2021 – 2031 Stormwater and Flood Protection Activity Management Plan

2021 – 2031 Mahere Ārai Waipuke

Nelson City Council
te kaunihera o whakatū

Quality Assurance Statement

Version No.	Date	Description	Prepared by	Reviewed by	Approved by
1	07/09/20	Draft for Council Infrastructure Committee	Various	A Louverdis	SLT
2	01/10/20	Draft approved by Infrastructure Committee to inform LTP 2021-31	Various	Elected Members	Elected Members
3	18/11/21	Final version recommended for adoption by Infrastructure Committee	Various	Elected Members	Elected Members
Final	8/12/21	Approved by Council	Various	Elected Members	Council

Cover Photos:

Sanctuary Drive, Orphanage Stream and York Stream

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i The purpose of the plan

The Stormwater and 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 stormwater and 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 Stormwater and Flood Protection Activity is to:

Provide a stormwater and 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 stormwater discharges.

This Plan provides the substantiation for budget forecasts put forward in the Long Term Plan (2021 - 2031) for the Stormwater and Flood Protection Activity.

ii Asset description

The Nelson City Council stormwater system can be categorized into two parts – natural and constructed components. The natural part consists of rivers and

streams that play an important role in the support of aquatic ecosystems, recreation and the channelling of stormwater flows in rainfall events.

The constructed stormwater network includes pipes, open channels, and overland flow paths that convey stormwater to receiving water courses or the sea. The stormwater system also incorporates two pump stations and 20 detention devices. In many parts of the city a fully reticulated system is not provided and individual properties discharge stormwater to onsite soakage or to the road channel as part of the primary drainage system.

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

The inventory of public stormwater and flood protection assets owned by Nelson City Council and managed by the Infrastructure Group - Utilities as at June 2020 is shown in Table ES-1.

Table ES-1: Summary of Stormwater and Flood Protection Assets

Asset Category	Quantity	
	km	units
Stormwater		
Pipes Up To 600mm	198.8	
Pipes > 600mm	45.5	
Culverts	2.9	
Rocks Rd Culvert	0.3	
Intake Structures		121
Manholes		4,924
Outfalls		126
Sumps		345
Pump Stations		2
Tide Gates		24
Detention Devices[1]		20
Flood Protection		
Urban Streams/Rivers[2]	42.3	
Bank Protection	28.5	
Open Channels	1.8	

The 2020 full replacement valuation of the stormwater and flood protection assets[3] are: Stormwater $268,231,000 and Flood Protection $39,197,000.

[1] Detention devices are listed in Table 4-8, Section 4.1 – Background Data
[2] The length of urban streams and rivers has been updated July 2021. Urban streams and rivers are listed in Table 4-5, Section 4.1 – Background Data.
[3] The June 2020 asset valuation is given in Table 4-13, Section 4.1 – Background Data

Figure ES-1: Water Catchment Boundaries: North Nelson

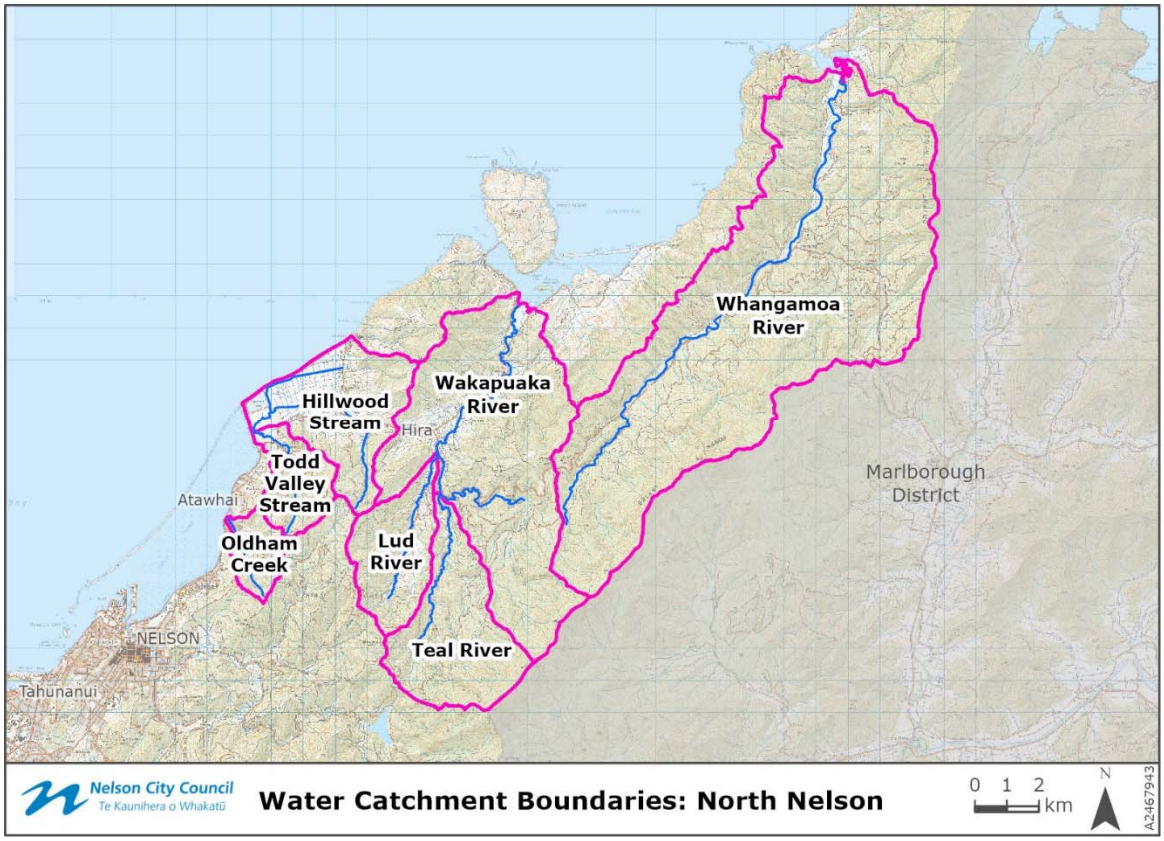


Figure ES-2: Water Catchment Boundaries: York, Brook, Maitai

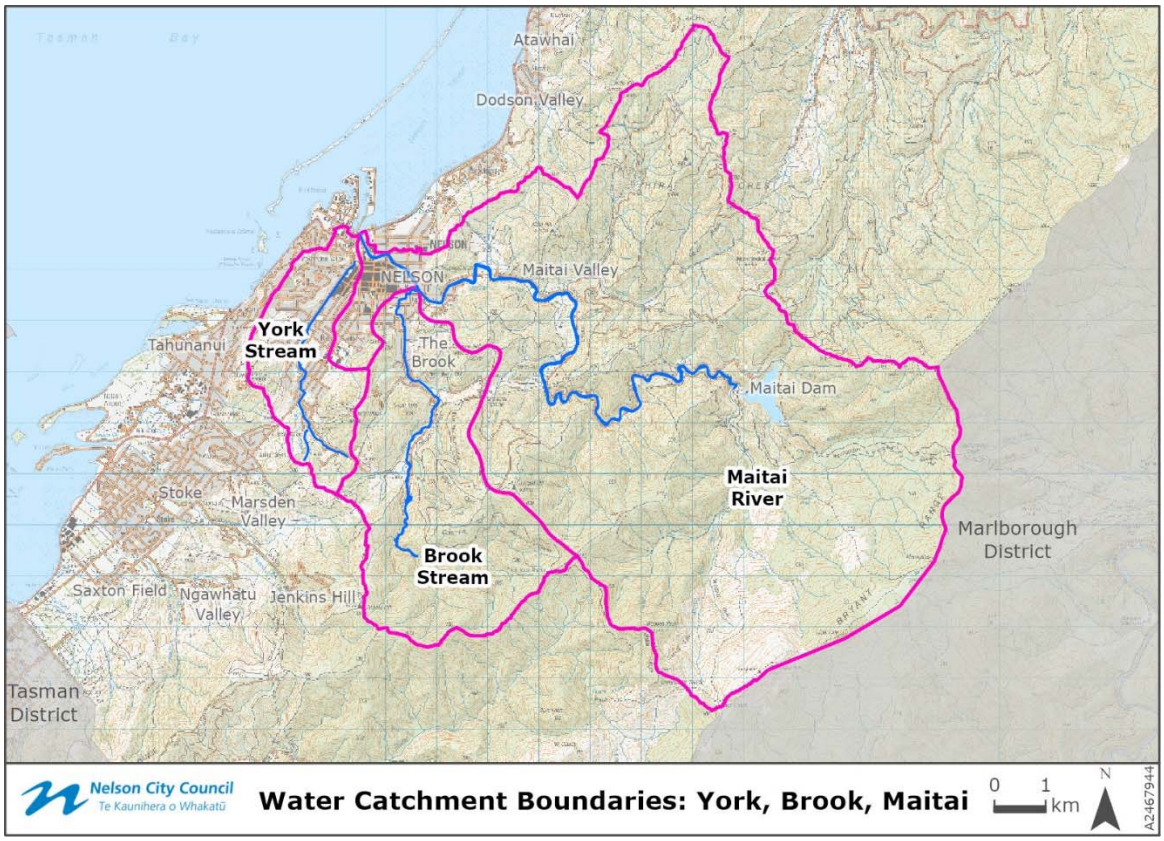
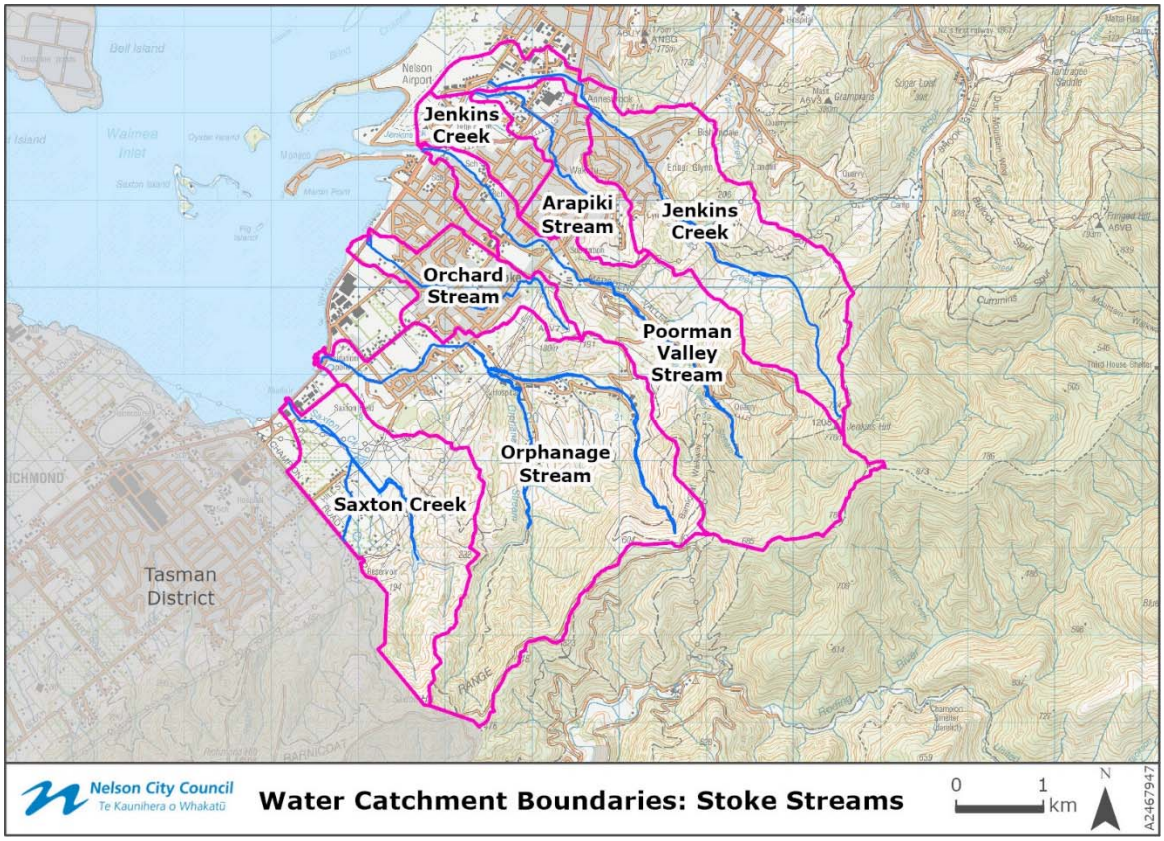


Figure ES-3: Water Catchment Boundaries: Stoke Streams



iii Climate change

Five key issues have been identified for this activity in both this Plan and the Infrastructure Strategy 2021-2051. These five 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 five of the identified issues for stormwater and flood protection over the decades to come.

Climate Change as an Over-arching Issue:

Climate change is a significant and urgent international, national, and local issue. At a local level, 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.

In 2017 the Council signalled its commitment to a holistic approach to climate change through its participation in the Local Government Position Statement on Climate Change and the Local Government Leaders Climate Change Declaration. In 2019 Council declared a climate emergency. This committed Council to examine how its plans, policies and work programmes can address the climate emergency and to ensure that climate change is embedded in all future Council strategic plans. 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. At a local level, Council's preliminary understanding of the impacts of climate change are as follows:

- ***Sea level rise***

Sea level rise is the biggest climate challenge for Nelson as a large proportion of the 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, and 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 coastal 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 implication 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.

Stream and river flood mapping is shown on the Council's online map viewer[4].

This mapping shows present day flood extents as well as predicted future flood extents allowing for climate change effects.

- ***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 aquatic fauna/ flora, 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 this activity the main issues will be along open channels including drains, streams and rivers, as well as ponds. This may affect Council's ability to achieve freshwater quality objectives set in relation to Key Issue 5.

- **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 Nelson Tasman Land Development Manual 2019 (NTLDM) requires that new stormwater assets 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 new stormwater projects therefore contribute to climate change adaptation to some degree.

[4] http://www.nelson.govt.nz/environment/nelson-plan/natural-hazards/mapping-our-natural-hazards/

- Stormwater strategies identify future risks associated with stormwater overflows and secondary flow paths and prioritise response options to mitigate risks.

- Flood Protection Strategies consider catchment flood flows and stream / river overflows out to 2130. Prioritisation of response options, the level of service and design life of assets will be determined through a risk based approach. The level of service for assets may therefore be different than for stormwater assets. This is discussed in more detail under key issue 1.

Major projects included within this Plan that contribute to climate change adaptation are identified in Section 1.2.

- **Climate Change Mitigation**

The stormwater & 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 energy efficiency of the stormwater pumping stations and operating system will be the main focus of climate change mitigation initiatives for this activity. As shown in section 1.2, the two stormwater pumping stations account for only 0.004% of overall Council GHG emissions. An Emissions Reduction Strategy is planned for this activity in the first 3 years of the 10 year plan.

