide evidence that what was planned was delivered, and ensure that knowledge is shared. In short, that processes are appropriate and consistently applied and understood.	Awareness of need to formalize systems and processes.	Simple process documentation in place for service-critical AM activities.	Basic Quality Management System in place that covers all organisational activities. Critical AM processes are documented, monitored and subject to review. AM System meets the requirements of ISO 55001.	Process documentation implemented in accordance with the AM System to appropriate level of detail. Internal management systems are aligned.	ISO certification to multiple standards for large asset intensive organisations, including ISO 55001. Strong integration of all management systems within the organisation.			52.5	60	70		
		Management systems are in place to support AM.								25%	60				Utilities Manager position created	
		AM processes are documented within a management system framework								25%	55				Business cases/PIDs/Data Analysis/Computer models	
		Processes are subject to review, audit and continual improvement								25%	50				Audits not undertaken	Requires audit process
		AM System is aligned / certified to ISO 55001								25%	45				System not certified	
IMM 4.4	13	**Establishing and Maintaining Information Systems**	How does your organisation meet the information needs of those responsible for various aspects of asset management?	AM systems have become an essential tool for the management of assets in order to effectively deal with the extent of analysis required.	Intention to develop an electronic asset register / AMIS.	Asset register can record core asset attributes – size, material, etc. Asset information reports can be manually generated for AM Plan input.	Asset register enables hierarchical reporting (at component to facility level). Customer request tracking and planned maintenance functionality enabled. System enables manual reports to be generated for valuation, renewal forecasting.	Spatial relationship capability. More automated analysis reporting on a wider range of information.	Financial, asset and customer service systems are integrated and all advanced AM functions are enabled. Asset optimisation analysis can be completed			70	75	80		
		IS records asset data within a hierarchy								20%	75				Not comprehensive for Flood Protection Assets	
		IS enables tracking of service requests and scheduling of planned maintenance								20%	80				No change from 2021 AMP	
		IS suports AM analysis (performance evaluation, valuation / renewal forecasting)								20%	65				IS supports valuation/ renewal planning	IS for performance / condition assessment
		IS reporting supports management and AMP requirements								20%	65				Borderline core / intermediate	Need training
		Information systems share / exchange data								20%	65				IS not currently well integrated	Need integrated finance / asset management system
IMM 4.5	14	**Service Delivery Models**	How does your organisation procure asset-related services like maintenance and consumables for different classes of assets? How does the organisation exercise control over any outsourced asset management services?	The effectiveness of asset management planning is proven in the efficient and effective delivery of services at an operational level.	AM roles generally understood.	Service delivery roles clearly allocated (internal and external), generally following historic approaches.	Core functions defined. Procurement strategy/policy in place. Internal service level agreements in place with the primary internal service providers and contract for the primary external service providers.	Risks, benefits and costs of various outsourcing options considered and determined. Competitive tendering practices applied with integrity and accountability.	All potential service delivery mechanisms reviewed and formal analysis carried out to identify best delivery mechanism.			75	80	85		
		Service delivery roles / functions defined (O&M, capital project delivery, etc)								25%	75				Clear delineation of functions between AM, Ops and Capital Projects	Documenting
		Functions allocated to roles / teams / contracts								25%	75					Documenting
		Service delivery options are evaluated and a strategy for outsourcing is in place								25%	75				Nelmac contract; Engineering consultants panel	Documenting
		Contracts / SLAs are in place for outsourced / in house service delivery								25%	75				Panel set up with contracts in place	Documenting
IMM 4.6	16	**Audit and Improvement**	How does your organisation ensure that it continues to develop its asset management capability towards an appropriate level of maturity?	Well performing agencies give careful consideration of the value that can be obtained from improving AM information, processes, systems and capability. The focus is on ensuring AM practices are "appropriate" to the business objectives and government requirements.	Recognition of AM improvements.	Improvement actions identified and allocated to appropriate staff.	Current and future AM performance assessed and gaps used to drive the improvement actions. Improvement plans identify objectives, timeframes, deliverables, resource requirements and responsibilities	Formal monitoring and reporting on the improvement programme to Executive Team. Project briefs developed for all key improvement actions.	Improvement plans specify key performance indicators (KPIs) for monitoring AM improvement and these are routinely reported. Improvement plans specify key performance indicators (KPIs) for monitoring AM improvement and these are routinely reported.			56.25	60	70		
		Gap analysis used to identify AM improvement tasks								25%	55					Document it
		Improvement tasks prioritised and developed into an AM improvement plan with allocated resources / timeframes / deliverables								25%	65					Document it
		Project scope / brief developed for major improvement tasks.								25%	50				Limited resourcing	Strategies to be completed
		Progress against the AM improvement programme is regularly monitored and reported to management								25%	55				Limited resourcing	Document it

APPENDIX E: DECISION CRITERIA (Creation / Augmentation)

Appendix Table E-1: Benefits Criteria for Strategic Business Case

DESIRED BENEFITS (STRATEGIC BUSINESS CASE)

Desired Outcomes	%	Benefits - Investment Objectives	Project Benefits Alignment
Increase in property protection	25%	Upgrade system capacity to ensure no habitable floor damage occurs for Q20 events. (Meeting LOS in LTP)	Strong / Medium / Weak
Provide resilient infrastructure to address climate change predictions, reduce the risk of blockages, and allow the city to continue to operate post Q100 event	20%	To ensure the primary system meets the required level of service (Q15) To reduce the risk of blockages which may result in that level of service not being met. To formalise secondary flow paths to accommodate Q100 or above if practical, to reduce risk of habitable floor damage for Q100 events. (i.e. full compliance with NTLDM Table 5-5) To increase resilience of the flood protection network to natural hazard events, through appropriate design and use of materials. *Note: Assessment of secondary flow paths should also allow for blockages in the primary system as defined in the NTLDM*	
Environmental benefits including: - Receiving environment - Making room for the river - Fish passage and habitat - Maintain or improve freshwater quality - Reduction of in-channel erosion - Reduction of siltation	15%	To ensure that flood protection upgrades do not negatively affect the ecological value of the open channel sections e.g. consideration to fish passage if required. Opportunities are taken to implement nature-based solutions where these are effective, feasible and affordable, to restore and improve freshwater outcomes in keeping with the principles of Te Mana o te Wai	
Improved access for maintenance of the flood protection assets and watercourses generally.	10%	To ensure sufficient easements are in place to protect council assets located within private property. To relocate flood protection assets to Council owned property where possible.	

DESIRED BENEFITS (STRATEGIC BUSINESS CASE)

Desired Outcomes	%	Benefits - Investment Objectives	Project Benefits Alignment
Capacity for growth *(Note on site detention for development could be challenging to achieve at some of these steep sites discouraging development within the upper catchment)*	15%	To offer the most cost effective and low risk approach for Council from a community perspective and developer to facilitate growth in upper catchments.	
Asset life/ condition *Remaining useful asset life*	15%	To ensure assets are renewed prior to failures occurring or excessive O&M costs are incurred to maintain serviceability of the asset.	

Appendix Table E-2: Decision Criteria for Indicative Business Case

DECISION CRITERIA (INDICATIVE BUSINESS CASE)

THESE ARE THE CRITERIA USED FOR MAKING A DECISION BETWEEN THE OPTIONS. DEGREE THE OPTION IS EXPECTED TO MEET THE CRITERIA. ALL COMPARE TO CURRENT STATE. (SEE A1969420 FOR BASIC EXAMPLE). USE BASIC MULTI CRITERIA ANALYSIS (MCA) TABLE BELOW OR INSERT ALTERNATIVE METHOD FOR DECISION MAKING.

Note: 3 highest (best), 1 is lowest

Indicator	Definition	Weight	Option 1	Option 2	Option 3
Scale of benefit improvements	*From the benefits table in the strategic section (SBC).* *Could be risk reduction as well if that is the benefit*	40%			
Value for money *(increase in benefit / cost)*	*Option that optimises the return on investments – Benefit v Cost v Risk.* *Benefits in strategic case table related to cost (either CAPEX or whole of life)*	20%			
Achievability	*Probability the project will successfully deliver the benefits*	10%			
Affordability	*Overall impact on debt level or rates increases*	20%			
Cost	*Compared to budget or whole of life*	10%			
Total Score					

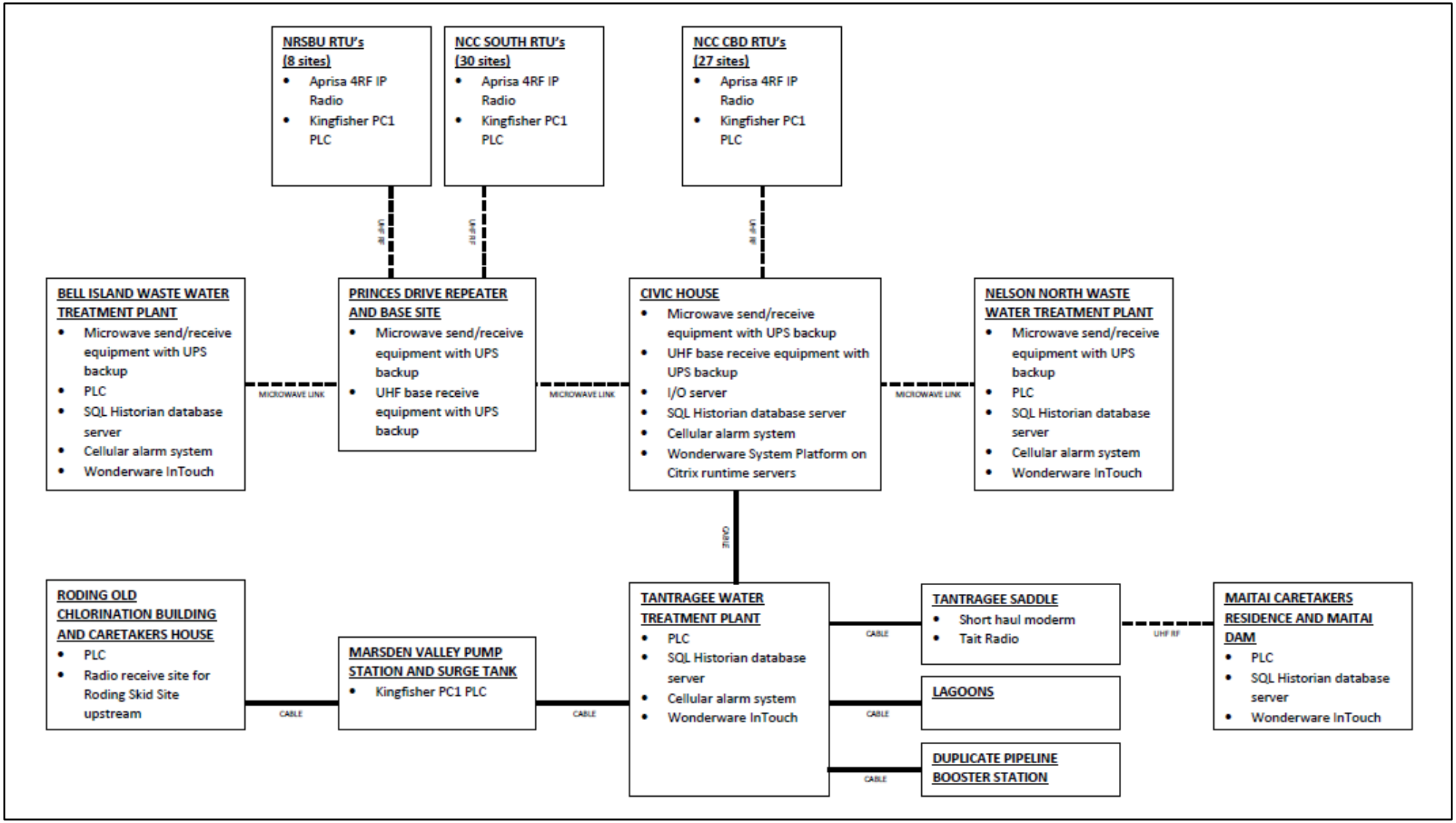
APPENDIX F: DECISION CRITERIA (Renewals)