- **Community Engagement**

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

- Whakamahere Whakatū Nelson Plan consultation on natural hazards overlays (including flood maps) and provisions (Objectives, Policies, Rules and Methods)

- Maitai Flood Management Options: Consultation is to be undertaken in 2021 to inform a risk based approach to identify and prioritise response options.

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

iv Key Issues

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

Issue 1: The level of service provided by existing stormwater and 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 the stormwater network from natural hazards.

Issue 3: Planned levels of service for stormwater and flood protection will not be met unless assets are maintained, renewed and upgraded.

Issue 4: Management of increased stormwater flows associated with urban intensification and growth.

Issue 5: Meeting new freshwater quality objectives and standards set under the Whakamahere Whakatū Nelson Plan, the National Policy Statement for Freshwater Management (NPS-FM), and the National Environmental Standard for Freshwater Management (NES-FM).

Further information on the five 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: The level of service provided by existing stormwater and 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 stormwater 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, will be undertaken following completion of the stream upgrades which are currently in progress. These models generate flood maps which show predicted overflows from streams and rivers across the city. The effects of climate change shown include 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[5] and further refinement of the flood models has been completed since the previous consultation. This includes updating the flood models to incorporate newly constructed stormwater and flood protection works, and with new hydrological inputs (including rainfall and sea level) to align with the most recent data and guidance from the Ministry for the Environment and NIWA.

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 prioritise flood protection interventions for existing developments. Flood risk for proposed new developments is currently managed under the Nelson Resource Management Plan (NRMP) and the Nelson Tasman Land Development Manual 2019 (NTLDM 2019). During 2021, Council will be consulting with the public on the Whakamahere Whakatū Nelson Plan, including the updated flood mapping and flood related provisions under the Natural Hazards Chapter.

A new proposal arising from the 2020 review of the Resource Management Act 1991 is for a new 'Climate Change Adaptation Act'. 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.

- ***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 2019 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 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

[5] http://www.nelson.govt.nz/environment/nelson-plan/natural-hazards/mapping-our-natural-hazards/

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.

Council will be trialling this new approach with the Maitai River Flood Management project which will be a priority over the next 3 years. This project seeks to identify and address the implications for the Central Business District (CBD), The Wood and Nelson East from the Maitai River, Brook stream and York stream flood flows. In conjunction with consultation on flood provisions in the Whakamahere Whakatū Nelson Plan, community engagement on flood impacts and response options will be on-going through this process. Should this approach prove successful, Council intends to take the same approach in other areas of the city at a later stage, leading to the development of flood protection strategies. This process will need to be prioritised using a risk-based approach that considers current and future flood impacts with strategies formulated to identify an appropriate sequence of options to implement as flood risk increases over time.

- ***Identifying and Managing Secondary Flowpaths (Pluvial Flood Risk)***

  Secondary flow paths carry overland stormwater flow to streams and rivers where there is no stormwater network or when stormwater pipes are full. These flow paths are progressively being mapped as part of work to develop stormwater strategies for various areas of the city. Draft maps of secondary flow path routes were produced in 2018/19 based on topographical survey done in 2015, but these do not represent the diversion of stormwater into the piped network, or show the predicted extent of the overland flowpaths. Additionally this first stage of mapping did not show the extent of flooding in basin areas where culverts are under-sized or may become blocked. It is important to recognise the limitations of this type of mapping generally in relation to the level of landform and structure detail that can be represented in the modelling, and the dynamic nature of stormwater catchments as well as urban development.

  Mapping of secondary flow path routes show there are a large number of flow paths on private property that will carry stormwater during significant storm events. These need to be identified and landowners made aware of the importance of keeping them clear so as not to cause damage to their property. In future, a warmer climate is expected to lead to more intense storm events, which would increase runoff and flows along secondary flowpaths. A second stage of mapping these secondary flow paths is proposed over the first 4 years of this Plan, as part of new stormwater network modelling.

The NTLDM 2019 provides guidance and standards for developers of new subdivisions on the best means of managing these flows. Generally roads are the preferred secondary flowpaths in the city.

Issue 2: Damage to the stormwater network 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.

  An assessment of natural hazard risk to Nelson stormwater and flood protection assets is being carried out between 2019 and 2024. To date, the assessment has focussed on defining the areas potentially subject to natural hazards, and the criticality of assets. This will lead to prioritisation of 'resilience works' with construction of network upgrades to follow investigation. For the Stormwater and Flood Protection Activity, this work is expected to focus on the detention dams, stop banks, pump stations, stormwater intakes and the piped network in specific areas of the city.

  The Tahunanui Hills Stormwater Upgrade project is an example of a stormwater resilience project, through the use of flexible HDPE pipe across slump block boundaries. This not only maintains the integrity of the stormwater network, but also reduces leaks and stormwater infiltration into the ground, which reduces the risk of further land movement.

- ***New Dam Safety Proposals for large stormwater detention dams***

  In 2019, the Ministry of Business Innovation and Employment (MBIE) undertook public consultation on proposals for a new regulatory framework for dam safety under the Building Act 2004. These proposals include establishing a nationally consistent approach that would protect people, property and the environment from the potential impact of a large dam's failure without imposing undue compliance costs.

  The proposals aim to ensure that classifiable dams are well maintained and regularly monitored, and that potential risks of dam failure are reduced. Under these proposed regulations classifiable dams would include dams over 4 metres in height and reservoir volume exceeding 20,000m^{3}, or less than 4 metres in height but with over 30,000m^{3} reservoir volume. It is expected that only the larger stormwater detention dams would be classifiable, and these would be required to undergo regular dam compliance certification.

Issue 3: Planned levels of service for stormwater and flood protection will not be met unless assets are maintained, renewed and upgraded

Stormwater pipes and open channels can be renewed or upgraded when they fail to provide the required level of service. However, the majority of stormwater assets in Nelson are relatively new with stormwater pipes having an average age of approximately 30 years, less that the national average for stormwater pipes of 37 years (Refer to Appendix H for Water NZ Benchmarking data). In addition, they are not subject to the same water pressures as the wastewater and water supply networks, and do not have the same integrity requirements.

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, Orphanage Stream, York Stream and Little-Go Stream.***
    - Saxton Creek is in the middle of an extensive stream channel upgrade resulting from the flood damage to both Tasman District and Nelson City in the extreme rain event of 2013. The upgrade work is being carried out in four stages, with stages 1 to 3 from Champion Road to Main Road Stoke due to be completed by the end of 2020/21, and construction of stage 4, from Main Road Stoke to Whakatu Drive planned for 2021/22 to 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 is now being progressed upstream of Saxton Road East. This includes the construction of a bund and floodwall in 2020/21 and channel benching works planned at Suffolk Road in 2024/25.
    - York Stream stormwater upgrade from the intake in Bishopdale Reserve through to Kawai Street was completed in 2017/18, and further upgrades are now being assessed in the upstream catchment around the Bishopdale Avenue area, and for the intake at Victory School on Totara Street.
    - Upgrading Little-Go Stream from Franklyn Street to the Girls College playing field in Waimea Road was completed in 2017/18. The next stage (Rutherford Stage 1) involves extending the upgrade down to the Rutherford Street / Examiner Street intersection. Construction is due to be undertaken in 2021/22 – 2022/23. Following on from that, Rutherford Stage 2 involves upgrading system capacity downstream of Examiner Street.

- ***Develop Stormwater Strategies for the city.***

    It was recognised in the Stormwater Asset Management Plan 2018 - 2028 that a more strategic approach was required to identify stormwater requirements across the city and develop appropriate responses. To achieve this, stormwater strategies are currently being progressed to identify areas with inadequate stormwater services, both built (eg pipes, flumes and concrete channels) and natural (eg smaller hillside gullies, overland flow paths, and drains).

    The first of the stormwater strategies to be developed is for the Stoke area, and this includes the following components:

- Development of a stormwater network model to identify existing and future (to 2090) levels of service provided by the network, and secondary flow paths resulting from runoff and pipe overflows. This will inform Council of the flooding risks relating to existing levels of service provided by the stormwater network, and the upgrades required to meet target levels of service for the stormwater network. A key objective of this modelling is to identify how the performance of the network can best be optimised, including prioritisation of the upgrade projects needed to achieve this.

- Undertaking an analysis of network resilience risks, including blocked intake structures, pipes and culverts.

- A water course assessment that identifies ecological values, channel state and issues with built structures along the natural stream channels. This will also identify issues with stormwater discharges to the receiving environment.

- Development of a decision making matrix to inform prioritisation of stormwater projects based on a framework of benefit criteria.

Following on from the Stoke Stormwater Strategy, funding was allocated in the Long Term Plan 2018 – 28 for additional stormwater strategies to cover Tahunanui, Port Hills, and Atawhai. Under this Plan, an additional stormwater strategy is proposed for Central Nelson (CBD catchments).

- ***Stormwater Asset Condition Assessments and Renewal Strategy***

  Pipe renewals are expected to remain at a low level (below $100k per year) for the 10 year period of this Plan. Specific renewal budgets are in place for critical assets such as pump stations, tide gates, detention devices and the larger culverts. The total stormwater renewals budget peaks at $1.6 Million in both 2025/26 and 2026/27 due to the planned renewal of the Haven / Vincent Street box culvert.

  Council proposes to develop a Stormwater Renewal Strategy to address the increasing level of anticipated renewals required from the 2050s onwards, and to identify renewals required earlier due to poor condition. This will include more regular condition assessments of critical assets identified through the natural hazards resilience assessment referred to above (including larger pipes and detention basins), as well as assets approaching, or beyond, end of design life. A new funding line has been established for renewal of detention devices, as the number of these is increasing rapidly to service areas of urban growth.

  The other potentially vulnerable parts of the stormwater network are the remaining sections of brick culverts in the city. There are 2.2 km of brick culvert within the city, which are becoming difficult to repair due to an enhanced health and safety awareness of confined spaces. These are being inspected by CCTV to confirm their condition, and included in the renewal strategy referred to above.

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

- ***The maintenance of drains on private property***

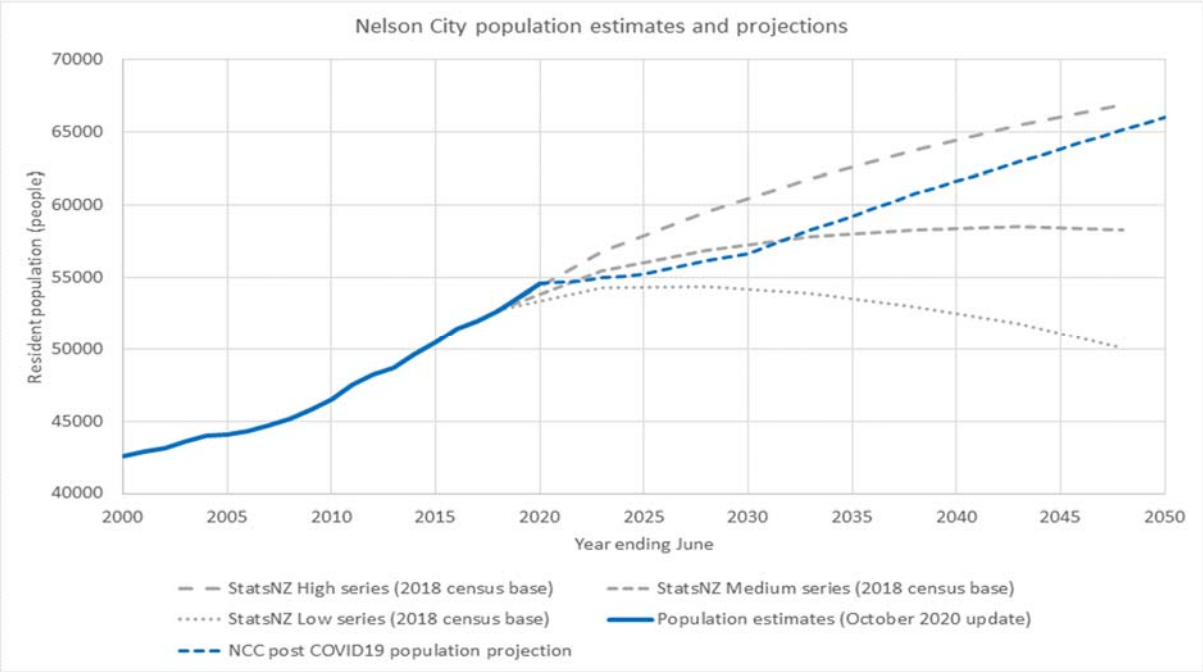
  Much of Nelson still uses a network of small open drains to channel stormwater from hillsides to public drains or streams. These channels are largely on private property but serve a wider public purpose. Council receives regular requests for assistance from property owners to maintain these channels. The question of public / private drain ownership has been clarified to some extent by new criteria in section 5.3.7 of the NTLDM 2019, which specifies that public drains are drains that serve six properties or more, and/or are covered by a Council easement, or are located within a public road reserve.

  This is not a comprehensive definition, as there are other criteria which determine whether a drain would be assessed as a public drain, but it is a useful starting point. This will be further clarified by updating Council's GIS drain ownership records over the first three years of this Plan, to better align with the new NTLDM 2019 criteria. This is expected to increase the number of public drains which Council holds responsibility for.

Issue 4: Management of increased stormwater flows associated with urban intensification and growth

Between 2001 and 2008 the population of Nelson grew by around 330 people per year on average. Since 2008 the rate of population growth has increased to around 700 additional residents or 290 additional households per year. The following graph is based on statistics New Zealand growth projections for the city out to 2048. An increase in population to 66,040 by 2050 is expected under post-COVID 2020 population projections.

Figure ES-4: Population growth and projections, 2020-50, Nelson



The following documents define future urban capacity requirements and identify where urban intensity and growth are planned to take place over the next 30 years in Nelson.

- *National Policy Statement – Urban Development (2020)*
- *Nelson Tasman Future Development Strategy (2019)*
- *Intensification Action Plan (2020)*

- ***National Policy Statement – Urban Development (2020)***

  The National Policy Statement on Urban Development 2020 (NPS-UD) replaces the NPS-Urban Development Capacity 2016 (NPS-UDC) and 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:

  - in the short term (within 3 years)
  - medium term (3-10 years)
  - long term (10-30 years)

  The location of actual growth will depend on where there is capacity for residential growth (residential zoning, infrastructure servicing) and where development is feasible. Residential growth areas and the sequencing of urban development capacity in the short, medium and long term are provided in section 3.5 - Asset programmes to meet demand.

- ***Future Development Strategy and Intensification Action Plan***

  The Nelson Tasman Future Development Strategy (FDS) sets out where future housing is likely to be located within the next 30 years, in Nelson and Tasman, and the likely timing of these developments. Community feedback on the FDS supported growth through intensification of existing urban areas rather than expansion onto rural land. The FDS identifies space for 8,166 extra dwellings in the Nelson Urban Area (which includes Richmond), and states that about 60% of this growth can be achieved by adding new housing into existing urban areas (intensification), including the City centre and Stoke.

  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. The key methods in the Intensification Action Plan (IAP) that relate to the programming of infrastructure are:

  - Bulk programming of infrastructure investment to enable sufficient capacity for intensification development in agreed areas.
  - Development of neighbourhood asset upgrade plans
  - Refinement of infrastructure investment through the Long Term Plan process for the next thirty years.