Appendix Table F-1: Decision Criteria (Renewal)

Indicator or Attribute	Definition	Weight
Public flood protection asset	Does the section meet the criteria for a public flood protection asset	Y/N
Life safety or injury hazard	Would failure of the asset present a life safety or injury hazard	Y/N
Damage to property or roads	Is there evidence that more than minor damage to property or roads would be directly attributable to the failure of the flood protection asset	Y(1-5) /N(0)
Overall system capacity	Can the asset cope with demand and meet the levels of service	Y(1-5) /N(0)
Number of properties covered	Does the asset (location and or material) serve multiple properties (See public flood protection asset)	1-4 (1) 5-9(2) 10-19(3) 20-49(4) 50+(5)
Multiple system failures: Location	Has the asset failed more than once in the past 5 years?	Y 2-3(2) 4-6(5) 7+(8) N(0)
Multiple system failures: Material	Has the asset failed more than once in the past 5 years?	Y 2-3(2) 4-6(5) 7+(8) N(0)
Other NCC works in same general location	Is there an opportunity to combine works	Y(2)/N(0)
Condition Assessment	Results of condition assessment (Scale 1-5, Best-Worst)	1-2(0) 3(2) 4(4) 5(5)
Asset Criticality	Is it a critical asset	Y (10) N (0)

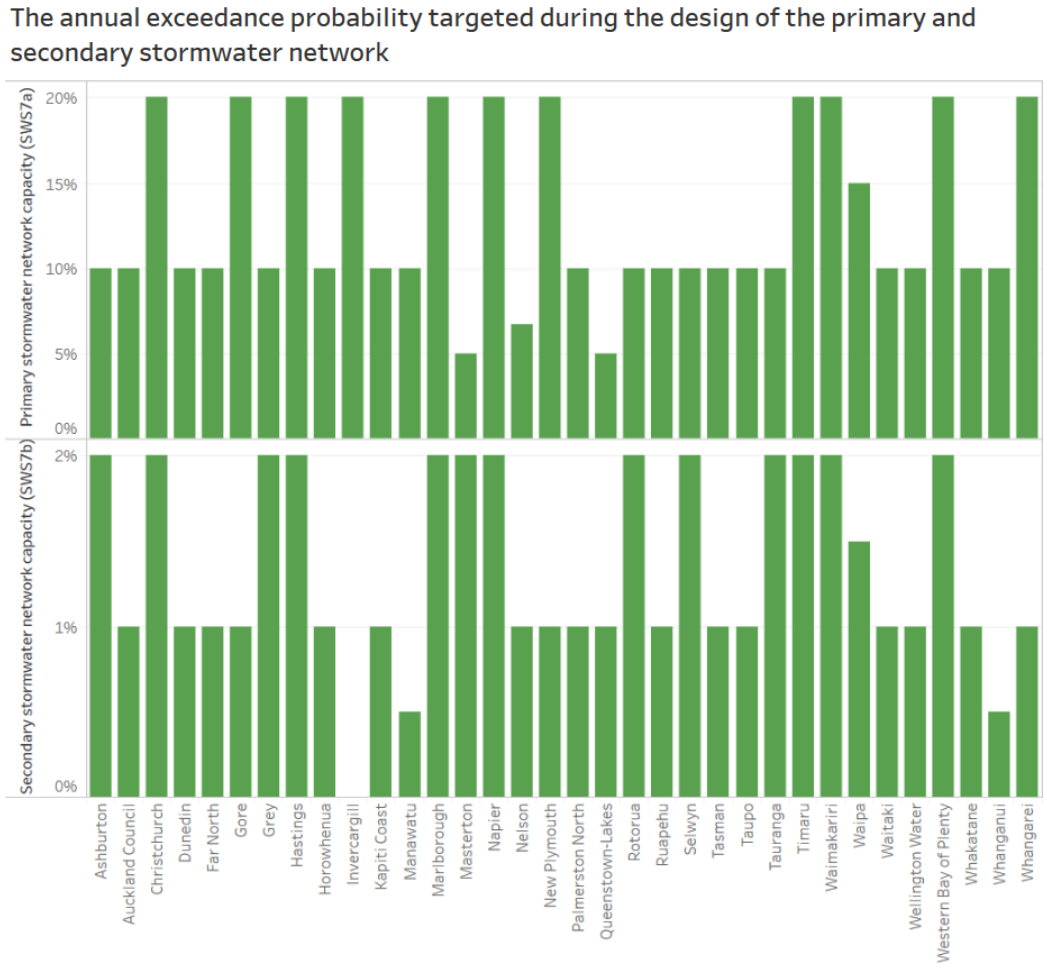
APPENDIX G: SCHEMATICS

Appendix Figure G-1: Supervisory Control and Data Acquisition (SCADA)

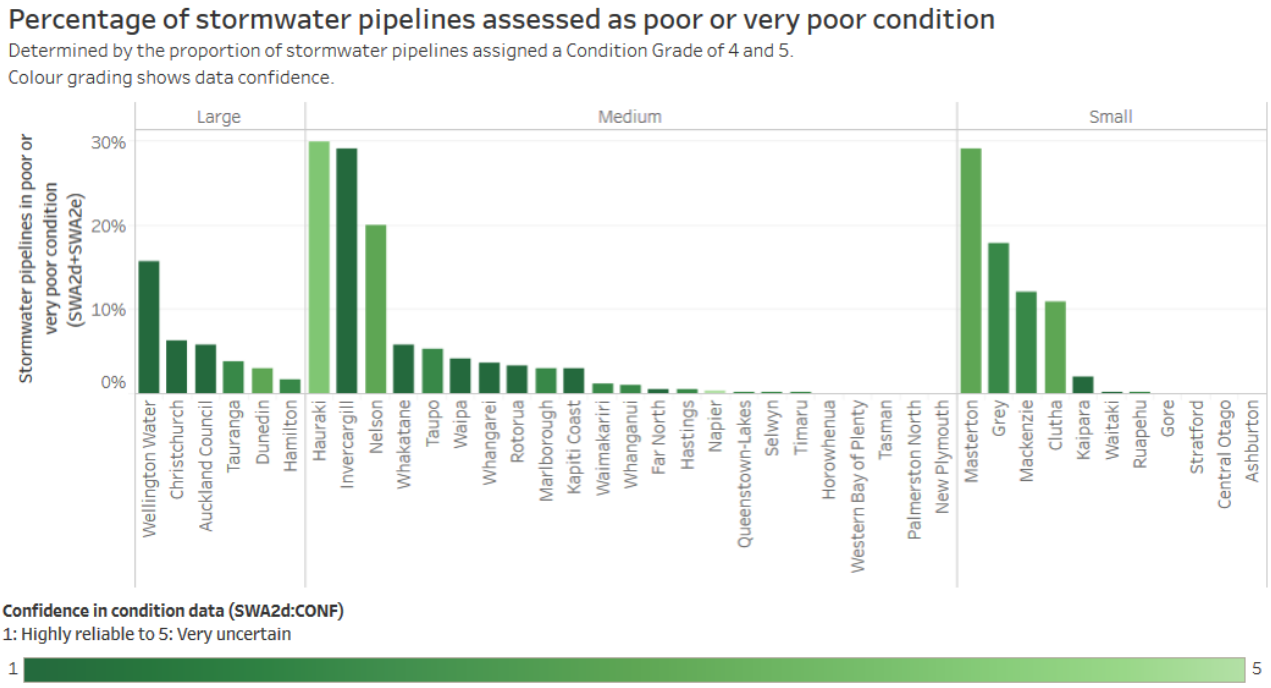


APPENDIX H: WATER NZ BENCH MARKING 2018 - 2019

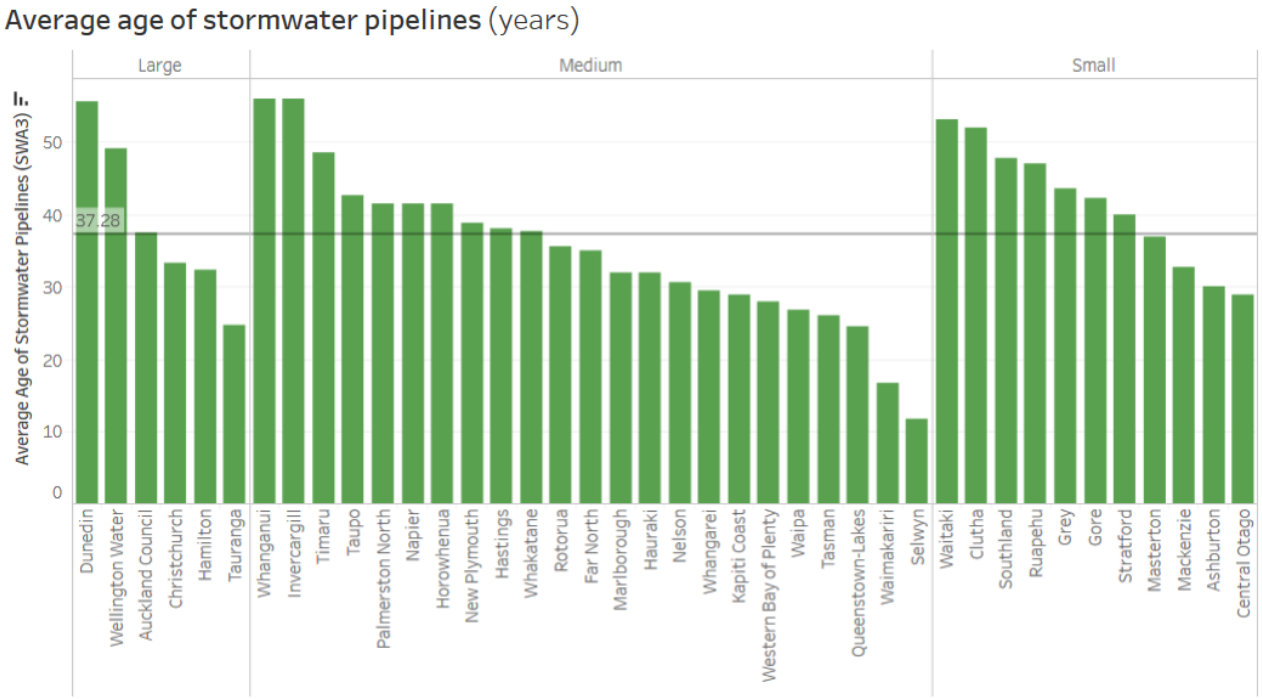
Appendix Figure H-1: Level of Service for Primary and Secondary Systems