Council has identified six intensification areas that will be focussed on in the provision of infrastructure over the next twenty years. The focus areas for the next ten years are the City Centre and Victory. Washington Valley is also programmed for an upgrade and therefore will have infrastructure capacity for greater intensification.

An additional 1300 extra dwellings could be constructed in the Wood, Vanguard, Gloucester Street and Tahunanui in 20–30 years' time, but Council will not be providing for intensification in these areas unless the effects of climate change (particularly sea level rise) can be addressed in these areas.

Greenfield areas within Nelson which have also been identified as being potentially suitable for new urban development in the medium term are in South and East Nelson.

- ***Ensuring sufficient stormwater disposal options are available to allow for the on-going growth of the city***

  Future population growth that results in new development proposals will bring with it a requirement to consider the capacity of existing stormwater and flood protection networks and either upgrade these as necessary or use on-site detention devices for stormwater disposal.

  The NTLDM 2019 sets out requirements for stormwater treatment, infiltration (soakaways), detention and system capacity that are required to accommodate or mitigate the additional flows from urban growth and intensification, so that new urban growth or intensification does not exacerbate downstream stormwater issues.

  Stormwater disposal options range from low impact disposal to land (infiltration), detention (onsite tanks or larger ponds) and public drains. No single response is going to be able to be applied across the whole city given the need for freshwater quality improvements and the cost of constructing conventional piped drainage networks. Any upgrading of the public network undertaken to support growth areas will, where possible, be co-ordinated with other utility upgrades in the same area.

Issue 5: Meeting new freshwater quality objectives and standards set under the Nelson Plan, the National Policy Statement for Freshwater Management 2020 (NPS-FM 2020), and the National Environmental Standard for Freshwater Management (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 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. Although rules are still draft and subject to consultation, activities that impact on the freshwater environment (including stormwater discharges, and works within watercourses) will need to respond to any changes to rules from the date of notification of the proposed plan.

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. The urban stormwater system discharges to the Stoke and Maitahi/Mahitahi/Maitai FMUs. In relation to stormwater catchments significant improvement is required to achieve target attribute states in Saxton Creek, Orphanage Stream, Lower Poormans Stream, Jenkins Creek, York Stream and Todds 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 stormwater management:

- 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 stormwater discharges.

- Discharges of untreated wastewater as overflows will require a resource consent. This will drive additional efforts to prevent or reduce stormwater inflow and infiltration into the wastewater network.

It is likely that Council will need to intervene to get the contaminant levels to acceptable levels, particularly in relation to stormwater generated from road run off which will require intervention by Council's Transport team. Measures such as first flush treatment for high contaminant generating surfaces may not be sufficient on their own to improve stormwater quality to the extent that receiving environment attribute limits are no longer exceeded. Based on the information presented in Appendix N – Freshwater Management Units, the attributes where significant improvements need to be made for the urban stormwater catchments are:

- Macroinvertebrate Community Index
- e-coli
- Water Temperature
- Water Clarity
- Dissolved Reactive Phosphorous (DRP)

In addition, levels of Dissolved Inorganic Nitrogen (DIN) are high at specific sites including the Saxton Creek and the York Stream.

Monitoring and improving freshwater quality is a complex area and there are a number of significant data gaps which affect how this issue should be considered. Matters to consider include:

- The status of stormwater quality discharges relative to receiving environment attribute targets across a range of flows, as well as over time.

- Where receiving environment limits are exceeded, the extent to which stormwater discharges contribute to this, and for which particular attributes, as well as what the other contributors are.

- Establishing where stormwater discharges are a significant contributor to receiving environment limits being exceeded, so that stormwater quality improvement plans for those catchments can be prioritised.

- ***Outcomes from Central Government's Three Waters Review***

  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.

These Central Government 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.

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).

A separate Water Services Bill was introduced to Parliament on 28 July 2020, which includes some obligations on wastewater and stormwater network operators, such as the establishment of a national-level monitoring and reporting framework for wastewater and stormwater systems, and the operators of those systems. Submissions to the Bill are currently being considered by a Select Committee and it is not expected to complete the parliamentary process until late 2021 or early 2022.

The Government has indicated that its starting intention for the reform of the water services industry is to develop four publicly owned multi-regional entities for water service delivery to realise the benefits of scale for communities and reflect neighbouring catchments and communities of interest. There is still a preference for the entities to be in the shared ownership of local authorities. Design of the proposed new arrangements will be informed by discussion with the local government sector. Whilst stormwater services for Nelson are expected to be overseen by a new water entity from 2024, at this time it is assumed the management and delivery of flood protection services will remain with Council for the duration of this Plan.

- ***Sustainable development.***

  This needs to be the focus of all parts of the stormwater and flood protection activity in order to ensure the city can accommodate future growth 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:

  - *Wider inter-departmental and community involvement to improve freshwater quality at the source rather than rely on 'end of pipe' stormwater treatment techniques.*

    A number of Council activities directly impact on the streams and rivers in the city. Transport assets channel contaminants from roads and public carparks into the stormwater network and Parks and Reserves can impact on water quality from vegetation grooming and mowing activities adjacent

to streams. Council funds a variety of non-regulatory environmental and behaviour changing programmes such as Only Rain down Drains; Riparian Planting and water conservation education.

- *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)

- *Additional effort to reduce stormwater flow into the wastewater system to reduce sewer overflows and reduce pumping costs*

  It is anticipated that upgrades and stormwater network extension will be required as part of a package of measures needed to meet the requirements of the National Environmental Standard (NES) for the treatment of wastewater discharges and the management of wastewater overflows, as well as to achieve improved freshwater quality.

v Levels of service

Table ES-2: Proposed Levels of Service 2021 – 2031

					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)**
Stormwater	**Our unique natural environment is healthy and protected**	**Environmental Protection**	Compliance with resource consents for discharge from the stormwater system, measured by the number of: a) abatement notices b) infringement notices c) enforcement orders, and d) successful prosecutions received in relation to those resource consents* Measurement Procedure 1	No contraventions in 2019/20 and 2018/19 2 infringement notices in 2017/18 No contraventions in 2016/17	100% compliance with resource consents for discharge			
	Our region is supported by an innovative and sustainable economy	**Customer Response** ^Minimise justifiable complaints	The number of complaints received about the performance of the stormwater system, per 1000 properties connected to the stormwater network* Measurement Procedure 2	7 complaints per 1000 properties in 2019/20 11 complaints per 1000 properties in 2018/19 31 complaints per 1000 properties in 2017/18 10 complaints per 1000 connections in 2016/17	No more than 20 complaints per 1000 connections per year			
Flood Protection	**Our unique natural environment is healthy and protected** **Our infrastructure is efficient, cost effective and meets current and future needs**	**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 2019/20	Network maintained to current service potential			
				No flood events occurred which required repairs between 2017/18 and 2019/20.	Flood event damage identified, prioritised and repair programme agreed between Council and the community			
				No flood events occurred which required repairs between 2017/18 and 2019/20.	High priority work completed as soon as practicable			

					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)**
	Our urban and rural environments are people-friendly, well planned and sustainably managed			Between 2017/18 and 2019/20 only minor flood protection repairs were required to maintain waterways	Network components renewed to continue provision of original design service potential			
			Develop risk based Maitai flood response options Measurement Procedure 5	Flood analysis completed in 2018/19 Response options identified in 2019/20	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
			Develop city wide flood protection strategies Measurement Procedure 5	2018/2019 Completed flood models for major streams 2019/20 Prioritise flood response based on results of risk based analysis	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
Stormwater & Flood Protection	**Our communities are healthy, safe, inclusive and resilient**	**Customer service** ^Protection from damage to property	a) The number of flooding events that occur b) For each flooding event, the number of habitable floors affected per 1000 properties connected to the stormwater network* Measurement Procedure 2	No flooding event in 2019/20 No habitable floor damage in 2019/20	No more than 10 per 1000 urban properties with habitable floor damage in any one year			
		Customer service ^Response to stormwater system issues	Median response time to attend a flooding event, measured from the time that notification is received to the time service personnel reach the site* Measurement Procedure 2	Median response time 20 minutes in 2019/20 42 minutes in 2018/19 41 minutes in 2017/18 25 minutes in 2016/17	Median response time less than 60 minutes			

^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:
1. Council RMA infringement records at 1 July
2. Report from SR system at 1 July

3.	Review check sheets for individual projects
4.	GIS flood reports for properties inside flood overlay
5.	Ensure annual targets are met

vi 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. Need to identify appropriate disposal techniques where public drains lack capacity. Growth projects are identified in the financial tables.
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 or a greater acceptance by the community of the adverse impacts of extreme events. Design standards in the NTLDM 2019 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 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 stormwater flooding and ponding on property and roads during and after storms. This can drive a demand for the installation of reticulation in existing urban areas.
Community Expectation on environmental protection	There are increasing expectations for improved stormwater 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.
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 impact on Stormwater quality requirements for discharges to waterways and 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 Council develops the freshwater sections of the proposed Whakamahere Whakatū Nelson Plan through to planned notification in 2022.

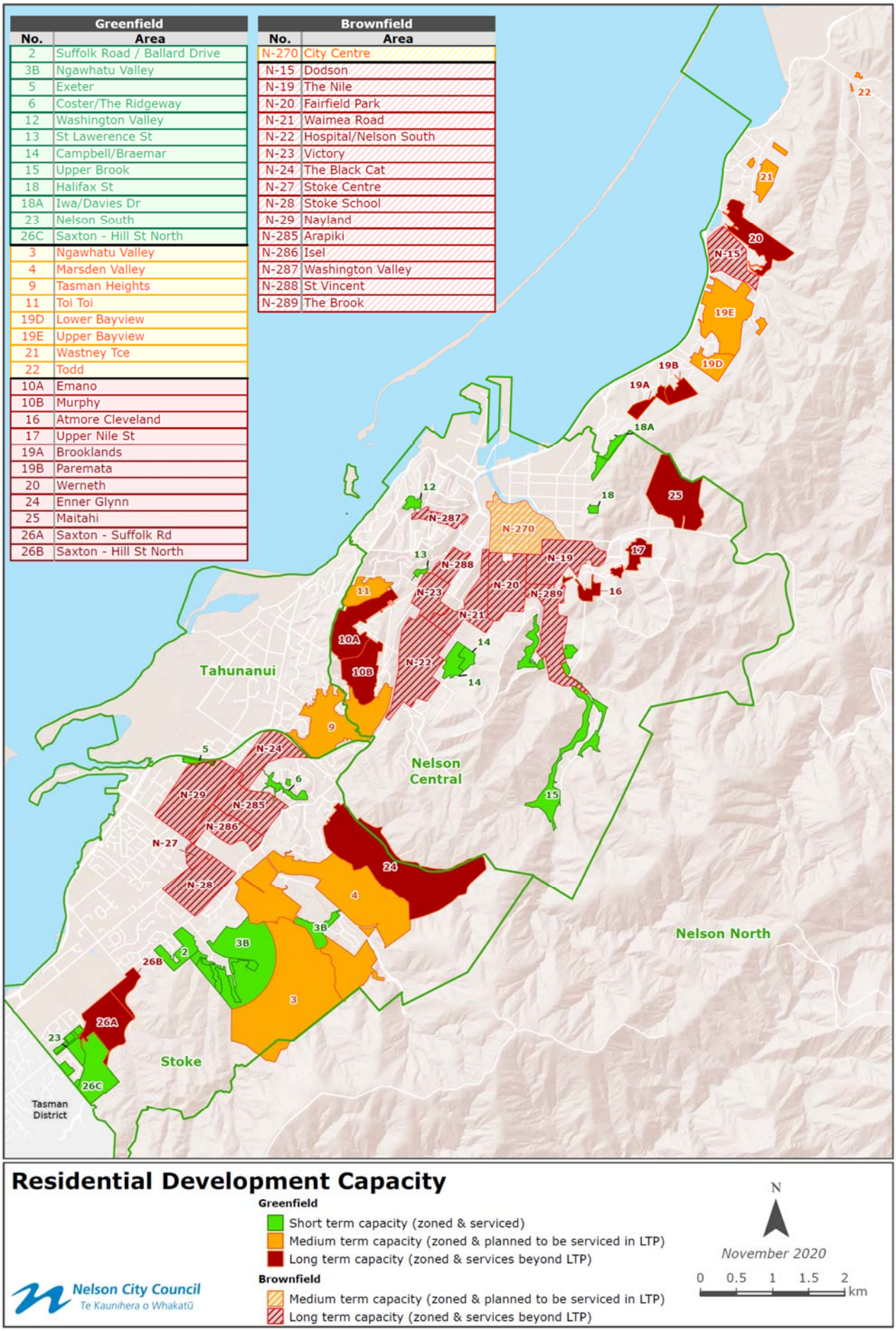
Stormwater and Flood Protection Demand Drivers	Changes to the Activity
• Urban Development	• Urban Development will ensure each territorial authority makes adequate provision for future population growth in their areas. This will require Council to undertake strategic growth studies and identify the impact on the demand for stormwater services and flood response measures.
Organisational Policies Environmental Sustainability	Development of sustainability strategies that include reduction of inflow and infiltration (into the wastewater system). In practice this may require the reticulated stormwater network to be extended into areas of the city where properties lack access to stormwater services. Existing cross-connections that allow stormwater into the wastewater network need to be addressed, and the wastewater network itself may need to be upgraded to incorporate additional storage or reduce infiltration into pipes. Refer to the Wastewater Activity Management Plan for specific details.

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 stormwater flooding and ponding on property and roads during and after storms, as well as enhanced stormwater discharge quality. These expectations will need to be fully assessed and balanced against other desired outcomes.

Infrastructure Planning for Growth Projects

Figure ES-5 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. This work is expected to be complete in 2022. As demand for development becomes clearer, growth areas will be prioritised for services upgrades.

Figure ES-5: Nelson Growth Areas and Infrastructure Timing



vii 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 3 waters networks in Nelson was developed during a period of intense urbanisation and conversion to public servicing from the 1960s and 70s. Whilst the majority of stormwater assets in Nelson are relatively new with stormwater pipes having an average age of approximately 30 years, less than the national average of 37 years, these assets are now well into their useful working life. Figures ES-6 and ES-7 show a 'bow-wave' of stormwater pipe renewals projected for the period 2050 - 2100, based on the expected working life of assets. The 2050'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. Nelson's hillslope terrain provides a challenging environment for reticulated networks, particularly where land movement is occurring.