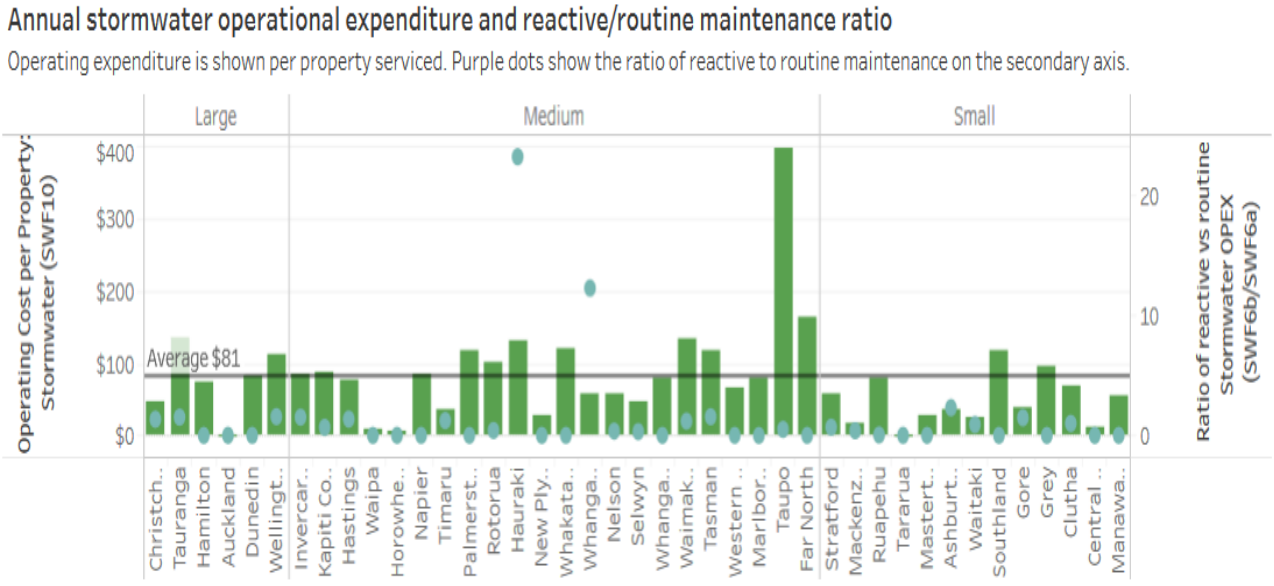
Appendix Figure H-2: Stormwater Pipe Condition



Appendix Figure H-3: Average Age of Stormwater Pipes



Appendix Figure H-4: Operational expenditure per property connected



APPENDIX I: COUNCIL FORECASTING ASSUMPTIONS 2024 – 2034

Appendix Table I-1: Council Forecasting Assumptions 2024 – 2034

<table>
<tr><th>Significant Forecasting assumption 2024-2034</th><th>Description of risk 2024-2034</th><th>Impact if assumption not correct 2024-2034</th><th>Mitigation 2024-2034</th></tr>
<tr><td colspan="4">Demographics</td></tr>
<tr><td colspan="4">Population growth</td></tr>
<tr><td>Nelson's population is expected to increase by 5,431 between 2024 and 2034 to 60,837. The projections suggest a relatively modest annual average growth rate for 2023-2033 of around 0.9%. Growth rates are likely to decline over time due to structural population ageing. The rates of growth are based on commissioned demographic analysis and reflect the medium scenario projections from the findings of this analysis.
These projections are higher than those produced by Statistics New Zealand, primarily due to higher net migration assumptions used for this analysis.</td><td>If Nelson's population growth is higher than projected, it risks putting pressure on Council services and infrastructure. If it is lower than projected Council risks over investing in services.</td><td>Low</td><td>Council is careful when applying population growth estimates to its infrastructure planning, given the uncertainties, so there is generally a good margin for error should growth be higher than projected. Growth projections are reassessed for each Long Term Plan and adjustments made to Council's work programme. New infrastructure is usually built for the medium to long term so there is the ability to draw on that future capacity if population growth is higher than projected. This limits the risk exposure.[42]</td></tr>
<tr><td colspan="4">Ageing population</td></tr>
<tr><td>The proportion of the population aged 65 years and over is projected to increase from 21% in 2023 to 26% in 2033.
As the population ages, it is assumed the proportion of our population on fixed incomes will increase, with a corresponding pressure on Council to limit rates increases. An ageing population also requires a different balance of services/facilities/activities and changes in spending patterns across Council activities.</td><td>If the population age profile varies from what is forecast, particularly if there is accelerated growth in the ageing population, it risks putting pressure on Council to change the type of facilities and services that it provides.</td><td>Medium</td><td>Risks can be mitigated by Council working with the community to prepare for these changes, and appropriately modifying investments in assets and the provision of services.</td></tr>
<tr><td colspan="4">Growth in rating units</td></tr>
<tr><td>It is assumed that the growth in rating units across the next ten years of the Long Term Plan is as follows:
<table>
<tr><th>Year</th><th>Growth</th><th>Number of rating units</th><th>Year on year increase</th></tr>
<tr><td>2024/2025</td><td>0.95%</td><td>23538</td><td></td></tr>
<tr><td>2025/2026</td><td>0.94%</td><td>23760</td><td>222</td></tr>
<tr><td>2026/2027</td><td>0.93%</td><td>23981</td><td>221</td></tr>
<tr><td>2027/2028</td><td>0.93%</td><td>24203</td><td>222</td></tr>
<tr><td>2028/2029</td><td>1.71%</td><td>24618</td><td>415</td></tr>
<tr><td>2029/2030</td><td>1.69%</td><td>25034</td><td>416</td></tr>
</table></td><td>Economic conditions, demographic factors, and landowner/developer decisions can cause variations in rating unit growth meaning growth could be higher or lower than projected.</td><td>Low</td><td>Council has used current property information from its valuation service provider (Quotable Value) to assess the level of growth in rating units, along with an assessment of year on year increases from recent years. This information is as accurate as possible, so the risk of variation is limited.</td></tr>
</table>

Significant Forecasting assumption 2024-2034				Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
2030/2031	1.66%	25449	415			
2031/2032	1.63%	25865	416			
2032/2033	1.60%	26280	415			
2033/2034	0.69%	26462	182			
Relationship with iwi						
Strengthening an authentic partnership between Council and iwi of Te Tauihu is central to improving outcomes for iwi/Māori and the Whakatū/Nelson community. It is assumed that Council will resource activities to support greater opportunities for: • Meaningful engagement between iwi and Council (i.e. regular meetings at governance, management and operational levels) • Increased iwi participation in Council decision making • Increased engagement and partnership with iwi and Council on legislative proposals and changes Staff and elected members will continue to develop their understanding of iwi and Māori priorities, legislation, te reo Māori and tikanga Māori.				Establishing ways of working with iwi/Māori requires resources that may not be available. For example (i) iwi have limited capability and capacity to engage on the volume of Council projects; (ii) Council may not have capability and capacity to resource the needs of the relationship; (iii) staff may not have time available to attend professional development courses to improve cultural capability. The risk of not resourcing opportunities to strengthen an authentic Council iwi partnership are: • It being perceived as an insincere relationship • Unrealistic expectations from both Council and iwi, leading to tensions • A competing requirement of iwi staff time that is under resourced Council working reactively and inefficiently with iwi.	Medium	Council will focus on strengthening its relationship with iwi by: • Funding that supports iwi capability and capacity to engage with Council • Attracting staff who are culturally competent • Developing planning tools and strategies that are reflective of a meaningful partnership with iwi/Māori Supporting opportunities for staff cultural competency development.
Climate change and natural disasters						
Climate change risks and impacts						
The expected risks of climate change for Nelson are based on science and projections from the Intergovernmental Panel on Climate Change, NIWA and governmental advice from the Ministry for the Environment. Sea-level rise projections are based on a range of global emissions scenarios developed by the Intergovernmental Panel on Climate Change and recommended by the Ministry for the Environment. Council considers a range of sea-level rise scenarios in its planning. It is assumed that it is not possible to reduce the mid-century warming, due to the amount of greenhouse gas emissions already accumulated in the atmosphere – i.e. that the projections for mid-century are already 'locked in'. Current roles and responsibilities in relation to climate change adaptation are unclear and expected to be clarified through legislative reform. It is assumed that, under any new legislation, Council will have a lead role to play in preparing Nelson for the impacts of climate change.				Increased numbers or severity of extreme weather events, such as heavy rainfall with flooding and slips, and dry weather resulting in drought and fire, would lead to increased costs for Council in both responding to the events and building greater resilience into infrastructure. There is a risk that inadequate assessment of the likelihood and impact of more frequent higher intensity natural hazard events would leave Council and the community unprepared to respond appropriately. Inadequate investment to reduce exposure to climate change risks would result in significantly greater costs than if proactive measures were taken. It would also lead to greater disruption to the community and essential services, and increased costs to Council. Over estimation of the impacts may result in Council having over-spent in preparing for risk factors.	Medium	To prepare Nelson for the impacts of climate change, Council is following the Dynamic Adaptive Pathways Planning (DAPP) process, recommended by the Ministry for the Environment in the Coastal Hazards and Climate Change Guidance for Local Government. This process enables Council to develop an adaptation plan the full extent and timing of climate change impacts is uncertain. Parts of Nelson Central are subject to flood risks and future intensification will be guided by the outcomes of the DAPP process. Over the period 2024-2034, Council will continue to work through the steps in the DAPP process, adapting the approach as new climate information is made available and drivers of change occur. Council will also closely monitor updates to ensure it is following the latest science, projections and guidance. Plan Change 29 (the Housing Plan Change) limits opportunities for intensification in low lying areas. Subsequent plan changes will be required to increase the resilience of the community, including regionally significant infrastructure. Council will continue to make allowances for increased stormwater management for areas that are identified as low lying and flood prone.
Greenhouse gas emissions						

Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
It is assumed that current policies (as set out in Aotearoa New Zealand's Emissions Reduction Plan) will be implemented and New Zealand's emissions will reduce in line with emissions budgets. Over the next few years, there is likely to be significant further central government policy reforms changing the direction to local government and potentially creating different priorities for Council's climate change mitigation and adaptation work.	A change in central government direction could result in a different emissions reduction pathway and policies than what is set out in the current Emissions Reduction Plan. With growing legislative requirements and community expectations to respond to climate change, there needs to be a corresponding increase in resources available for the climate change work programme. If this does not occur, Council risks not meeting expectations, failing to meet its operational emissions reduction targets, and failing to implement legislative requirements. Council has previously made a number of statements and commitments (for example through declaring a Climate Emergency) to provide a leadership role on climate change. If this is not supported by a comprehensive work programme that is well-resourced, Council risks failing to meet community expectations.	Medium	Staff will closely monitor developments in central government policy, to anticipate possible shifts in direction and reprioritise work accordingly. The Long Term Plan includes appropriate allocation of financial and staffing resources for the climate change work programme, and funding to grow the resource allocation to match the growing workload over time. Climate change adaptation and mitigation objectives will be embedded across key Council work programmes, in particular: transport, waste management and minimisation, forestry, resource management planning and utilities. Engagement will be undertaken with the community to set targets that are ambitious, attainable and consistent with scientific evidence regarding the reductions needed to limit global warming to 1.5 degrees. Staff will report regularly to Council on progress with this work programme.
New Zealand Emissions Trading Scheme (NZ ETS)			
Council has assumed that the NZ ETS costs will rise in the medium to long term as a result of amendments to the Climate Change Response Act 2002, including changes in NZ ETS settings. NZ ETS unit pricing in the short-term is likely to fluctuate before increasing. This will impact the Regional Landfill Business Unit.	Rising NZ ETS costs could result in increasing costs to Council from waste emissions managed under the Regional Landfill Business Unit. This will provide greater financial incentives to reduce emissions at the landfill.	Medium	If the increase in NZ ETS costs is materially higher than assumed, Council may need to increase waste management fees and charges, increase rates to fund these costs or reduce waste minimisation funding. The Regional Landfill Business Unit is proposing to mitigate the increase by improving landfill gas collection and destruction, pre-purchasing units to fix the cost, and to pass the remaining cost to consumers through landfill charges.
Natural disasters			
It is assumed that natural disasters will occur in the Nelson area during the life of the Long Term Plan. Nelson is located on a fault line meaning a major earthquake is not a matter of "if but when".	Greater than anticipated magnitude or frequency of natural disaster events could result in greater costs for Council in both recovery and in building greater resilience into infrastructure.	High	A characteristic of Nelson is the concentration of lifelines infrastructure (road network, port, airport, wastewater treatment ponds etc.) on or near hazards such as fault lines, vulnerable soils, low-lying ground and the coast. Increasing awareness of earthquake prone buildings through legislative requirements will increase understanding of earthquake resilience in buildings and infrastructure. Priority has been given to identification (completed) and remediation of unreinforced masonry buildings in Nelson's central city. Strategic transport routes for emergency response have been identified and approved. Identification of potentially earthquake prone buildings along these routes were completed in 2022. Owners of these prioritised buildings will be required to complete seismic work within 12.5 years of identification. Identification of other potentially earthquake prone buildings is to be completed by 2027. Owners of these will have 25 years to complete seismic work. Plans are made through the Nelson Tasman Civil Defence Emergency Management Group which illustrate the degree of risk faced by Nelson in terms of natural disasters including earthquakes (infrequent but high consequence) and flooding (likely but lower consequence). Council has sufficient borrowing capacity above its self-imposed debt cap to be used as

Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
			funding in the case of a natural disaster where costs exceed its emergency reserves.
Legislative and Regulatory Changes			
There are reforms and legislative changes impacting local government that are likely to progress or come into effect during the period of the Long Term Plan. It is assumed that Council will be affected by other government legislation. However, as the nature of these changes is not known, it is not possible to make appropriate financial provision at this stage, except where noted elsewhere in these forecasting assumptions. It is assumed that the Council will have the opportunity to submit on legislation likely to affect it and that central government will work with councils to ensure that any legislative changes are managed appropriately.	Central government's proposed changes could require changes to Council's work programme and budgets and decrease work in some areas. The changes could create uncertainty and require re-prioritisation of work programmes.	Low	By working closely with central government, Council can best understand its obligations under upcoming regulatory and legislative changes. This will allow Council to move resources to respond to changes or to seek additional resources, if needed, through future Annual Plans. Council's work programme in this area will change as needed to respond.
Amalgamation of water services – Water Services Reform			
It is assumed Council will continue to manage water supply, wastewater, and stormwater for the lifetime of the Long Term Plan 2024-2034. Therefore, funding for assets, staff and contractors who deliver water services has continued to be included in the budgets.	There is still some uncertainty about the future management of the three waters services, due to the Government's proposed Local Waters Done Well reforms. However, these reforms are early in the policy process and it is likely that Council will continue to deliver three waters services for several years. If Council's role in managing and delivering water services changes prior to the next review of the Long Term Plan in 2027, it would mean Council's Long Term Plan would need significant adjustment and it could have impacts on Council finances, staffing, capital works programmes and operations.	High	Council will respond to the direction provided by the Government and engage closely with the Te Tauihu councils, iwi and stakeholders as needed.
Resource management reforms			
The new Government has indicated an intention to reform the Resource Management Act 1991. The nature and extent of these reforms have been signalled to occur in phases but the full detail is currently unknown. Council has allocated budget in the Long Term Plan to review the Nelson Resource Management Plan or undertake other resource management policy development as required under the proposed reforms. It is assumed there will be obligations on Council to develop, implement and maintain strategic growth and resource management plans, in some form, and that Council will continue to have a role in the regulatory authorising environment and monitoring and compliance functions.	Until the reforms and associated legislative changes are finalised, it is difficult to estimate the likely impact on Council. However, the reforms may bring with them obligations for Council to fund a changed planning system.	Low	Council will make any adjustments necessary to respond to changes to the resource management legislation through annual plans and the Long-Term Plan 2027-2037.
Future for Local Government Review			
In April 2021, the Government established a Ministerial Inquiry into the Future for Local Government. The overall purpose of the review is to "identify how our system of local democracy needs to evolve over the next 30 years, to improve the wellbeing of New	There is potential for a gradual change to how Council works and is funded due to these reforms. This could have ramifications for work programmes, operational and capital expenditure, and budgeting.	Low	The Council will make any adjustments necessary to respond to any changes to local government legislation through annual plans and the Long-Term Plan 2027-2037.

Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
Zealand communities and the environment, and actively embody the treaty partnership." The review includes, but is not limited to, roles and functions of local government, as well as representation, governance, funding and financing. It is unclear whether the new Government will follow through with any of the recommendations in the review. The assumption is that any substantial change will be slow to result. Council has therefore prepared the Long Term Plan 2024-2034 assuming that its existing roles and functions (not impacted by other reforms) will continue.	It may also have impacts on costs for Council or changes to the way Council delivers services. However, until the Government has made its intentions clear it is difficult to estimate any impact on Council.		
Economic environment			
Economic Forecasts			
It is assumed Nelson's economy will grow at a similar rate to the long-run average for New Zealand for most of the 10 years. Treasury expects inflation to fall to 4.6% in 2024 and drop inside the Reserve Bank's target band of 1-3% inflation by 2025. Treasury has forecast New Zealand's real production GDP to change as follows to 2027[43]: **Year** / **Average Annual % Change** 2024 1.3 2025 2.0 2026 3.3 2027 3.2 Any ongoing economic downturn will affect ratepayers' and businesses' ability to pay for Council services and affect people's wellbeing. It will also have an impact on Council's work programme and delivery of services. Tourism is an important component of the Nelson economy, with it contributing around 4.1%[44] to the city's GDP and it has been affected by COVID-19 restrictions in recent years. Visitor arrivals to New Zealand are expected to grow an average of 4% each year, reaching 5.1 million visitors in 2025. Spend is forecast to grow at a slightly higher rate than the growth of visitor numbers, suggesting that spend per visitor will increase.	A downturn in the regional economy and higher unemployment may exacerbate affordability issues in the community, with some residents and businesses finding it more difficult to meet financial commitments including rates. This would also impact Council's ability to make financial commitments.	Medium	A focus on affordability, value for money and continued Council investment in sustainable projects which will help reinvigorate the economy and improve economic wellbeing.
Inflation/price changes			
Council has used inflation figures provided by BERL in preparing its Long Term Plan 2024-3024, along with other councils in New Zealand. BERL has provided two sets of figures – one set with water infrastructure and one set without water infrastructure. Council has used the figures that include water infrastructure for the ten years of the Long Term Plan. Financial year	Inflation higher than expected would increase costs for Council, reducing its programme to invest in and maintain infrastructure and facilities, and impacting its ability to deliver the levels of service set out in the Long Term Plan 2024-2034. There is still a lot of uncertainty about forecasting inflation. Previous forecasts have varied from the actual rates of inflation.	Medium	If inflation is higher than assumed, Council will consider increasing rates and charges, reducing its programme of investment in facilities and infrastructure, increasing debt and/or reducing levels of service. If inflation is lower than assumed, Council costs will be lower and Council will consider reducing rates and/or fees and charges or selectively increasing levels of service.

Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
LGCI 2024/25 – 2.9 2025/26 – 2.2 2026/27 – 2.3 2027/28 – 2.3 2028/29 – 2.2 2029/30 – 2.1 2030/31 – 2.0 2031/32 – 2.0 2032/33 – 1.9 2033/34 – 1.9			
Interest rates			
In preparing the Long Term Plan 2024-2034, Council has assumed the following interest rates, based on forecasts provided by PwC, Council's Treasury Advisors. These interest rates include the cost of both funds already borrowed and anticipated new debt at anticipated future interest rates. Financial Year 2024/25 – 4.85 2025/26 – 4.63 2026/27 – 4.63 2027/28 – 4.79 2028/29 – 4.9 2029/30 – 5.06 2030/31 – 5.21 2031/32 – 5.21 2032/33 – 5.21 2033/34 – 5.21	Higher interest rates would increase costs for Council.	Medium	Projected interest costs are largely hedged against changes in floating interest rates over future years. Therefore, the impact of interest rate increases over future years is low. However existing hedge commitments reduce over time (in accordance with Council's Policy) so that in the later years of the Plan the impact of changing interest rates would be greater which would be met either by increasing rates or adjusting down future borrowing requirements. Council manages interest rate exposure in accordance with its Liability Management Policy and in line with advice from Council's independent treasury advisor.
Labour market			
There are ongoing labour market shortages in particular skilled areas making it difficult for Council to hire staff with appropriate technical qualifications and experience needed to deliver work programmes. Sustained labour market shortages are expected in many of the occupations that Council is likely to be recruiting for, which will be compounded by a decreasing proportion of the Nelson population being of working age. Shortages in particular skill areas are highly likely and demand for more flexible and hybrid working options will increase. The shrinking of our working-age population, as well as the region's average wage being the lowest in the country, will contribute to ongoing problems maintaining Council's workforce.	A more competitive marketplace with accompanying labour shortages would mean Council may not be able to deliver work programmes on time due to the absence of enough sufficiently qualified staff. Greater reliance on consultants to fill temporary workforce gaps may increase costs.	Low	Council would reconsider service delivery to manage skills shortages, and to help maintain output. Providing remote working options may increase the pool of expertise to recruit from. It is also expected that the proportion of older adults remaining in the workforce will continue to rise, improving incomes at older ages and somewhat mitigating against forecast workforce shortages.

Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
Operational			
Useful lives of significant assets			
It is assumed triennial reassessments of the useful lives of significant assets during the ten year period covered by this Long Term Plan will continue. Significant assets will have lifespans that are consistent with initial assessments. The detail of useful lives for each asset category is covered in the Statement of Accounting Policies.	There is a risk of assets wearing out earlier than predicted and funding needs to be found for replacements. There is no extensive damage to Council's local roading network following the diversion of traffic from the State Highway during the August 2022 severe weather event.	Low	Council would make changes to underlying capital expenditure programmes to allocate funding for replacement assets.
Vested assets			
Vested Assets are engineering assets, such as roads, paid for by developers and vested to Council on completion of the subdivision. It is assumed that vested assets will remain the same over the term of the Plan as projects from the previous five years are completed. If required, additional budget can be added to the plan on account of private development agreements. However, as these agreements occur as and when private developers undertake work, this figure is largely indeterminable in advance. Council assumes that the impact of vested assets will be neutral, in that the costs associated with the additional assets will be offset by a proportionate increase in rates revenue. The impact of higher or lower growth is not considered significant.	Council has more assets vested and this could increase the depreciation and maintenance expense in subsequent years.	Low	Vested assets must be maintained by Council and depreciation provided for, therefore if growth is higher than forecast Council will increase its budget to maintain those assets and provide for the additional depreciation.
Cost to deliver capital projects			
A competitive local market means tenders are being received with prices above expectations. Furthermore, additional requirements and compliance issues that are included in contractual terms, such as carbon and freshwater requirements and waste minimisation, may increase prices further. Council will continue to work with contractors to achieve a living wage for their staff. It is assumed that this escalation of prices will continue in the medium term. It is assumed that major projects will be completed on time and within budget but acknowledges that not all projects will be completed on time as unforeseen issues will occur.	Increases in project prices resulting in higher costs would have potential upward pressure on rates and debt. Delays in project completion or additional costs may result in other major projects being reassessed in terms of both available budget and timeframes for completion. Important projects that run into significant cost increases, that are deemed essential, may require rates or borrowing increases, or reallocation of funds from other projects to offset the higher costs.	High	Increased flexibility in the capital works programme around timing of projects could help mitigate this trend. Reassessing Council's work programme to ensure adequate consultation and analysis prior to work commencing will be undertaken so that Council has the best information available.
Delivery of the capital programme			
Notwithstanding best intent to deliver the capital works programme, Council assumes that the full capital works programme will not always able to be fully delivered for a variety of reasons including project delays, weather and a range of other constraints. Council has also made an assumption that it is unlikely to use the full amount of contingency for every project. An overall downward adjustment of approximately 10% per year to the total capital programme cost has therefore been made to avoid overfunding the activities.	There is a risk that the cost of the capital programme may be more or less than the 90% budgeted for. If more is spent Council's debt will be more than forecast with an associated increase in costs. Delays in project completion or additional costs may result in other major projects being reassessed in terms of both available budget and timeframes for completion. Important projects deemed essential that run into significant cost increases, may require	High	Increased flexibility in the capital works programme around timing of projects could help mitigate this matter. Council ensures adequate consultation and analysis prior to work commencing so that it has the best information available to adjust the work programme as needed. Council will consider the impacts on rates, debt and levels of service when making any adjustments to the work programme. Priority will be given to making adjustments which reduce rates and debt increases but which are also least likely to have a negative impact on the Long Term Plan levels of service.

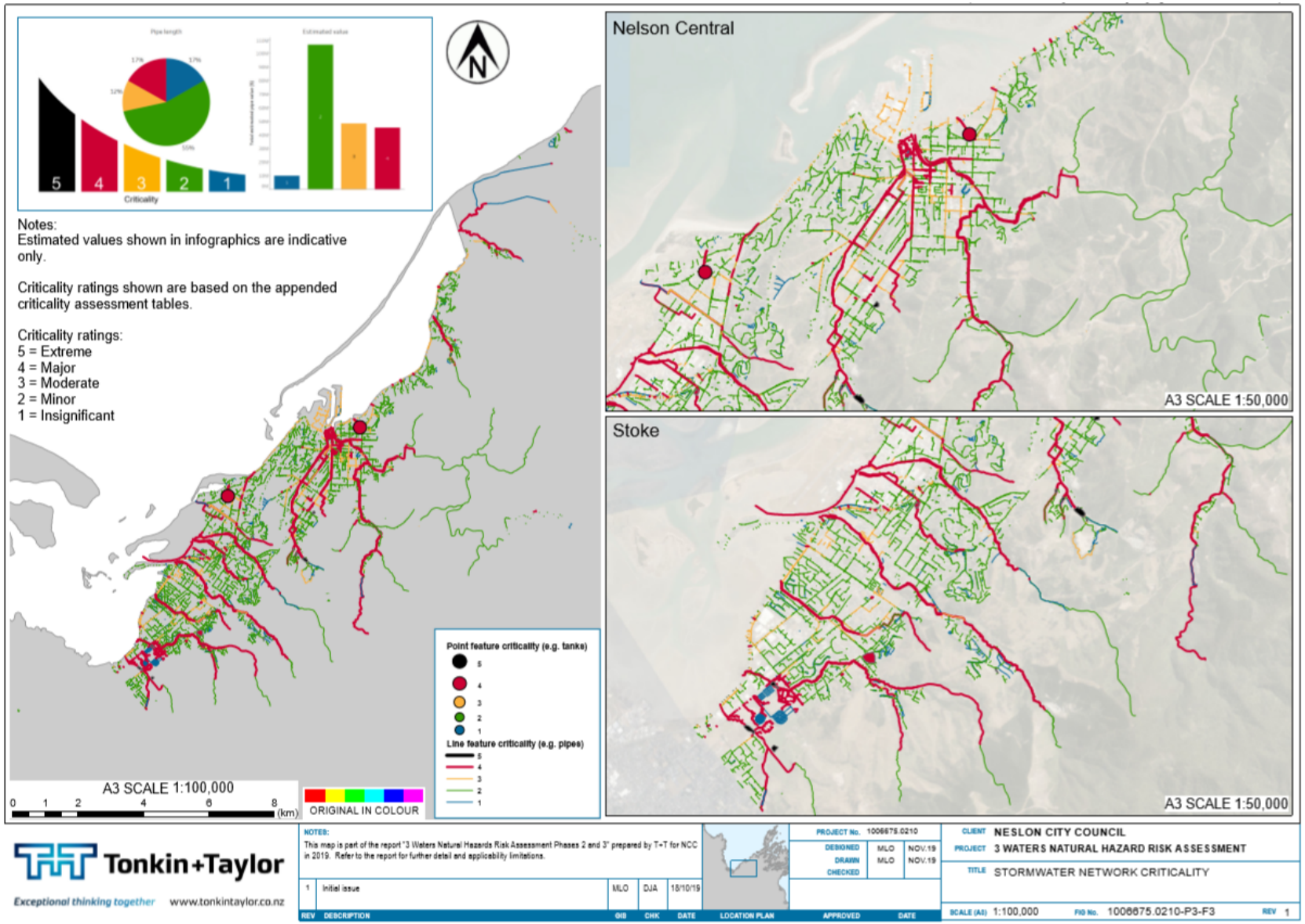
Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
	rates or borrowing increases or reallocation of funds from other projects to offset the higher costs.		
Earthquake prone buildings			
It is known that Council faces future costs with regard to earthquake prone building (EPB) assets. Civic House has earthquake prone status and being a EPB Priority Building, and Council premises, has a Taskforce assigned to address the compliance requirement. Council has four assets with EPB notices and it is assumed these properties will remain Council owned. Work will need to be completed between now and 2034 on these properties. Council as a Territorial Authority is required to identify EPBs and issue EPB notices. Identification of all priority buildings was completed by 30 June 2022, and all remaining EPB notices need to be completed by 30 June 2027.	Significant additional expenditure on earthquake strengthening buildings risks not being met by assigned budgets. EPB work can initiate other compliance work as part of consenting processes, therefore there is a risk that required work could become more significant than anticipated.	Medium	Processes are underway to seek Council direction to confirm intention for each asset with EPB status – options that may be considered are whether to a) retain and strengthen, b) deconstruct, or c) dispose of asset. Not all options are available for all assets but understanding Council's preferred direction will allow for staff to manage time, target tasks to be done, and set appropriate budgets.
Pandemics			
It is assumed New Zealand will avoid significant impacts from an epidemic or pandemic including COVID-19, and that no further lockdowns or major border restrictions are required.	A pandemic or epidemic could have significant impact on New Zealand and the Nelson region resulting in restrictions and/or illness, which would have a major impact on Council's ability to deliver services.	Medium	Council will maintain its organisational understanding of managing pandemic risks in the workplace and capacity of the organisation to work remotely.
Resource consents			
It is assumed that any resource consents held by Council that are due for renewal during the life of the Long Term plan 2024-2034 will obtain consent. It is assumed, however, that the consents will be subject to a more rigorous process, given national direction in areas such as freshwater. In terms of Council's role as regulator adjusting to the new resource consent regime, it is assumed there will be more permitted standards meaning less resource consents to process but more monitoring requirements/expectations of those permitted standards. It is assumed there will not be a drop in the overall number of staff or costs but potentially a change in roles to be able to undertake monitoring as well as processing.	Conditions of resource consents could be altered and significant new compliance costs or consents may not be able to be renewed as expected. Changes to the staff roles are required when transitioning to the new resource consent regime, to be able to undertake more monitoring as well as processing.	Medium	Budgets based on current expected levels of activity. More effort may not transfer into increased recovery so Council will have to carefully monitor expenditure in the absence of more capacity.
Financials			
Loan arrangements			
It is assumed that new borrowing or renewal of existing borrowings can be obtained from financial institutions including the Local Government Funding Agency on competitive terms given Council's strong credit rating.	Access to committed loan facilities less than expected may result.	Medium	Council minimises this risk by maintaining a strong credit rating and a mix of current and non-current borrowings as per its Liability Management Policy. Council's guarantor status for the Local Government Funding Agency also minimises the risk of not being able to borrow the funds it requires. Council also prefunds upcoming borrowing maturities early to lower the risk of not being able to borrow.
Insurance costs			
It is assessed that insurance cover for Council assets will be available throughout the period of the Long Term Plan 2024–2034 and that premiums will rise faster than the rate of inflation.	There is a risk that premiums increasing above inflation and/or Council cannot obtain 100% cover.	Medium	Council may reduce other budgets or reassess levels of service to reduce costs and provide more funds for covering premiums. Council could also increase rates. Also, Council is currently looking to reduce its level of

Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
Council expects insurance base costs to rise by 15-20% plus the impact of inflation on asset values in those years.			insurance cover by Council taking more financial risk to manage the increased premiums.
Return on investments			
It is assumed that the return on investments, including dividends from Council Controlled Trading Organisations and retained earnings on subsidiaries, will continue at current levels, plus inflation.	Returns could be lower than expected.	Low	This would impact on Council's ability to fund services and would likely require an increase in rates. Alternatively, Council could consider reducing levels of service.
Revaluation of non-current assets			
Council's accounting policy provides for its most significant asset classes (infrastructure assets and land, excluding land under roads) to be revalued with sufficient regularity as long as the carrying value does not differ materially from fair value. The revaluations for infrastructural asset classes: sewerage, water, drainage, and roads are updated annually with full valuations being completed bi-annually and an index valuation in alternate years. A registered valuer assesses asset unit rate replacement values through analysing areas such as current contract pricing, comparisons of similar councils, impacts of regional and national influences such as weather events, and CPI indexes which are then applied to a full valuation. Assets abandoned during the financial year are disposed then confirmed rates are applied to all Council's infrastructure assets generating a total asset replacement cost, depreciated replacement cost and depreciation. For intervening years, infrastructural assets are revalued by means of applying an inflation index and additional uplift where necessary to align with market rates, whilst accounting for disposals and additions at cost. Each year the valuation produced is peer reviewed by a registered valuer. The latest full valuation was the 2021-22 year and was reviewed by WSP New Zealand Ltd. The next full valuations will be taking place in the following years: 30 June 2024 30 June 2026 30 June 2028 30 June 2030 30 June 2032 30 June 2034 To forecast for these valuations in this Long Term Plan, we revalue Infrastructural asset classes: sewerage, water, drainage, and roads every year based on Local Government Cost Index (LGCI) Capex. Land is reviewed annually and revalued at market value every five years or if there is a material movement. The latest valuation was conducted as at 30 June 2021 by QV Valuation.	Actual revaluation results could differ significantly from those forecast in this Long Term Plan.	Medium	Council will be maintaining best practice in accounting policies to minimise risk of assets' carrying value differing significantly from fair value.

Significant Forecasting assumption 2024-2034	Description of risk 2024-2034	Impact if assumption not correct 2024-2034	Mitigation 2024-2034
We have forecast land revaluations to occur in years 3, 6 and 9 of the Long Term Plan. We revalue Property Plant and Equipment (PPE) every year based on Local Government Cost Index (LGCI) Capex. Depreciation is calculated based on revalued PPE each year – depreciation on existing assets therefore increases each year starting in Year 2 (as a result of the prior year revaluation).			
NZ Transport Agency Waka Kotahi Funding			
Council assumes the NZ Transport Agency Waka Kotahi Financial Assistance Rate (FAR) will remain at the same rate (51%) over the term of the Long Term Plan 2024-2034 and only programmes/projects with strong alignment with the Government Policy Statement on land transport will receive National Land Transport Funding (NLTF). It assumes that the projects included years 4 to 10 of the Long Term Plan will be approved as fitting within the new National Land Transport Funding framework when it is released.	Projects and programmes that do not qualify for National Land Transport Funding will need to be deferred which may impact levels of service or continued at 100% local share which is likely to impact rates and debt. If the FAR is reduced or projects no longer supported, Council will need to decide whether to increase funding (an impact of approximately $5-20M, typically on debt over years 4 to 10) or to remove work from the plan (which may impact on services).	Medium to high (depending on the level of change)	Changes to the funding priorities of NZ Transport Agency Waka Kotahi are outside Council's control, however any significant change to the FAR or NLTF eligible works may require Council to reassess its transport work programme in order to reduce costs and/or to make up operational and/or capital shortfalls, with potential impacts on rates and debt or levels of service.
Co-funding arrangements			
It is assumed that for projects where other partners are contributing part of the funding, this funding will continue to be available. It is assumed that where Council could be eligible for government funding, e.g. infrastructure and community projects, Council will also seek this funding. Council will seek co-financing where available from central government towards implementation of climate change projects.	Partners may no longer be in a position to provide funding which may result in an increased level of funding from Council, or the termination of the project.	Medium	If co-funding arrangements changed, the viability of projects would be reviewed and Council would need to consider its ongoing commitment. Funding for projects may be sought from other sources.
Sources of funds for the future replacements of assets			
It is assumed that funding for the replacement of existing assets will be obtained from the appropriate sources as detailed in Council's Revenue and Financing Policy.	There is a risk that a particular funding source is unavailable.	Low	Depreciation is used to fund renewals and is funded mainly through rates and user charges. Should other sources of capital funding such as subsidies or development/financial contributions differ from levels forecast in a particular activity, Council is able to access borrowings through various sources as explained under Loan arrangements section.

APPENDIX J: ASSET CRITICALITY

Appendix Figure J-1: Plan of Network Criticality and Estimated Values



Appendix Table J-1: Table of Measures for Determining Asset Criticality

Table of stormwater pipe & channel measures

Impact / Criticality Rating	Safety (whereby failure is likely to directly cause safety impacts as described in the NCC consequence rating table)	Health	Asset Performance/Service Delivery	Environmental/ Historical/cultural	Financial	Political / Community/Reputational	Proximity to adjacent infrastructure & accessibility (as an indicator of difficulty of repair or potential for cascading failures)	Critical facilities
Extreme (5)	• Any detention dam >2m high	• Any detention dam >2m high	(Not assessed at this stage - potential future measure identifying pipes designed to take both primary and secondary system flow)		• Culverts value > $5,000,000 • Not assessed for pipes • Pumpstation or detention dam > $5,000,000	Not directly measured - instead set equal to highest value from other categories		
Major (4)	• Any stormwater rising main • Any stream or river passing through urban area (open channel or piped) • Any flood protection stopbank • Any Stormwater pumping station • Any flood gate preventing tidal inflow • Any detention dam <2m high	• Any stormwater rising main • Any stream or river passing through urban area (open channel or piped) • Any flood protection stopbank • Any Stormwater pumping station • Any flood gate preventing tidal inflow • Any detention dam <2m high			• Culverts value $1,000,000-$5,000,000 • Not assessed for pipes • Pumpstation or detention dam $1,000,000-$5,000,000		• Stream crossing (culvert under State Highway or Arterial Road) • Stream channel 1km downstream from any detention dam. • Pipe > 1,000mm dia. buried beneath a State Highway	• Stormwater assets within 100m of: - Nelson Hospital - Ambulance Centres - Nelson Fire Station - Nelson Police Station - Nelson City Council Office - Salvation Army on Rutherford Street (CD Welfare Centre) - Trafalgar Pavilion (CD Welfare Centre) - Saxton Stadium (CD Facility) - Electricity substations
Moderate (3)	• Any other pipe or culvert > 1,000mm dia (not on stream).	• Any other pipe or culvert > 1,000mm dia (not on stream).		• Subsoil drains on land categorised as 'high slope instability susceptibility'	• Culverts value $500,000 to $1,000,000 • Not assessed for pipes • Pumpstation or detention dam $500,000 to $1,000,000		• Stream crossing (bridge under State Highway or Arterial Road) • Pipe > 1,000mm dia. buried beneath an arterial road • Pipe > 1,000mm dia buried beneath a building. • Pipe > 1,000mm dia within 10m of a State Highway	• Stormwater assets within 100m of: - Nelson Port - Green Meadows Community Centre -Rest homes - Schools, daycare centres & kindegartens - Petrol Stations
Minor (2)	• Collector pipes < 1,0000mm (not on stream)	• Collector pipes < 1,0000mm (not on stream)		• Subsoil drains on land categorised as 'medium slope instability susceptibility'	• Culverts value $100,000-$500,000 • Not assessed for pipes • Pumpstation or detention dam $100,000-$500,000		• Within the 'NCC - Inner City' planning zones	
Insignificant (ie. very minor) (1)	• Pipe laterals	• Pipe laterals		• Subsoil drains on land categorised as 'low slope instability susceptibility'	• Culverts value $10,000 to $100,000 • Not assessed for pipes • Pumpstation or detention dam		• Nothing of interest within 10m	