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 stormwater pipes in Nelson are generally performing better than those in the wastewater and water networks, further assessment is required to better support an evidence based decision making approach for stormwater 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 Stormwater 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-6: Estimated Pipe Replacement Length by Year

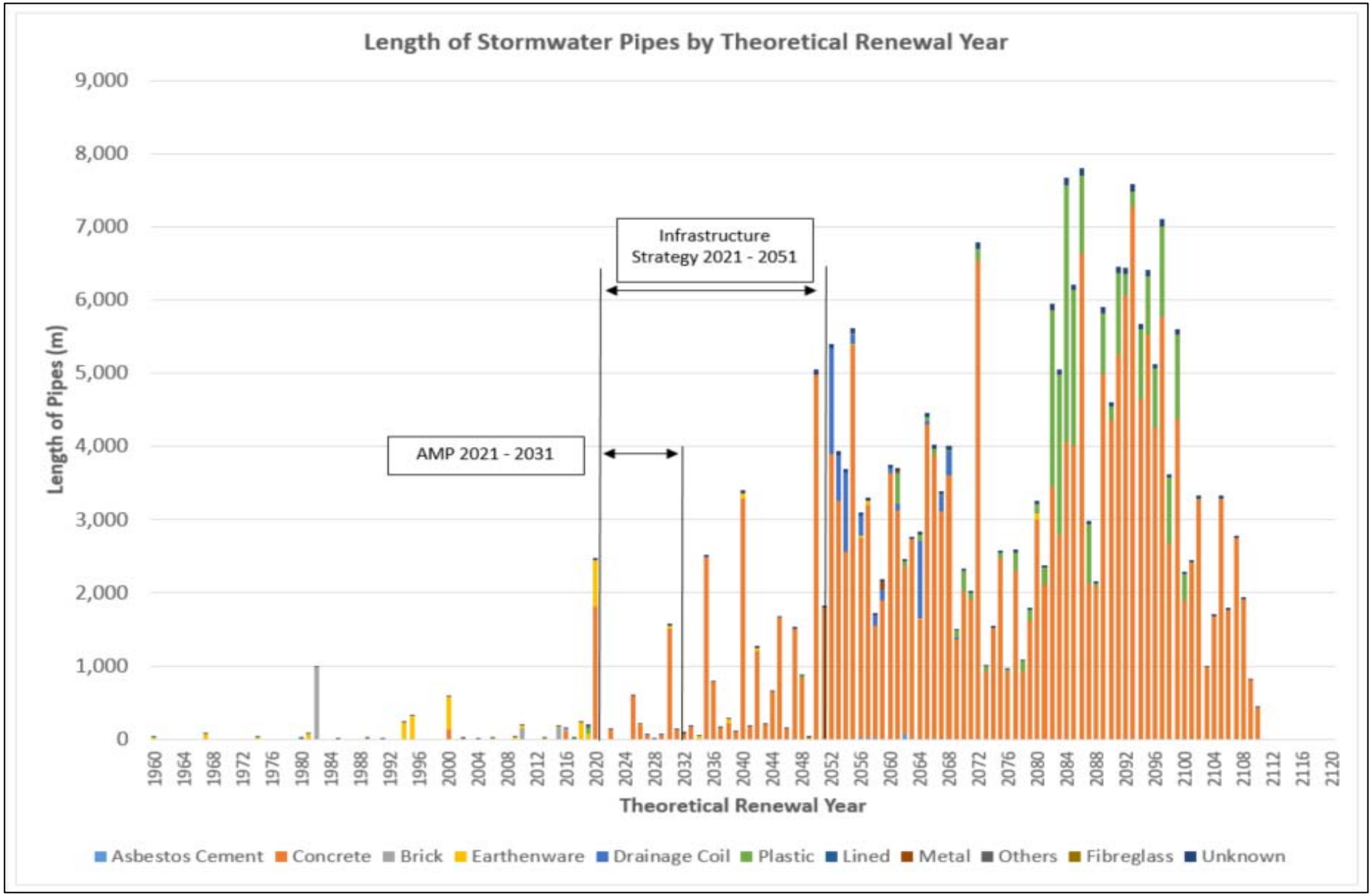
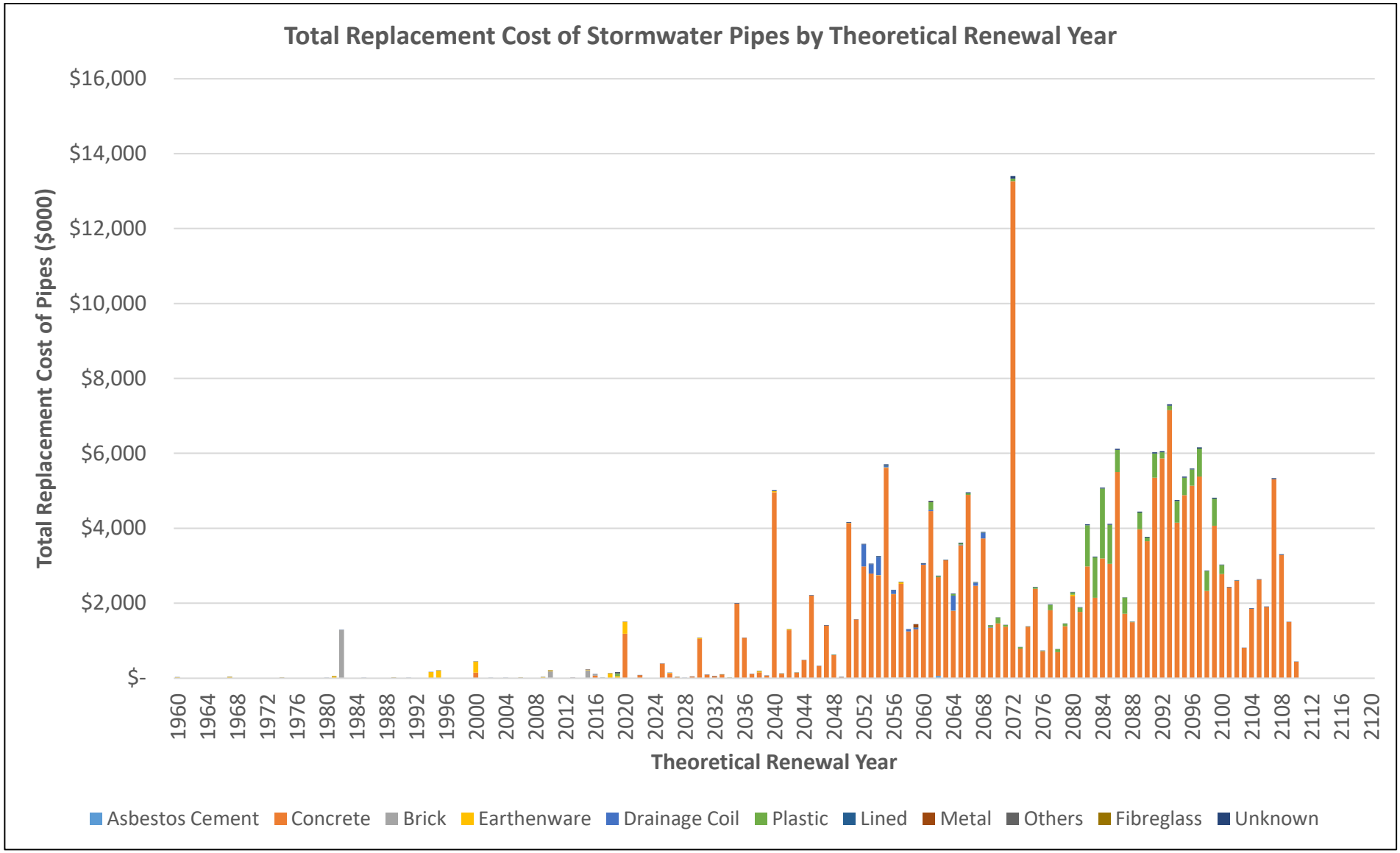


Figure ES-7: Estimated Pipe Replacement Cost by Year



viii 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
- Enable the Council to avoid threats and seize opportunities
- 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
- Asset performance/Service Delivery
- Environmental/Historical/Cultural
- Financial
- Political/Community/Reputational
- Relationship with Iwi
- Legal compliance
- Information/Decision support

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 five specific Community Outcomes that guide the Stormwater and Flood Protection risk analysis are also used to inform the Stormwater and Flood Protection levels of service:

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

- Our region is supported by an innovative and sustainable economy
- 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.

ix 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-4 and ES-5 below show total projected operational and capital expenditure on stormwater and flood protection for 2021 – 2031 by expenditure type.

***Projected expenditure for Stormwater*:** is relatively constant over the term of the plan.

Operational expenses are relatively constant at $1.0M - $1.3M per annum over the 10 years.

Capital expenditure is predicted to be in the range $5.0M to $12.0M per annum over the 10 years, including level of service upgrades, renewals and growth projects. Level of service upgrades account for the elevated expenditure of over $9.0M per anum over the first 3 years. Major projects to be included within the first 3 years include: Haven Road, Washington Valley, Rutherford Street, Konini Street, Wastney Terrace, Centennial Park stormwater outfall and Tahunanui Hills stormwater upgrades. The slight spike above $8.0M per annum in years 2029/30 and 2030/31 relates to an increase in projected expenditure on growth projects and Level of Service upgrades

Projected expenditure for Flood Protection: is higher in the first 2 and last 2 years of the 10 year plan.

Operational expenses are variable within the range $300k - $750k per annum over the 10 years.

Capital expenditure is above $11.0M per annum for the first 2 years and reduces after 2022/23 when the construction of the Saxton Creek Stage 4 upgrade is expected to be largely complete. This project is expected to receive co-financing of $7.5M through the Ministry of Business Innovation & Employment - Provincial Development Unit's COVID Response and Recovery Fund (CRRF).

From 2023/24 – 2028/29 capital expenditure is forecast to be in the range $1.5M - $4.0M per annum but increases over the last 3 years of the 10 year plan to above $5.0M per annum due to 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.

Table ES-4: Projected Operational Expenditure 2021 – 31

Group Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Stormwater	1,231,095	1,062,055	1,081,095	1,092,755	1,108,525	1,083,235	1,114,065	1,101,825	1,082,705	1,097,535
Base Expenditure	363,095	360,055	394,095	418,655	377,305	384,875	378,535	386,115	379,785	387,385
Unprogrammed Expenses	210,000	210,000	210,000	212,100	214,220	216,360	218,530	220,710	222,920	225,150
Programmed Expenses	658,000	492,000	477,000	462,000	517,000	482,000	517,000	495,000	480,000	485,000
Flood Protection	478,978	718,978	643,978	490,478	381,988	353,527	345,065	386,624	358,212	319,801
Base Expenditure	79,278	79,278	79,278	79,828	80,378	80,948	81,508	82,078	82,668	83,248
Unprogrammed Expenses	95,000	95,000	95,000	95,950	96,910	97,879	98,857	99,846	100,844	101,853
Programmed Expenses	304,700	544,700	469,700	314,700	204,700	174,700	164,700	204,700	174,700	134,700

Table ES-5: Projected Capital Expenditure 2021 - 31

Group Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Stormwater	11,916,079	9,401,000	9,451,000	6,821,000	5,876,000	5,441,000	6,866,300	6,606,000	8,621,000	8,466,000
Capital Growth	916,000	916,000	1,006,000	1,946,000	1,046,000	1,046,000	1,646,000	1,976,000	2,666,000	3,811,000
Capital Increased LOS	10,840,079	8,215,000	8,095,000	4,680,000	3,205,000	2,765,000	4,510,000	4,420,000	5,445,000	4,455,000
Renewals	160,000	270,000	350,000	195,000	1,625,000	1,630,000	710,300	210,000	510,000	200,000
Flood Protection	13,540,500	11,591,000	1,967,000	2,297,000	2,497,000	2,417,000	2,287,000	3,692,000	5,632,000	6,162,000
Capital Growth	0	0	0	0	0	0	0	0	0	0
Capital Increased LOS	13,540,500	11,561,000	1,937,000	2,267,000	2,467,000	2,387,000	2,257,000	3,662,000	5,602,000	6,132,000
Renewals	0	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000

x 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 the stormwater system and 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 and explain the level of service implications of budget variations.

Internal Audit

Internal audits 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 2018/19 are provided in Appendix H.

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 stormwater and 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, stormwater reticulation and secondary flowpath modelling on a catchment by catchment basis

Table ES-6: Improvement Programme

Improvement Programme	Improvement Actions
Expand sustainable practice throughout the stormwater and flood protection activity	Implement the Code of Practice which sets out standards and good practice methods for undertaking work within water courses.
Improve linkage to Environmental Activity & Transport Activity Management Plans including creating a chart to show the links	Combined Stormwater 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 as well as from Central Government through a new NES relating to wastewater overflows.
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 taking into consideration climate change effects.	This was achieved in 2018/19 although further updates are in progress due to new NIWA storm rainfall data (HIRDSv4)
Complete stormwater network modelling to inform Stormwater Strategies	The Stoke Stormwater network model has been completed. Central Nelson and Port Hills/ Tahunanui network models are in progress.
Complete Stormwater Strategies for the five urban areas: Stoke, Tahunanui, Central Nelson, Port Hills, Atawhai taking into consideration future climate change effects.	The Stoke Stormwater Strategy has been completed. The Tahunanui Stormwater Strategy is in progress.
Develop a Stormwater Quality Improvement Strategy to enable freshwater quality targets in the Whakamahere Whakatū Nelson Plan to be met.	New implementation action – subject to freshwater quality provisions that will be set in Whakamahere Whakatū Nelson Plan
Complete a Stormwater renewal strategy to manage the bow wave of renewals expected from the 2050's onwards	New implementation action primarily focussed on the stormwater network. This strategy will include a framework for prioritising and implementing condition assessments.
Review condition assessments and improve accessibility of this information.	New CCTV inspection viewer is currently being developed to improve accessibility of this information and provide analysis on condition of surveyed assets.
Ongoing refinement of lifecycle decision making and financial forecasts, including review of asset life expectancy	The stormwater renewal strategy will investigate and provide guidance on the expected base life of assets. Asset values are being reviewed in 2020.
Develop Flood Protection Strategies for critical assets such as open channels, streams and	Critical stormwater and flood protection assets including open channels and streams have been

Improvement Programme	Improvement Actions
rivers taking into consideration future climate change	identified through the 3 waters natural hazards resilience project. Flood Protection Strategies are being progressed for urban areas of the city following a risk based approach.
Improve accuracy of data through review and modification of collection, storage, and auditing	Asset data accuracy is being reviewed through the development of Stormwater network models and the 3 Waters Natural Hazards resilience project. Further work is required to update asset data, especially ownership data.
Develop drain ownership policy based on NTLDM standards to guide operations and maintenance activities. Update GIS asset ownership to align with this policy	Stormwater asset ownership to be updated before this policy can be put in place.
Expand focus on inter-relationship of network components and development of improved strategies for maintenance, renewals, and upgrades	Stormwater upgrades are being prioritised through the stormwater strategies, supported by network modelling. A stormwater renewal strategy will be developed to prioritise renewals.
Investigate reporting processes and procedures from Infor and maintenance contractors to ensure that the appropriate levels of service and asset management reporting is available	An update to the system has been made that automates level of service reporting, although Service Requests still need to be analysed to determine number of storm events that exceed network capacity.
Investigate better reporting options regarding blockages to pipe network so that service requests identify whether a roading or stormwater issue	This relates to the updating of asset ownership data referred to above. Typically sumps and laterals located within the carriageway are roading assets.
Update customer service information collection processes to include specific information that relates to stormwater and flood protection levels of service, such as incidents resulting in flooding of habitable floors.	This improvement action has been completed for the flooding of habitable floor measure. Improved reporting for this measure will apply from 2020/21.
Improve reporting on response times. The median time reported is currently based on 50% of requests	An update to the system has been made which automates reporting of response times.
Extend stormwater network into priority catchments for the Inflow & Infiltration Programme	Priority catchments being identified. Washington Valley stormwater upgrade is planned to reduce known inflow & infiltration (I&I) issues in that catchment, which relate to stormwater entering the sewer network.

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 stormwater and 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 stormwater and 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 substantiation for budget forecasts put forward in the Long Term Plan (2021-2031) for stormwater collection, treatment, disposal and flood protection.

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. 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 a Proposed Plan is expected to be formally notified in 2022. While the impact of the Nelson Plan on the stormwater and 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 as the proposed plan responds to the NPS-FM, and NES-FM. Any future stormwater and 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.

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 stormwater management:

- New water quality limits relate to nutrient levels, sediments, algae, bacteria and macroinvertebrates, and are much more stringent than those in the NRMP.
- Monitoring of water quality from wastewater and stormwater will be required, particularly to fill current data gaps.
- Discharges of untreated wastewater as overflows will require consent as a discretionary activity, and will ultimately need to be phased out for the requirements of national direction to be met
- Where the health of streams and rivers in the region is known to be degraded, Council will need to take action. This includes improvements to stormwater and wastewater management, where they may be contributing to the loss of health of those rivers and streams

Implications for Stormwater quality

Stormwater discharges from Council's existing stormwater network are anticipated to be a permitted activity if they comply with the water quality limits, and will be a controlled activity where water quality limits are exceeded. All new stormwater discharge outlets are likely to be a discretionary activity.

Stormwater runoff from individual sites onto roads and into Council's reticulated system is also likely to be required to meet quantifiable limits (to achieve water quality limits in the freshwater receiving environment at the end of the reticulated network). The rationale is that if receiving environment attribute limits are met for runoff from an individual site, that site would not cause receiving environment limits to be exceeded. An option for achieving this is for stormwater sampling to be undertaken to support consent applications where stormwater is to be 'diverted' into the stormwater network or on a case by case basis to confirm that runoff meets permitted activity thresholds.

It is likely that Council will need to intervene to get the contaminant levels to acceptable levels, particularly in relation to stormwater generated from road run off, which falls under the Transport activity. Stormwater quality improvement requires cross Council collaboration and a working group has been established to progress this.

Works in and near streams and rivers

The Draft Nelson Plan provides for works in the beds of rivers as a permitted activity if the minimum standards in the Code of Practice are met. Council may choose to apply for a consent for specific situations where it is not feasible to meet these minimum standards.

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 2019, retrofit of green infrastructure in priority areas identified through the proposed Stormwater Quality Improvement Strategy, and opportunities for green infrastructure and detention identified for Intensification and Growth areas under the Nelson Tasman Future Development Strategy (2019).
- Stormwater filters such as the fish nets currently fitted to Stormwater outlets, sump filters such as those trialled by the Transport team in the CBD and larger vortex filters to be trialled at the Centennial Road Stormwater pumping station.

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.

Certified Emissions Measurement and Reduction Scheme (CEMARS – now called Toitū Envirocare) Action Plan

Council has undertaken to measure and reduce its carbon emissions. This started with all organisational emissions for 2017/18 being measured, and the development of a draft preliminary action plan for emissions reduction. Council has set a target for emissions reduction to be in-line with the Climate Change Response (Zero Carbon) Amendment Act 2019 (net carbon zero by 2050, with the exception of biogenic methane, for which there are a range of targets from 24 to 47% reduction). Refer to section 1.2 – Climate Change for more information about mitigation activities.

Community Engagement – Environmental Activity

Council funds a variety of non-regulatory environmental programmes which contribute to environmental enhancement of freshwater and coastal areas, and encourage the community to play their part in reducing contaminants to freshwater. Programmes include Nelson Nature; Healthy Streams; Rainwater Harvesting; Only Rain Down Drains; Riparian Planting; water conservation education; citizen science stream monitoring; advocacy for consumer options such as copper free brake pads and zinc free roofing materials; and behaviour change programmes related to littering, disposal of dog poo, car-washing and fly tipping behaviours.

An ongoing programme of permitted activity condition monitoring in Nelson's industrial precincts also identifies potential contaminant sources entering streams via stormwater and encourages best practice with a combination of support, advice and enforcement. Monitoring by Environmental Inspections Ltd of Industrial areas between April 2016 and mid-2019 assessed 486 properties for stormwater and hazardous substances compliance. This identified 24 illegal discharges to stormwater which were directed to cease, preventing detergent, oil, paint wash and carpet cleaner from entering the local waterways.

Iwi Management Plans:

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

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

This is a collective initiative involving five of the six local iwi (Ngati Rarua, Rangitira, Te Atiawa, Ngati Koata, Ngati 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: (Ngati kuia)

Iwi Management Plan 2002: (Ngati Koata)

Environmental Management Plan 2018: (Ngāti Tama)

Te Tau Ihu Mahi Tuna (Eel Management Plan) 2000: (All iwi)

Long Term Plan 2021-31

This Plan supports Council in the development of the Long Term Plan 2021-31 by providing the substantiation for budget forecasts put forward in the Draft Long Term Plan for the stormwater and flood protection activity. As 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, 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 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 impact on stormwater volume, peak runoff and Stormwater quality for these future growth areas is one of the key focus areas for this Plan. The NPS-UD 2020 requires Councils to review the current FDS and prepare an update. This work is now in progress and expected to be completed in 2022.

Nelson Tasman Land Development Manual (2019)

The NTLDM 2019 has replaced the Nelson City Council Land Development Manual 2010. The NTLDM 2019 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 2019 in relevant sections of the NRMP, and the new NTLDM 2019 will also be referenced in the Whakamahere Whakatū Nelson Plan.

A major component of the NTLDM 2019 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.

This manual is also supported by the following Practice Notes:

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

Stormwater Quality Improvement Plan (2006):

The Reticulated Stormwater Quality Improvement Plan 2006 is a requirement of the NRMP if discharges from Council's stormwater infrastructure are to be considered as a controlled activity. This plan deals with the quality of stormwater discharged to the reticulated network and ultimately the streams, rivers and marine environments.

A new Stormwater Quality Improvement Strategy is planned to be developed in the first 3 years of this Plan to respond to the requirements of the NPS-FM 2020, and the Whakamahere Whakatū Nelson Plan.

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 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.

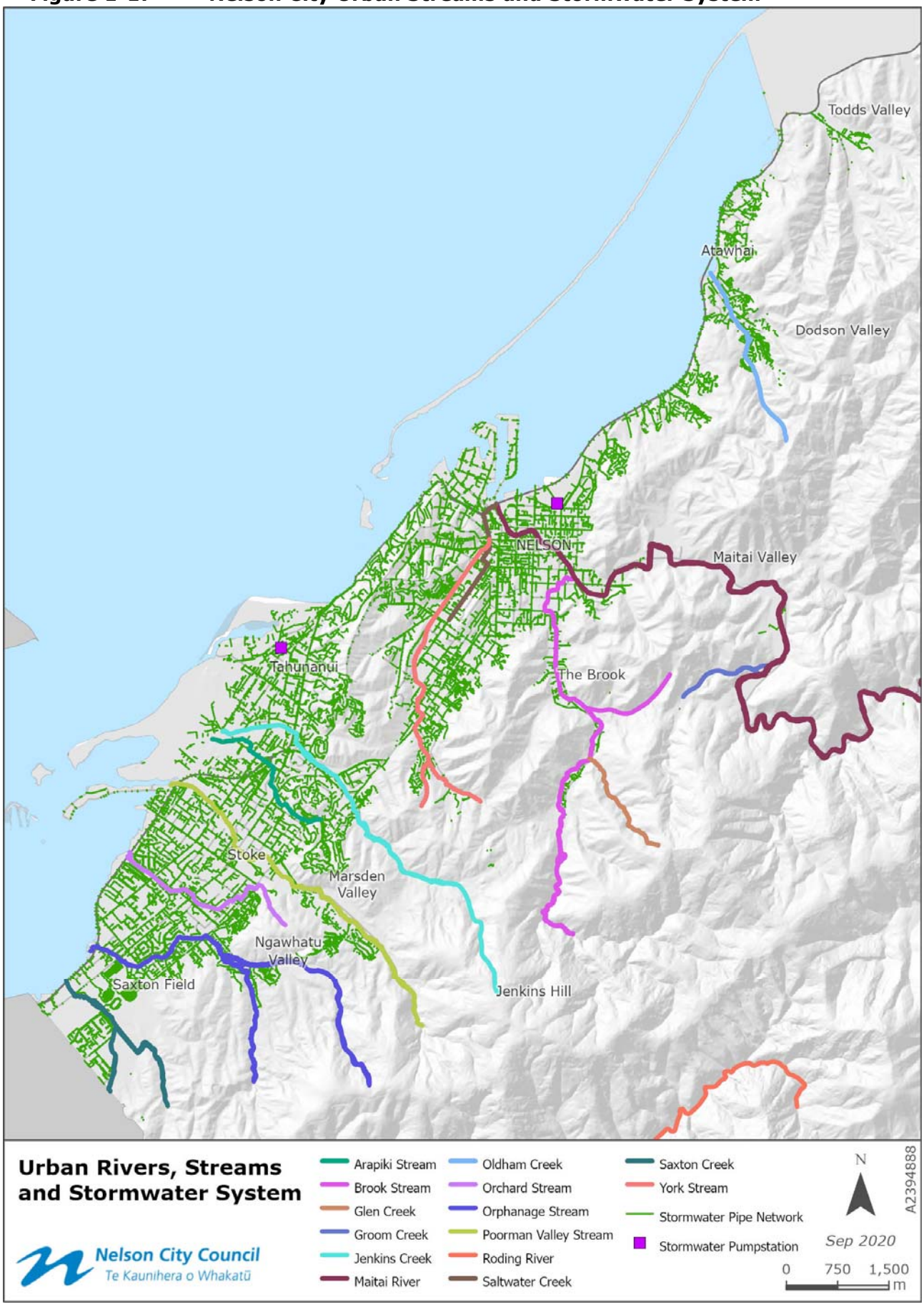
1.1.3. Infrastructure assets included in the plan

The Nelson City Council stormwater system can be categorized into two parts – natural and constructed components. The natural part consists of rivers and streams that play an important role in the support of aquatic ecosystems, recreation and the channelling of stormwater flows in rainfall events.

The constructed stormwater network includes pipes, channels, and overland flow paths that convey stormwater to receiving water courses or the sea. The stormwater system also incorporates two pump stations and 20 detention devices. In many parts of the city a fully reticulated system is not provided and individual properties discharge stormwater to onsite soakage or to the road channel as part of the primary drainage system.

The extent of the Nelson City Council stormwater system is shown in Figure 1-1 and discussed in section 4.1 – Background Data of this Plan. This includes the inventory of public stormwater services and assets owned by Nelson City Council and managed by the Infrastructure Group as at June 2020.

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.
External Partners and Stakeholders	
Residents and ratepayers	Public health and safety, service reliability, environment, cost
Industrial and commercial users	Public health and safety, 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/programmes
Internal Stakeholders	
Councillors and Sub-committees	Public health and safety, service reliability, environment, cost
Staff	Public health and safety, service reliability, environment, cost
Nelson City Council (unitary authority)	Environment
Nelson City Council (unitary authority)	Transport
Nelson City Council (unitary authority)	Parks & Reserves

1.1.5. Organisation structure

Council has an activity based structure with operations, maintenance and asset management functions for stormwater and 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 Team Leader – Utilities.

Asset management functions are undertaken by separate activity engineers, overseen by the Utilities 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 stormwater and flood protection activity to support the resolution.

1.2.2. Climate change effects on the Stormwater and Flood Protection Activity

The key climate change effects that will impact on Council's stormwater and 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 (Mapping our Natural Hazards - Nelson City Council). 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 stormwater and 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 Nelson Tasman Land Development Manual 2019 (NTLDM) requires that new stormwater assets 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 stormwater and flood protection projects therefore contribute to climate change adaptation to some degree.
- Stormwater Strategies are in progress that consider stormwater network flows under future climate conditions for an RCP 8.5 climate scenario out to 2090, as required by the NTLDM. These strategies identify future risks associated with stormwater overflows and secondary flow paths and prioritise response options to mitigate risks.
- Flood Protection Strategies that consider catchment flood flows and stream / river overflows out to 2130. Prioritisation of response options follows a risk based approach and the level of service and design life for assets may be different than for stormwater design.
- Major projects included within this Plan that contribute to climate change adaptation include:
    - Current/Ongoing Major Projects
        - Saxton Creek Upgrade
        - Orphanage Stream Upgrade
        - Little Go Stream Upgrade (Rutherford Stages 1 and 2)
        - Mount St / Konini St Stormwater Upgrade
    - New Projects
        - Maitai Flood Mitigation Project
        - Jenkins Creek Upgrade
        - Poormans Valley Stream Upgrade

- Washington Valley Stormwater Upgrade
- Main Road Stoke / Maitland Stormwater Upgrade
- Tahunanui Hills Stormwater Upgrade
- Brooklands Stormwater Upgrade
- Wastney Terrace Stormwater Upgrade
- York Stream Upgrade
- Haven Road Stormwater Upgrade

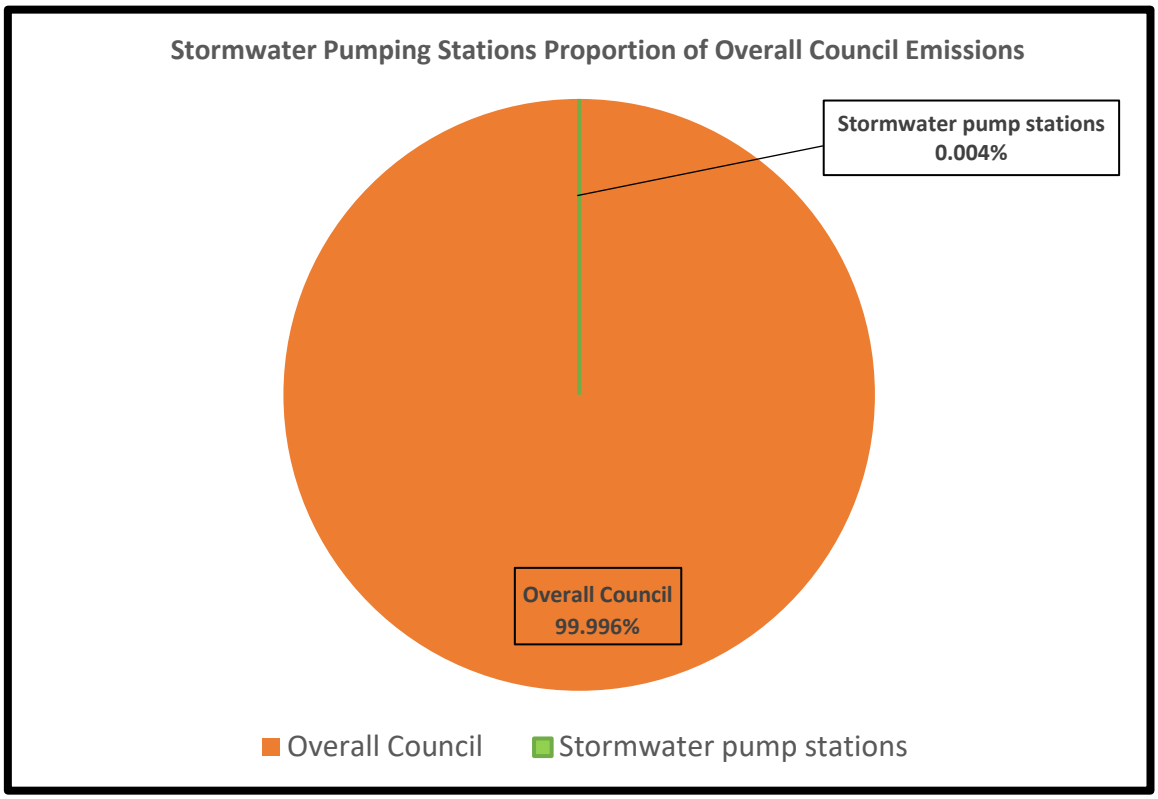
1.2.4. Climate Change Mitigation

The stormwater & 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'.