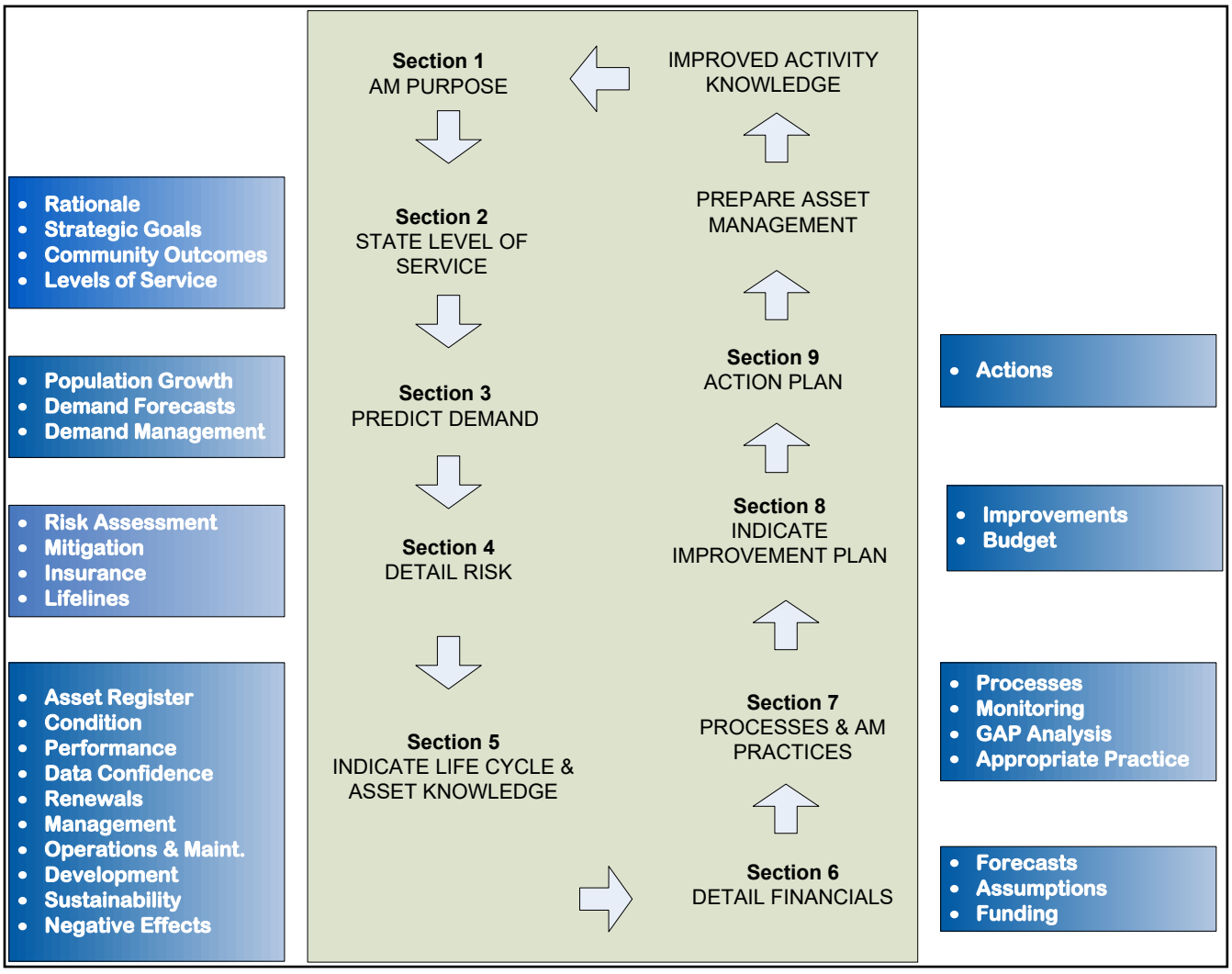
Notes:

	Purple box - no units of measure valid or required for impact ratings in this impact category
• Green text	Unit of measure for a pipe
• Orange text	Unit of measure for a point asset (typically pumpstation, detention dam)
• Black text	Unit of measure for both pipe and point assets
	Minor point assets will not be directly assessed, instead they will take the resulting value of the pipe that they are on

APPENDIX K: ACTIVITY MANAGEMENT PLAN

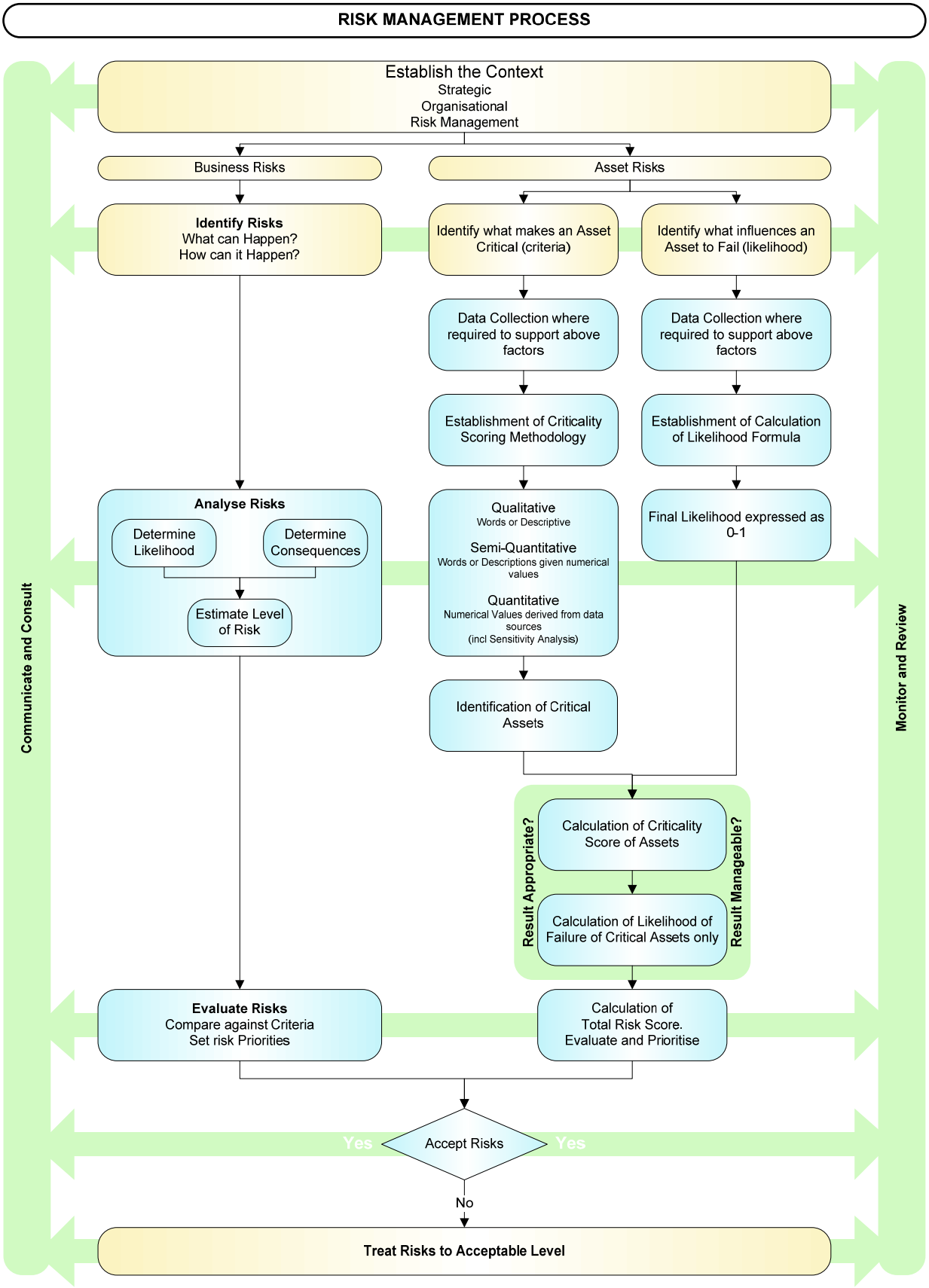
A mixture of the top down and bottom up approaches have been taken to develop this Plan, using existing data followed by data improvement. The structure of this plan mirrors the logical process followed for activity management planning as shown in Figure K-1 below.

Appendix Figure K-1: Activity Management Process



APPENDIX L: RISK MANAGEMENT PROCESS

Appendix Figure L-1: Risk Management Process



APPENDIX M: RISK

Appendix Table M-1: Consequence Rating (Impact)

Rating	Political / Community/ Reputational	Asset Performance/ Service Delivery	Relationship with Iwi	Legal risk	Safety	Health	Financial	Information/ decision support	Environmental/ Historical/cultural
Extreme (5)	Major loss of public confidence in Council (>2000 opponents via social media or other mediums) Negative international mainstream media coverage; shareholder or key stakeholder outrage; or loss of a key customer	At least 2 of the 3 outcomes apply: (i) cannot be delivered by alternative means, (ii) 20+ vulnerable persons significantly impacted, (iii) neighbouring businesses annual revenue falls > 20%	Major breakdown of relationship affecting multiple areas. Refusal to resolve without one or more major concessions from council	Adverse findings against council by court or government/regulatory agency resulting in any of the following: (i) Extreme financial penalty or liability imposed; (ii) Imprisonment of officer; (iii) Extreme harm to achieving objectives	Multiple notifiable fatalities of workers or public (MF)	Significant loss of life expectancy for multiple persons or incapacity for more than 1000 person days	Overspend, loss (i.e. spend without result) or income loss of > $7.5m OR >100% of business unit budget	Multiple errors in information and analysis and presentation misleading (intentionally or not) or not understandable by non-specialists	Permanent environmental damage on a nationally significant scale and/or permanent loss of nationally significant building, artwork, or other valued entity
Major (4)	Significant negative public reaction likely (200-2000 opponents via social media or other mediums) Negative national mainstream media coverage; significant negative perception by shareholder or key stakeholder; or a customer disruption	Only 1 of the 3 outcomes apply: (i) cannot be delivered by alternative means, (ii) 20+ vulnerable persons significantly impacted, (iii) neighbouring businesses annual revenue falls > 20%	Significant breakdown of relationship largely in in one area. Some concessions from council sought before substantive issue considered by iwi grouping affected	Adverse findings against council by court or government/regulatory agency resulting in any of the following: (i) Major financial penalty or liability imposed; (ii) Major harm to achieving objectives, e.g., directed by court to re-make decision.	Single notifiable fatality of workers or public (SF)	Single loss of life expectancy or incapacity for between 100 and 1000 person days	Overspend, loss (i.e. spend without result) or income loss of > $1.5m and <$7.5m OR between 70% and 100% of business unit budget	One major error in information, analysis incomplete and presentation ambiguous	Major environmental damage with long-term recovery requiring significant investment and/or loss or permanent damage to a registered historical, cultural or archaeological site or object(s)
Moderate (3)	Some negative public reaction likely (30-200 opponents via social media or other mediums) Repeated complaints; Regulatory notification; or negative stakeholder, local media attention	At least 2 of the 3 outcomes apply: (i) partial delivery by alternative means possible, (ii) <20 vulnerable persons significantly impacted, (iii) neighbouring businesses annual revenue falls 10% to 20%	Major relationship damaged in a single area but amenable to negotiation	Risk of court action or investigation by government/regulatory agency resulting in any of the following: (i) Moderate penalty or liability exposure; (ii) Moderate harm to achieving objectives, e.g., legal challenge unsuccessful but results in moderate delay.	Notifiable injury of workers or public.	Incapacity for between 20 and 100 person days	Overspend, loss (i.e. spend without result) or income loss of > $0.75m and <$1.5m OR between 30% and 70% of business unit budget	Information correct but presentation/ analysis insufficient to support decision on the day	Measurable environmental harm on a nationally significant scale. Some costs in terms of money and/or loss of public access or conservation value of the site and/or restorable damage to historical, cultural or archaeological site or object(s)
Minor (2)	Minor public reaction likely (<30 active opponents via social media or other mediums) Workforce attention; limited external attention;	At least 2 of the 3 outcomes apply: (i) full delivery by alternative means possible, (i) <20 vulnerable persons moderately impacted, (i) neighbouring businesses annual revenue falls < 10%	Relationship damage resolvable through normal communication/ consultation mechanisms	Risk of court action or investigation by government/regulatory agency resulting in any of the following: (ii) Formal warning; (i) Non-binding recommendations; (iii) Minor harm to achieving objectives, e.g., minor delay while legal dispute resolved.	Serious injury on one person requiring medical treatment (MA)	Incapacity for between 1 and 20 person days	Overspend, loss (i.e. spend without result) or income loss of > $150k and <$750k OR between 10% and 30% of business unit budget	Information correct, analysis complete but presented in a way which could be misinterpreted	Medium term environmental impact at a local level and/or development compromise to the integrity of a registered historical, cultural or archaeological site
Insignificant (1)	Very limited negative reaction (1 or 2 active opponents via social media or other mediums) Internal attention only from staff directly working on the matter.	All of the following outcomes apply: (i) full delivery by alternative means possible, (ii) <20 vulnerable persons moderately impacted, (iii) neighbouring businesses annual revenue falls < 10%	Iwi/ tribe/ hapu public dissatisfaction resolvable through routine communication	No penalty or liability exposure and no harm to achieving objectives	Minor injury requiring only first aid or less (FA)	Incapacity for less than 1 person day	Overspend, loss (i.e. spend without result) or income loss of > $15k and <$150k OR between 5% and 10% of business unit budget	Small errors in information or presentation - no effect on decision	Short term and temporary impact requiring no remedial action and/or restorable loss damage to historical/ cultural record

Appendix Table M-2: Risk Rating Matrix

	CONSEQUENCES				
Descriptor	**Insignificant** (1)	**Minor** (2)	**Moderate** (3)	**Major** (4)	**Extreme** (5)
Almost certain (5)	**Medium** (5)	**Medium** (20)	**High** (45)	**Very High** (80)	**Very High** (125)
Likely (4)	**Low** (4)	**Medium** (16)	**High** (36)	**High** (64)	**Very High** (100)
Possible (3)	**Low** (3)	**Medium** (12)	**Medium** (27)	**High** (48)	**High** (75)
Unlikely (2)	**Very Low** (2)	**Medium** (8)	**Medium** (18)	**Medium** (32)	**High** (50)
Rare (1)	**Very Low** (1)	**Low** (4)	**Medium** (9)	**Medium (16)**	**Medium** (25)

Appendix Table M-3: Likelihood of the given consequence occurring

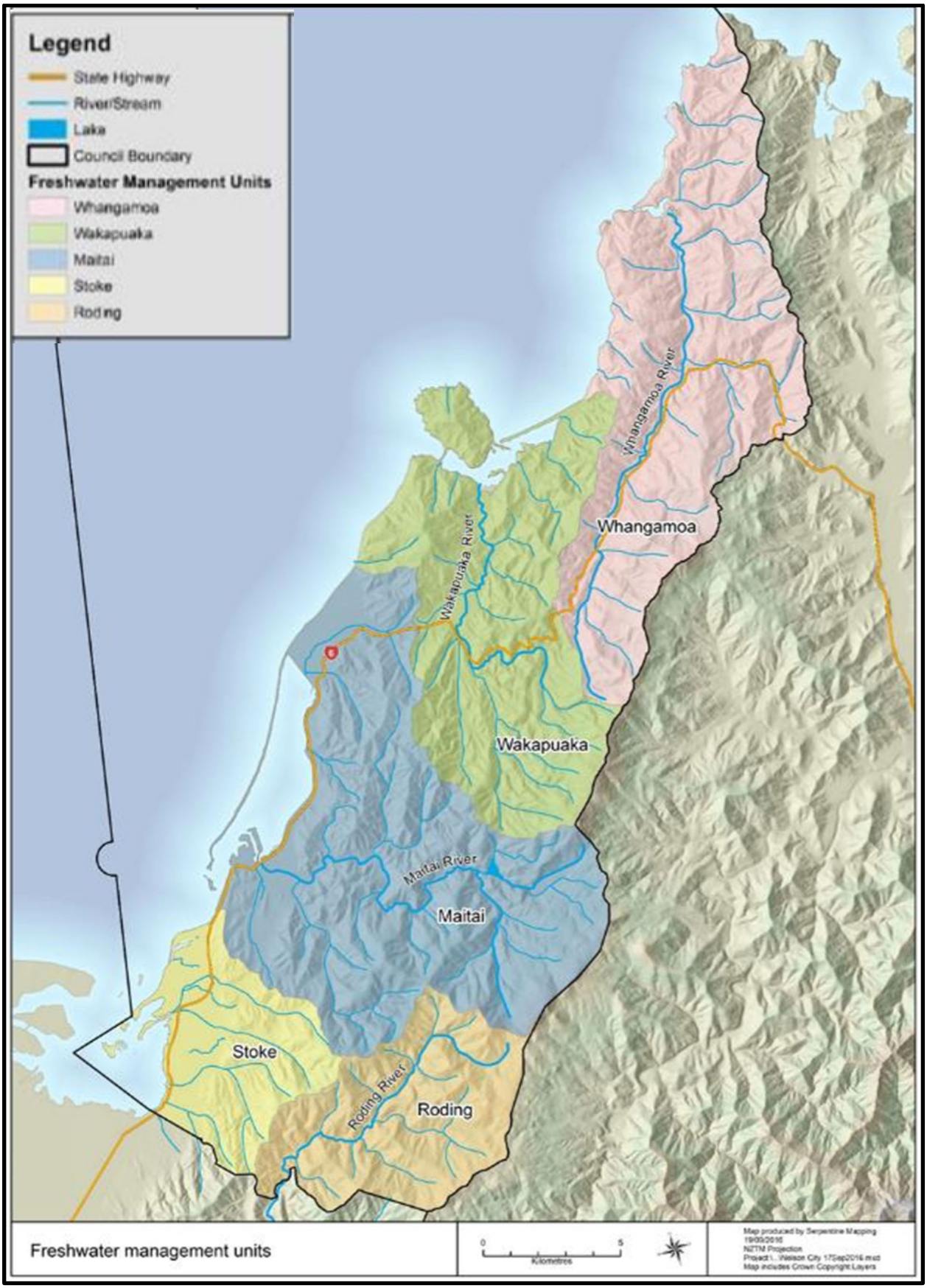
Descriptor	Qualitative guidance statement	Indicative Probability range	Indicative frequency range (years)
Almost certain (5)	The consequence can be expected in most circumstances OR *A very low level of confidence/information*	>90%	>1 occurrence per year
Likely (4)	The consequence will quite commonly occur OR *A low level of confidence/information*	20% - 90%	Once per 1-5 years
Possible (3)	The consequence may occur occasionally OR *A moderate level of confidence/information*	10% - 20%	Once per 5-10 years
Unlikely (2)	The consequence may occur only infrequently OR *A high level of confidence/information*	2% - 10%	Once per 10 - 50 years
Rare (1)	The consequence may occur only in exceptional circumstances OR *A very high level of confidence/information*	<2%	Less than once per 50 years

Appendix Table M-4: Residual Risk Tolerance

Risk Level	Description and Action	Authority for continued tolerance	Timing for implementing action	Obligation to promptly advise including advising treatments
Very High	Not normally tolerable, immediate intervention to reduce risk	Full Council on advice from CE	Immediate if possible but no more than one month	Full Council using best practicable means
High	Not normally tolerable, initiate action as soon as practicable to reduce risk below High	SLT or Group Manager (Council at CE discretion)	As soon as practicable but no more than 2 months	SLT or accountable Group Manager (Council at CE discretion)
Medium	Normally tolerable, frequently review to look for opportunities to further reduce risk where practicable	Business Unit Manager	At least within one quarter	Accountable Group Manager
Low	Acceptable risk, routine review for low cost actions to reduce risk further	No specific authority required	Routine review period (e.g. 3- 6 monthly)	None
Very Low	Acceptable risk, no specific actions to reduce further	No specific authority required	Only if incidental to another action	None

APPENDIX N: FRESHWATER MANAGEMENT UNITS

Appendix Figure N-1: Freshwater Management Units of Whakatū Nelson



Appendix Table N-1: Draft target (Rec) and baseline (Now) attribute states

	MCI		Ammonia Toxicity (95th %)		Nitrate Toxicity (95th %)		E. coli		Temp.		Clarity		DRP		DIN		Periphyton	
	Now	Rec	Now	Rec	Now	Rec	Now	Rec	Now	Rec	Now	Rec	Now	Rec	Now	Rec	Now	Rec
Stoke FMU:																		
Saxton	C	B	B	A	B	A	D	B	C	B	N/D	B	D	B	D	B	N/A	B
Orphanage	D	B	B	A	B	A	D	B	C-D	B	C	B	C	B	B	B	N/A	B
Upper Poorman	B	B	C	A	A	A	A	A	B	B	C	B	D	B	B	B	A	B
Lower Poorman	D	B	A	A	A	A	B	A	C	B	C	B	C	B	C	B	B	B
Jenkins	D	B	B	A	B	A	N/D	TBC	C	B	C	B	C	B	C	B	N/A	B
Maitahi/Mahitahi/Maitai FMU																		
Lower Maitai	C	B	A	A	A	A	A-B	A-B	C	B	B	B	A	B	A-B	B	B	B
South Branch	A	A	A	A	A	A	A	A	N/D	A	A	A	A	A	A	A	B	A
Groom	B	B	A	A	B	A	B	B	N/D	B	C	B	B	B	B	B	N/A	B
Upper Brook	A	A	C	A	A	A	A	A	A	A	A	A	D	A	A	A	N/A	A
Lower Brook	B-C	B	C	A	A	A	A	A	C	B	A-B	B	C	B	B	B	N/A	B
Sharland	B	B	B	A	B	A	A	A	N/D	B	C	B	B	B	C	B	N/A	B
York	D	B	D	A	B	A	D	B	N/D	B	C	B	C	B	D	B	N/A	B
Todds	C	B	B	A	A	A	D	B	C	B	D	B	D	B	B	B	N/A	B
Hillwood	C	A	A	A	A	A	D	B	C	B	C	B	D	B	B	B	N/A	B
Wakapuaka FMU																		
Lud	B	B	A	A	A	A	D	B	N/D	B	C	B	B-C	B	B-C	B	N/A	B
Teal	A	A	A	A	A	A	B	B	N/D	A	A	A	B	A	B	A	N/A	A
Upper Wakapuaka	A	A	A	A	A	A	D Hira	B	A	A	A	A	B	A	A-B	A	A	A
Lower Wakapuaka	B	B	A	B	A	B	C	B	N/D	B	B	B	B	B	B	B	C	B
Whangamoa FMU																		
Upper Whangamoa	A	A	B	A	A	A	A	A	N/D	A	A	A	B	A	B	A	A	A
Lower Whangamoa	A	A	A	A	A	A	B	B	N/D	A	A	A	A	A	B	A	B	A
Graham	A	A	A	A	A	A	A	A	N/D	A	B	A	B	A	A	A	N/A	A
Collins	A	A	A	A	A	A	B	B	N/D	A	C	A	B	A	B	A	N/A	A
Dencker	A	A	A	A	A	A	B	B	ND	A	C	A	B	A	A	A	N/A	A