Stormwater accounts for a very minor share of overall Council emissions, with power consumption on the two stormwater pumping stations being the only source of emissions, at 0.81 GEP (t CO2e) from consumption of 6770 KWh of electricity in 2017/18. This equated to 0.004% (1/25,000) of total Council emissions.

Figure 1-2: Stormwater GHG Emissions (% of Overall Council)



Mitigation Actions:

The energy efficiency of the stormwater pumping stations and operating system will be the main focus of climate change mitigation initiatives for this activity. A condition assessment of the pumps and operating system is being undertaken alongside renewal of electrical components in 2020/21, and this will include a review of energy efficiency. An Emissions Reduction Strategy is planned for the 3 waters activities in the first 3 years of the 10 year plan.

Budget has been identified in this Plan for the following strategy:

- Climate Change Emission Reduction Strategy (years 2021-2022)

The outcome from this emissions reduction strategy 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 2019. This will be reviewed as climate change monitoring and assessment techniques develop over time.
- Sea level rise by 2090 will be approximately 0.67m.
- 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.
- Funding will be available to specifically assess the potential impact of climate change on the Stormwater and Flood Protection Activity.
- 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 Whakamahere Whakatū Nelson Plan it is anticipated that new development in these 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 is to be undertaken in 2021 to inform a risk based approach to prioritisation of response options.
- Flood Protection Strategies: 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.

1.2.7. Knowledge Gaps

- Adaptation Strategy identifying long term adaptation responses for each coastal area of the city.
- Data collection (stream recorders, stormwater network flow and water level recorders, groundwater monitoring sites).
- Secondary flow path mapping (Required for Stormwater Strategies) generated by stormwater network hydraulic models.
- Pest weed management under warmer climates.
- Stormwater 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 Systems

The Nelson City Council has been responsible for stormwater disposal 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 Stormwater and Flood Protection

The Nelson City Council manages the provision of the public stormwater and 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, helps prevent inflow and infiltration of stormwater into the wastewater system, and protects the natural environment.

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

Vision: Nelson - A Smart Little City: *He tāone tōrire a Whakatū*

Mission statement:

We shape an exceptional place to live, work and play

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 2021-2031 that are summarised below.

- Our unique natural environment is healthy and protected
- Our urban and rural environments are people-friendly, well planned and sustainably managed
- Our infrastructure is efficient, cost effective and meets current and future needs
- Our region is supported by an innovative and sustainable economy
- Our communities are healthy, safe, inclusive and resilient
- Our communities have opportunities to celebrate and explore their heritage, identity and creativity
- Our communities have access to a range of social, educational and recreational facilities and activities
- Our Council provides leadership and fosters partnerships, a regional perspective, and community engagement

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

The Six Council Priorities

Council has the following six priorities for the development of the city for the period covered by this Plan. These form the high level strategic direction for the activity and are influenced by the need to recognise the overarching importance of climate change:

- **Infrastructure**. The stormwater and 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.
- **Environment.** The flood protection component of the activity relies on the capacity of natural waterways to convey flood flows whilst the stormwater

network captures runoff and intercepts secondary flows to convey and deliver them to natural channels as well as to the coastal environment. The primary environmental issues that may arise from the flood protection activity relate to works done within the channel, and installation or removal of structures.

- **City Centre Development**. The CBD is the heart of the city and ensuring business and residential activities have adequate flood protection and stormwater services to be successful and grow is very important to council's long term strategy.
- **Creating a sustainable transport culture**. 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 stormwater flows, and an opportunity presents itself to make more use of road reserves as corridors for green infrastructure to provide stormwater treatment and freshwater quality benefits.
- **Housing affordability and intensification**. In order to ensure growth in the city can be sustained into the future Council must ensure there are adequate drainage facilities available to match development timeframes. Areas for likely intensification in the next 10-15 years have been identified by Council and will be prioritised for services
- **Maitai River Precinct.** Council is investigating opportunities to develop the Maitai River Precinct with new spaces for people to enjoy, particularly through the development of a new library and adjacent civic plaza. Council's vision for the site is to link the river to the heart of Nelson City, and for the adjacent land to be a focal point for the community. Flood Protection options for the Maitai River will be subject to public consultation in 2022.

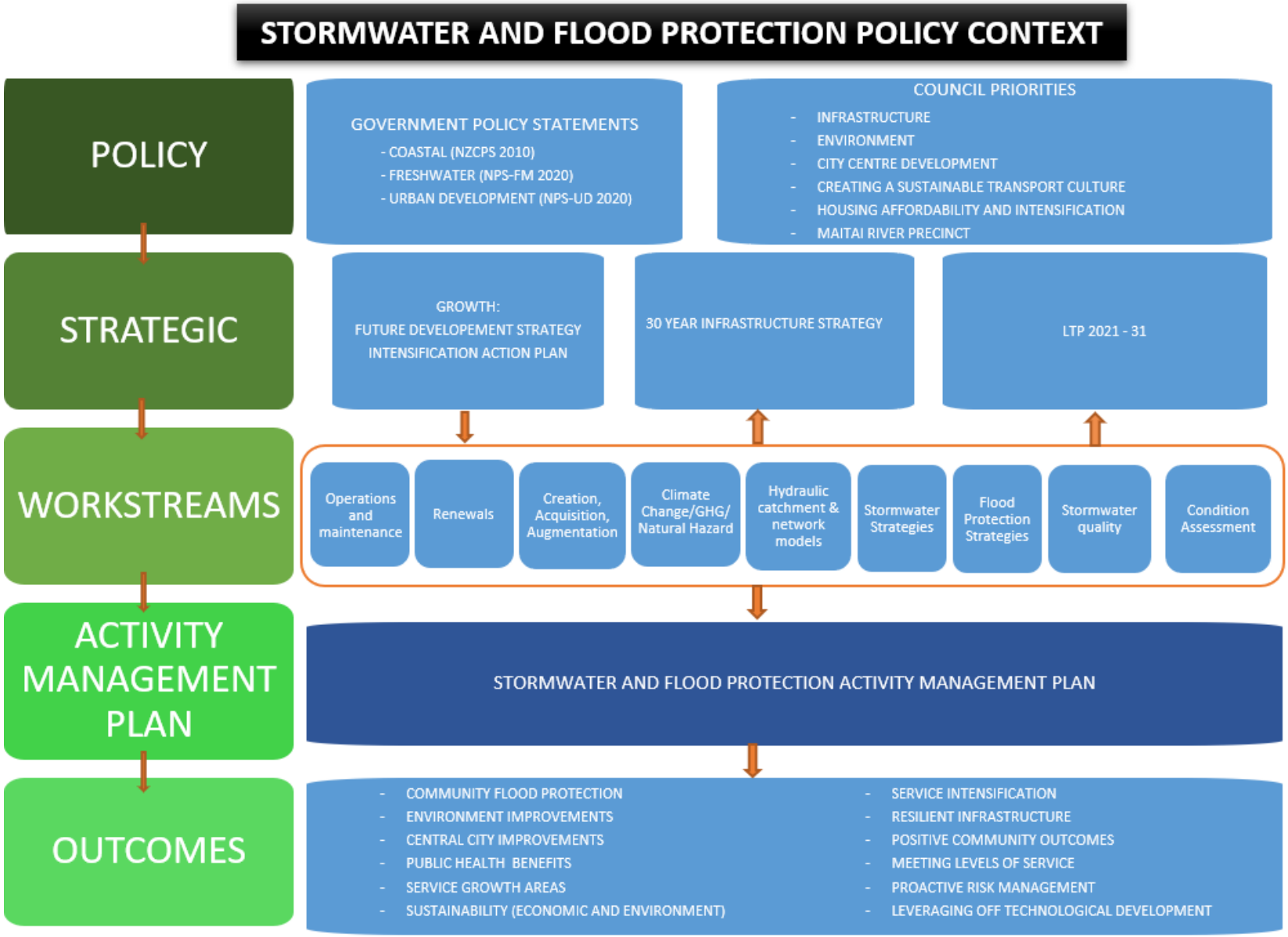
1.3.3. Plan framework and key elements

The framework of this Plan for 2021-31 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 1-3 Stormwater and 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 the 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 stormwater and 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 stormwater and 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: Stormwater Consultation Processes

Consultation Processes	Date/ Frequency	Reasons for Consultation	Extent of Consultation	Applicable to which Customer Value
Historical and Proposed				
Water and Sanitary Services Assessments	2005	To meet sanitary services assessment criteria of Local Government Act 2002.	Consultation via the Long Term Council Community Plan for acceptance of the assessment. Consultation with Medical officer of Health and local iwi.	Reliability Capacity
Residents' Survey	Most years since 1998	Rate satisfaction with services	300-400 residents surveyed by telephone.	N/A

Consultation Processes	Date/ Frequency	Reasons for Consultation	Extent of Consultation	Applicable to which Customer Value
		provided by Council.		
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

Nelson City Council measures a number of its satisfaction and user targets through an annual Residents' Survey. Gathering the views of the broader resident population is important so as to engage with residents who may not normally provide feedback and the method provides for representative data by randomly interviewing Nelson residents in line with population data. 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.

2012 Residents' Survey

47% very satisfied or satisfied with stormwater, 36% very satisfied or satisfied with Flood Protection

2013 Residents' Survey

In May 2013 a residents' survey on behalf of the Nelson City Council was carried out. This survey was shortened from previous years and did not specifically seek feedback on the stormwater and flood protection activity.

2014 Residents' Survey

48% very satisfied or satisfied with Stormwater, 31% very satisfied or satisfied with Flood Protection. Issues identified within Stormwater were: flooding, disposal of stormwater, drainage. 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.

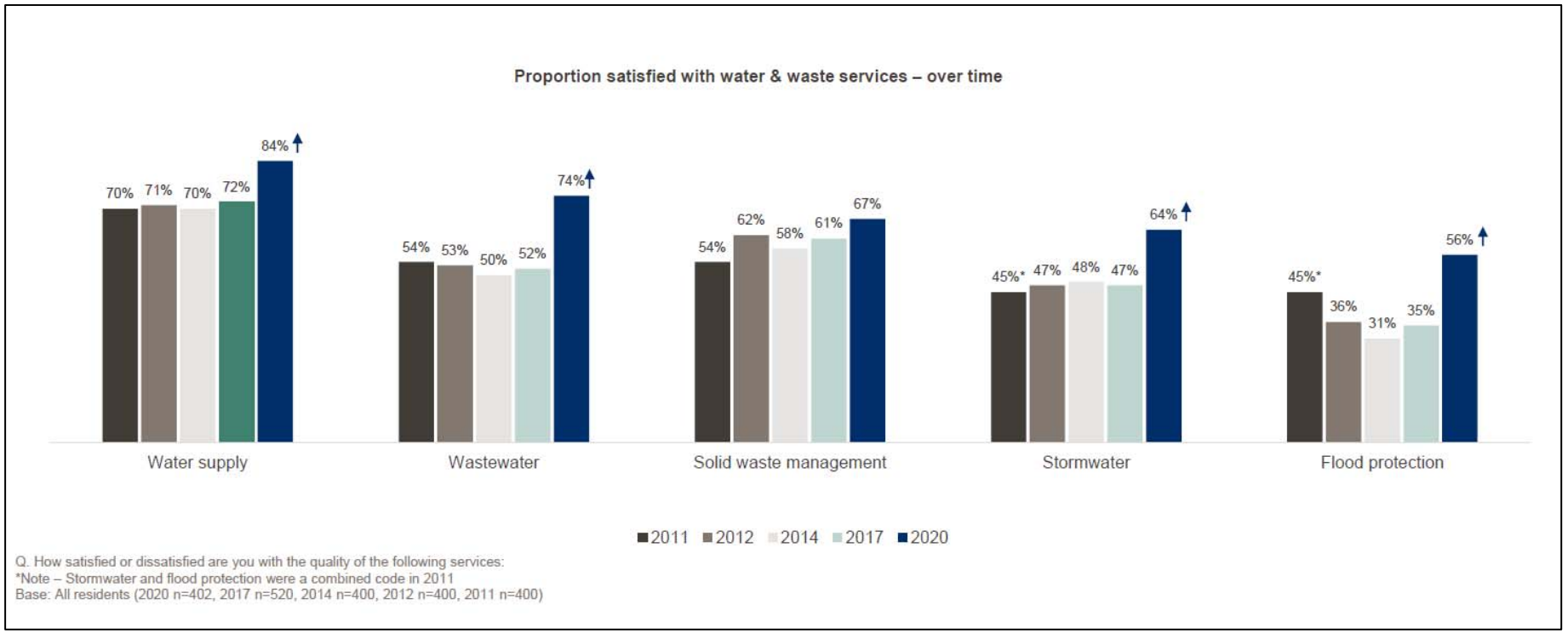
2015 Residents' Survey

A residents' survey was not carried out in 2015

2016 Residents' Survey

The 2016 residents' survey did not seek feedback on the stormwater and flood Protection activity.

Figure 2-1: Resident Survey of Satisfaction with Services



2017 Residents' Survey

47% very satisfied or satisfied with stormwater, 35% very satisfied or satisfied with Flood Protection. Issues identified with stormwater were: flooding, disposal of stormwater, drainage. Issues identified with Flood Protection were: too much flooding, Council not doing enough, more protection needed, the feeling there is limited help and facilities to deal with flooding.

2018 & 2019 Residents' Survey

The 2018 & 2019 residents' survey did not seek feedback on the stormwater and flood protection activity.

2020 Residents' Survey

64% very satisfied or satisfied with stormwater, 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 recent increase also applies to water supply and waste water as well as solid waste collection.

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 stormwater and 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 2021 – 2031. The following Community Outcomes are relevant to the stormwater and 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 stormwater and flood protection network that minimises damage to the modified and natural environment from rainfall events. Works to support the stormwater and 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 region is supported by an innovative and sustainable economy	Impact on businesses and economic activity are minimised by managing the stormwater and flood protection network to protect people and property.
Our urban and rural environments are people-friendly, well planned and sustainably managed	Sufficient and appropriate stormwater infrastructure is provided to ensure residential and business growth projections are achieved. New development takes into consideration future flood risk and protection of existing development from flooding is prioritised following a risk based approach.
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 stormwater and flood protection network. Flood risk assessment includes consideration of public safety, and design of upgrades allows for future climate change.
Our infrastructure is efficient, cost effective and meets current and future needs	A good quality, sustainable and affordable stormwater and 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 Stormwater and Flood Protection Activity

GOAL OF THE STORMWATER AND FLOOD PROTECTION ACTIVITY
Provide a stormwater and 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 stormwater discharges.

This Plan will also be reviewed in conjunction with the Wastewater Activity Management Plan. The stormwater system can have a significant impact on the wastewater system and its ability to comply with the required levels of service, by reducing stormwater inflow and ground water infiltration into the wastewater network. This may include providing property owners with an alternative to discharging stormwater directly to the wastewater network or to the street.

2.3. Legislative requirements

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

The stormwater 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.

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 stormwater drainage and 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:

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 2020 includes new legislation 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).

Resource Management Act Reform:

The Resource Management Act 1991 (RMA) will be repealed and replaced, arising from the 2020 review of the Resource Management Act 1991, with three new laws. The three new Acts will be the:

- Natural and Built Environments Act (NBA) to provide for land use and environmental regulation (this would be the primary replacement for the RMA).
- Strategic Planning Act (SPA) to integrate with other legislation relevant to development, and require long-term regional spatial strategies.
- Climate Change Adaptation Act (CCAA) to address complex issues associated with managed retreat and funding and financing adaptation.

The content of the replacement legislation was not available to Councils prior to this Activity Management Plan, therefore the implications from the reform package 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."

Climate Change Response (Zero Carbon) Amendment Act 2019

The Climate Change Response (Zero Carbon) Amendment Act 2019:

- Sets 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

- Establishes a system of emissions budgets to act as stepping stones towards the long-term target
- Requires the Government to develop and implement policies for climate change adaptation and mitigation
- Establishes a new, independent Climate Change Commission to provide expert advice and monitoring to help keep successive governments on track to meeting long-term goals.

Council has committed to a implementing a Preliminary Action Plan as part of the Certified Emissions Measurement and Reduction Scheme (CEMARS – now called Toitū Envirocare). This includes an Emissions Inventory Report and Action Plan to Reduce Council Greenhouse Gas Emissions. The assessment period for achieving reductions in greenhouse gas emissions is over five years from 2018 to 2023. Under this plan all Council activities will need to prepare a carbon reduction plan by June 2023.

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. These targets are intended to be achieved through the development and implementation of a Council wide 'Emissions Reduction Action Plan'. Refer to section 1.2 for information on how this relates to the stormwater and 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 stormwater and 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.

Policy 23 - Discharges of Contaminants - requires local authorities to manage discharges of stormwater in the coastal environment and take steps to avoid adverse effects of stormwater discharge to water on a catchment basis. This includes:

a) Avoiding where practicable and otherwise remedying cross contamination of sewage and stormwater systems;

b) Reducing contaminant and sediment loadings in stormwater at source, through contaminant treatment and by controls on land use activities;

c) Promoting integrated management of catchments and stormwater networks; and

d) Promoting design options that reduce flows to stormwater reticulation systems at source.

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 maori 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.

Outcomes from the Three Waters Review

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

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).

A separate Water Services Bill was introduced to parliament on 28 July 2020. The Bill will establish the new drinking water regulatory regime that Taumata Arowai will administer and develop provisions relating to source water protection. It also includes some obligations on wastewater and stormwater network operators. Submissions to the Bill are currently being considered by a Select Committee and it is not expected to complete the parliamentary process until late 2021 or early 2022.

The Government has indicated that its starting intention for reform of the water services industry is to develop four publicly owned multi-regional entities in public ownership for water service delivery to realise the benefits of scale for communities and reflect neighbouring catchments and communities of interest. There is still a preference for the entities to be in the shared ownership of local authorities. Design of the proposed new arrangements will be informed by discussion with the local government sector.

Whilst stormwater services for Nelson are expected to be overseen by a new water entity from 2024, at this time it is assumed the management and delivery of flood protection services will remain with Council for the duration of this Plan. It is therefore anticipated that separate stormwater and flood protection activity management plans will need to be developed for the 2024 – 2034 LTP. This will require a review of the assets, and appropriate allocation to the new AMPs by 2023.

Resource Consents for Stormwater and Flood Protection

Council seeks resource consents where required for all discrete operational activities and capital work projects. In addition two 'global' consents have been granted for stormwater and flood protection activities that occur on a day-to day basis.

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. This monitoring is expected to add to the previous monitoring in the city and allow us to develop a better picture of the contents of the stormwater runoff from various areas. Future initiatives need to be developed to reduce the level of pollutants entering the waterways in the city in line with the Central Government's Freshwater reforms and new freshwater provisions in the Whakamahere Whakatū Nelson Plan.

In 2017 a further global consent (RM175025) was granted for stream and river repairs and maintenance across the city. This consent will remain in force until the proposed Whakamahere Whakatū Nelson Plan is notified at which point a code of practice for stream works will be in place.

The resource consents held for the stormwater and 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: Stormwater and 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 985327	Stormwater discharge from Centennial Park	24 August 2033	To divert stormwater from Centennial Park, via a twin 600mm diameter rising main to the Tahunanui Reserve Modellers' Pond, and to discharge from the pond to the Back Beach tidal lagoon area.
RM 115033	Formalise the existing Wood stormwater outfall structure	1 April 2046	
RM 015445	Stormwater discharge into Maitai River	19 February 2037	Construction of outlet on the Maitai River bank (adjacent to the corner of Collingwood Street and Ajax Avenue) Associated stormwater discharge also covered under RM075499 above.
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.

Consent Number	Consent Type	Consent Expiry Date	Consent Allowance
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 035215	Coastal permit for works in the CMA and land use consent for laying pipes through the Rocks Road car park.	3 December 2038	To relocate the stormwater discharge that presently flows on to Tahunanui Beach adjacent to the Rocks Road car park, through one of two alternative outfall options (Option A and Option B), to new discharge points further along the Rocks Road seawall, and to restore the area where the present stormwater discharge is located by infilling.
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 utilitiy 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 stormwater activity may have. It indicates the existing approach or proposed action to address these in future. The Nelson City Council stormwater and 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 2018-28 (current levels of service). Refer to Table 2-8 for the desired levels of service for the Long Term Plan 2021-31.

Table 2-5: Negative Effects – The Stormwater 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	
Pump Stations									
Noise.	Static	Static	√		Minor	Nil	Minor	Nil	High degree of noise mitigation in residential areas during storm events.
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 stormwater strategies and flood protection plans for the different areas of the city, following a risk based approach.
Discharge of contaminated stormwater into waterways without treatment.	Static	Reducing	√		Minor	Nil	Mod	Mod	Environmental monitoring programme under the NRMP of properties that use or store hazardous materials. Transport and facilities activity management plans.
If increased development and population growth occurs, stormwater may contain more pollutants.	Static	Static	√		Minor	Minor	Mod	Mod	NRMP has controls for storage and use of hazardous materials including stormwater treatment and discharge. Intensification Action Plans to incorporate detention and green infrastructure for stormwater treatment.
Growth is constrained by lack of stormwater infrastructure	Static	Static	√		Minor	Mod	Minor	Minor	NPS-UD and Nelson Tasman Future Development Strategy prioritise roll out to ensure demand is met.

Table 2-6: Current Levels of service in the Long Term Plan 2018-28

					Performance Target			
	Community Outcomes	**Level of service**	**Performance measure**	**Previous and current performance**	**2018/19 (Year 1)**	**2019/20 (Year 2)**	**2020/21 (Year 3)**	**2021/22 – 2027/28 (Year 4-10)**
Stormwater	**Our unique natural environment is healthy and protected**	**Quality** Environmental Protection	Compliance with resource consents for discharge from the stormwater system, measured by the number of: a) abatement notices b) infringement notices c) enforcement orders, and d) successful prosecutions received in relation to those resource consents* Measurement Procedure 1	No contraventions identified in the previous three years to 2016/17	100% compliance with resource consents for discharge			
	Our region is supported by an innovative and sustainable economy	**Response** ^Minimise justifiable complaints	The number of complaints received about the performance of the stormwater system, per 1000 properties connected to the stormwater network* Measurement Procedure 2	10 complaints per 1000 connections in 2016/17 17 complaints per 1000 connections in 2015/16	No more than 20 complaints per 1000 connections per year			
Flood Protection	**Our unique natural environment is healthy and protected** **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 Procedures 3,4	No loss of current service potential in any urban streams 2016/17 and 2015/16	Network maintained to current service potential			
				No flood events occurred which required repairs in 2016/17. Previous flood event damage repair underway or completed.	Flood event damage identified, prioritised and repair programme agreed with community			
				Repairs from storm events prioritised via repairs consent	High priority work completed as soon as practicable			
				2016/17 flood repairs completed to maintain waterways	Network components renewed to continue provision of original design service potential			
			Develop risk based Maitai flood response options Measurement Procedure 5	New Measure	Flood analysis and property impacts identified	Response options identified	Community engagement on response options	Implementation of response option

					Performance Target			
	Community Outcomes	**Level of service**	**Performance measure**	**Previous and current performance**	**2018/19 (Year 1)**	**2019/20 (Year 2)**	**2020/21 (Year 3)**	**2021/22 – 2027/28 (Year 4-10)**
			Develop city wide flood protections strategies Measurement Procedure 5	New Measure	Complete flood models for major streams	Prioritise flood response based on results of risk based analysis	Identify top priority response options	Engage with the community and implementation of options
	Our communities are healthy, safe, inclusive and resilient	**Customer service** ^Protection from damage to property	a) The number of flooding events that occur b) For each flooding event, the number of habitable floors affected per 1000 properties connected to the stormwater network* Measurement Procedure 3	One flooding event in 2015/16, none in 2016/17 No habitable floor damage 2015/16 or 2016/17	No damage from flood events of a level that have a 50% probability of occurring in any one year No more than 10 per 1000 properties with habitable floor damage from events that have a 5% probability of occurring in any one year			
		Customer service **^Response to stormwater system issues**	Median response time to attend a flooding event, measured from the time that notification is received to the time service personnel reach the site* Measurement Procedure 3	Median response time 25 minutes in 2016/17 48 minutes in 2015/16	Median response time less than 60 minutes			

^L.O.S. included in LTP

Measurement procedures:

1. Council RMA infringement records at 1 July
2. Council financial records at 1 July
3. Report from SR system at 1 July
4. Review check sheets for individual projects
5. Project specific reports

* 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.

Reliability

Minimise Stormwater Blockages within Reticulation

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

Responsiveness

Reliable and Timely Response to Service Requests and System Failures

Generally system failures within the reticulation system 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 with Nelmac.

Table 2-7: System Failure Response Times

Circumstance	Investigation and Appraisal	Complete Repair
Clearance of obstructions from inlet structures, watercourses and outlet structures.	1 working day	2 working days
Repairs to intake and deep trap grills including replacement.	1 working day	5 working days
Other non-urgent works.	N/A	10 working days
Blocked inlet structures during rain.	30 minutes	1 hour
Flooding and overtopping of streams and rivers.	30 minutes	1 working day
Other emergency work.	30 minutes	1 working day

2.5. Proposed level of service for 2021 - 2031

One change to the stormwater and flood Protection levels of service set out in the 2018 – 2028 Asset Management Plan has been identified through the review process. The level of service relating to protection from damage to property previously related to only the stormwater activity. This was met with ease in previous years and has been 'tightened' by including the flood protection activity under this measure to provide a more challenging environment for Council and as well as a more logical and simplified level of service to report against. Under the revised measure, reporting for flooding of habitable floors will be combined for inadequate stormwater system capacity and stream / river overflows. This measure excludes commercial or industrial buildings which are deemed a lower priority than habitable buildings.

Table 2-8 outlines the proposed levels of service for 2021-2031.

Table 2-8: Proposed Levels of Service 2021 – 2031

					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)**
Stormwater	**Our unique natural environment is healthy and protected**	**Environmental Protection**	Compliance with resource consents for discharge from the stormwater system, measured by the number of: a) abatement notices b) infringement notices c) enforcement orders, and d) successful prosecutions received in relation to those resource consents* Measurement Procedure 1	No contraventions in 2019/20 and 2018/19 2 infringement notices in 2017/18 No contraventions in 2016/17	100% compliance with resource consents for discharge			
	Our region is supported by an innovative and sustainable economy	**Customer Response** ^Minimise justifiable complaints	The number of complaints received about the performance of the stormwater system, per 1000 properties connected to the stormwater network* Measurement Procedure 2	7 complaints per 1000 properties in 2019/20 11 complaints per 1000 properties in 2018/19 31 complaints per 1000 properties in 2017/18 10 complaints per 1000 connections in 2016/17	No more than 20 complaints per 1000 connections per year			
Flood Protection	**Our unique natural environment is healthy and protected** **Our infrastructure is efficient, cost effective and meets current and future needs**	**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 2019/20	Network maintained to current service potential			
				No flood events occurred which required repairs between 2017/18 and 2019/20.	Flood event damage identified, prioritised and repair programme agreed between Council and the community			
				No flood events occurred which required repairs between 2017/18 and 2019/20.	High priority work completed as soon as practicable			

					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)**
	Our urban and rural environments are people-friendly, well planned and sustainably managed			Between 2017/18 and 2019/20 only minor flood protection repairs were required to maintain waterways	Network components renewed to continue provision of original design service potential			
			Develop risk based Maitai flood response options Measurement Procedure 5	Flood analysis completed in 2018/19 Response options identified in 2019/20	Consult with the community, refine options and initiate business case	Develop concept designs for quick win projects	Initiate Resource consent process	Detailed design and Implementation
			Develop city wide flood protection strategies Measurement Procedure 5	2018/2019 Completed flood models for major streams 2019/20 Prioritise flood response based on results of risk based analysis	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
Stormwater & Flood Protection	**Our communities are healthy, safe, inclusive and resilient**	**Customer service** **^Protection from damage to property**	a) The number of flooding events that occur b) For each flooding event, the number of habitable floors affected per 1000 properties connected to the stormwater network* Measurement Procedure 2	No flooding event in 2019/20 No habitable floor damage in 2019/20	No more than 10 per 1000 urban properties with habitable floor damage in any one year			
		Customer service **^Response to stormwater system issues**	Median response time to attend a flooding event, measured from the time that notification is received to the time service personnel reach the site* Measurement Procedure 2	Median response time 20 minutes in 2019/20 42 minutes in 2018/19 41 minutes in 2017/18 25 minutes in 2016/17	Median response time less than 60 minutes			

^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:
1. Council RMA infringement records at 1 July
2. Report from SR system at 1 July
3. Review check sheets for individual projects
4. GIS flood reports for properties inside flood overlay
5. Project specific reports

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

Stormwater and flood protection demand drivers are set out in Table 3-1.

Table 3-1: Stormwater and Flood Protection Demand Drivers

Stormwater Demand Drivers	Changes to Stormwater and 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 stormwater flooding and ponding on property and roads during and after storms. This can drive a demand for the installation of reticulation in existing urban areas.
Community Expectation on environmental protection	There are increasing expectations for improved stormwater 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.
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 2019, 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 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 impact on stormwater discharges to waterways and require an enhanced response to design and construction of stream channel works. Cost implications are expected to become clearer as Council scales up stormwater 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 stormwater

Stormwater Demand Drivers	Changes to Stormwater and Flood Protection Activity
	services and flood response measures associated with this urban growth.
Dam Safety:	The Ministry of Business, Innovation & Employment is developing a new regulatory framework for dam safety under the Building Act 2004. The proposed regulatory framework aims to establish a nationally consistent approach to dam safety that better manages the potential risks of dams without imposing undue compliance costs. The intention is to provide better assurance that dams are being managed appropriately and an inventory of the number, size, location and ownership of all classifiable dams in New Zealand. The classifiable threshold is proposed to be 20,000 m^3 – 30,000m^3 in volume, depending on dam height. Currently the York Valley Stormwater detention dam above Westley Place is the only dam that would fall into this category.
Organisational Policies Environmental Sustainability Reduction of Inflow and Infiltration:	Development of sustainability strategies that include reduction of inflow and infiltration (I&I) into the wastewater system. Stormwater response will need to be through extension or upgrade of reticulation to priority areas identified for I&I reduction.
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 relatively low carbon footprint (less than 1% of total Council emissions) given the reliance on gravity reticulation. The two stormwater pumping stations at The Wood, and Centennial Park are the only sites which consume power from the electricity grid. In addition these sites only occasionally consume significant power – during major storm events. The percentage of renewable energy generated for grid is trending upwards and expected to exceed 90% by 2035, from 80% at present.

3.2. Demand forecasts

Nelson Population and Household Projections: 2020 - 2050

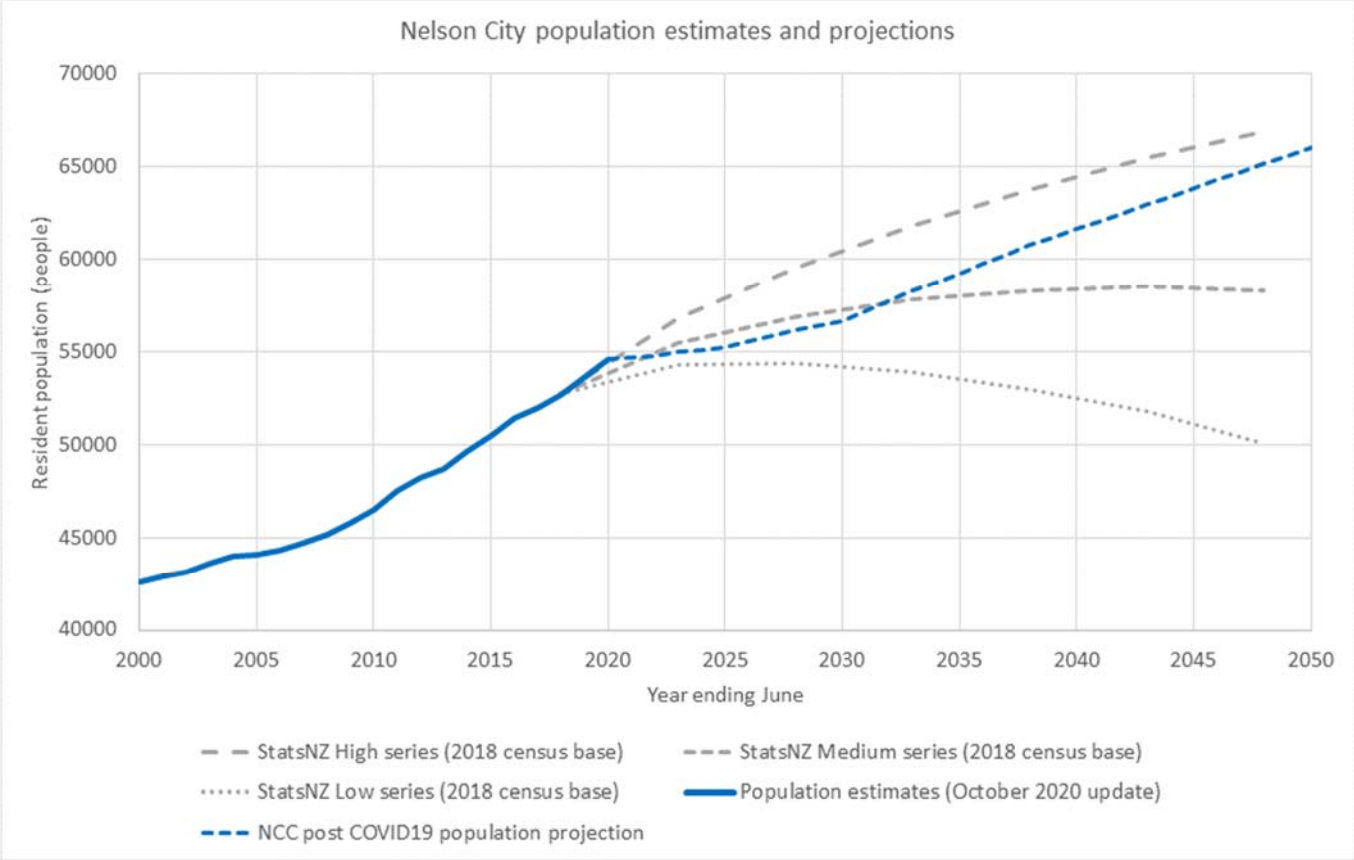
Traditionally, Statistics New Zealand would provide high, medium and low scenarios for Councils to use. In 2018, the latest census was completed but due to shortcomings in the move to online forms the return rate was lower than previously experienced. As a result, there has been significant delays in Statistics New Zealand providing updated population projections. It has been necessary to utilise alternative methods for determining future population growth in Nelson.

Further complicating projecting the future population of Nelson is the COVID-19 event. The COVID19 event is expected to have significant immediate and future economic effects particularly as it restricts the movement of people regionally and internationally.

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.

StatsNZ published population estimates in October 2020 which are applied to the 2020 starting population in the population projections in Figure 3-1.

Figure 3-1: Population growth projections 2020 - 2050, Nelson



It is clear from the figure above that the recommended projection is initially very low compared to the Statistics New Zealand high and medium series scenarios. The projection anticipates very low growth out until around 2030 before the rate of growth returns gradually to the same as the high series.

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 stormwater reticulation is driven by growth or intensification in the city, an associated increase in impermeable surfaces, and the absence of appropriate alternative disposal options in large parts of the city.

A significant constraint for Nelson is that most of our green field residential growth sites are located in upper catchment areas where capacity of downstream stormwater reticulation to service these sites is restricted. This means that new developments generally need to provide detention to offset the increase in runoff resulting from new impermeable surfaces. Given these upper catchment areas typically have steeper slopes, often with geotechnical constraints, it can be a challenge to locate suitable sites for detention. A further constraint for alternative ground based disposal options in these areas is the risk of land slippage on hillsides as ground becomes saturated during rain storms.

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 stormwater activity.
- 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 stormwater 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 2019 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. Rules in the NRMP and standards in the NTLDM 2019 protect the environment from illegal and contaminated stormwater discharges. The NRMP also controls storage and use of hazardous materials and discharges from commercial and industrial sites. 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	Continuation of non-regulatory community engagement programmes (2.1.2 above) to encourage community to reduce contaminants to freshwater
Alternative disposal strategies	As land is converted to urban development there is an associated increase in stormwater entering the drainage system, where it is appropriate on-site soakage can be used. The Land Development Manual includes standards for treatment of stormwater that originates from high contaminant generating surfaces. There are also standards which seek to reduce stream bank scour through a requirement for extended detention of stormwater where the discharge is to an open channel. The implementation of the NRMP requires at-risk sites, such as some industrial sites and service stations, to have oil and grit trap provisions. Nelson City Council has a need for drainage controls that reduce the quantity of stormwater entering wastewater drainage systems. This is currently being progressed through public education and investigations done under the Wastewater Inflow and Infiltration programme. 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 (2019)

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 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 NPS-UD 2020 requires Councils to review the current FDS and prepare an update. This work has been initiated and is expected to be complete in 2022.

The FDS 2019 sets out where future housing is likely to be located within the next 30 years in Nelson and Tasman, and the likely timing of these developments. The strategy identifies space for 8,166 extra dwellings in the Nelson Urban Area (which includes Richmond), and states that about 60% of this growth can be achieved by adding new housing into existing urban areas.

Council has identified six intensification areas that will be focussed on in the provision of infrastructure over the next twenty years. The focus for the first 10 years is the City Centre and Victory. Washington Valley is also programmed for an upgrade and therefore will have infrastructure capacity for greater intensification.

Community feedback on the FDS supported growth through intensification of existing urban areas with limited expansion onto rural land. An additional 1300 extra dwellings could be constructed in the Wood, Vanguard, Gloucester Street and Tahunanui in 20–30 years' time, but Council will not be providing for intensification in these areas unless the effects of climate change (particularly sea level rise) can be addressed in these areas.

In addition to intensification areas, greenfield areas that have been identified as being potentially suitable to accommodate growth in the medium term are in South and East Nelson, as well as Ngawhatu valley and Saxton.

Intensification Action Plan:

Implementation of intensification projects is more complex than traditional expansion, which is why an Intensification Action Plan has been developed. The Intensification Action Plan states that Council should:

- Lead investment in urban amenity and public transport to encourage growth in specific areas
- Lag investment in response to growth occurring (e.g. traffic lights to manage increased vehicle numbers, and stormwater and wastewater services to meet demand).

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.

Two of the methods in the Intensification Action Plan are to:

- Develop comprehensive neighbourhood upgrade plans
- Integrate urban design principles into infrastructure development and renewal processes at the scoping and design phase.

The availability of stormwater reticulation, detention and treatment facilities that have capacity to service the proposed intensification will increase developers' certainty that the neighbourhoods they are investing in will be attractive to buyers.

Strategic Planning

Significant upgrading of the stormwater network has occurred since 1996 as a result of the 1996 - 2016 Stormwater Strategic Plan and subsequent asset management plans. The capital investment programme in this Plan sets out the areas of the city where stormwater and flood protection projects are proposed. In addition, a number of wider strategies are identified to review the existing network and assess the most appropriate strategies to improve the overall performance of the system. These include:

- Stormwater strategies across the urban area. These are primarily to identify risks in relation to network capacity and discharge to the receiving

environment. Starting with the Stoke Stormwater Strategy, these strategies will inform decision making on the upgrades needed to achieve levels of service.

- Flood Protection Strategies for each of the urban streams. The prioritisation of these follows a risk-based approach.
- A Risk Management Plan – to respond to a new proposal for Stormwater network operators laid out in Central Government's Action for Healthy Waterways Package.
- Stormwater 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.
- Stormwater Quality Improvement Strategy to respond to the NPS-FM 2020 and new objectives being set in the Draft Nelson Plan
- Climate Change – Carbon Reduction Plan: This will follow on from the Council wide emissions inventory Report and Action Plan to Reduce Council Greenhouse Gas Emissions to achieve carbon neutrality by 2050. The Stormwater and Flood Protection activity will need to prepare a carbon reduction plan for the Stormwater pumping stations by June 2023. The focus of this will be on achieving efficiencies in electrical power consumption.

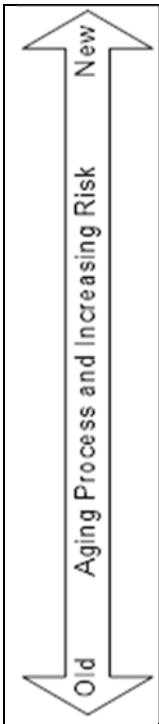
4. Lifecycle management

Lifecycle Management has a direct impact on the provision of stormwater 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 stormwater 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 stormwater 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	Maintaining the service potential of the assets and ensuring that the assets achieve that potential
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	
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 stormwater 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 the stormwater network.

4.1. Background data

Council supports the following public stormwater and flood protection works:

Stormwater network

In areas where stormwater rates are taken:

- Maintain and renew current and future public drains
- Upgrade the existing network to meet level of service where capacity issues are identified

- Extend the stormwater network to areas where current stormwater disposal options are inadequate.
- Extend the stormwater network to new growth areas and upgrade the network for areas of intensification.

In areas where stormwater rates are not collected:

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

Flood Protection network

In areas where stormwater 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 stormwater rates are not collected:

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

Currently, Council does not take stormwater rates 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.

4.1.1. Physical Parameters

Summary of Assets

Nelson City Council is responsible for a wide variety of assets that constitute the Stormwater and Flood Protection System. Table 4-4 shows the stormwater and flood protection assets managed by Utilities as of June 2020.

Table 4-6 shows the lengths of pipe and open channel by material type for the entire Nelson City stormwater and flood protection network. This includes reticulation that is privately owned, or owned by other parties such as NZTA, Nelson Port, Nelson Airport Authority, and other departments at Nelson City Council including Transport, Solid Waste and Parks & Reserves.

Table 4-4: Summary of Stormwater and Flood Protection Assets

Asset Category	Quantity	
	km	units
Stormwater		
Pipes Up To 600mm	198.8	
Pipes > 600mm	45.5	
Culverts	2.9	
Rocks Rd Culvert	0.3	
Intakes		121
Manholes		4,924
Outfalls		126
Sumps		345
Pump Stations		2
Tide Gates		24
Detention Devices[6]		20
Flood Protection		
Urban Streams/Rivers[7]	42.3	
Bank Protection	28.5	
Channels	1.8	

[6] Detention devices are listed in Table 4-8, Section 4.1 – Background Data

[7] The length of urban streams and rivers has been updated July 2021

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: Mains, Channels, Culverts and Bank Protection

Asset Category[8]	km
Asbestos Cement	.77
Aluminium	.11
Armour Coil	.38
Asphalt	.14
Brick	2.18
Ductile Cast Iron	.008
Pit Cast Iron	.006
Spun Cast Iron	.17
Concrete (InsituFORM lined)	.07
Concrete	383.44
CRST	.03
Drainage Coil	64.03
Euroflow	.03
Earthernware	6.86
Field Tiles	.2
Gabions	.79
Galvanised	.08
Gravity Flow	.03
High-density polyethylene pipe	.59
Helcoil Aluminium	.17
Medium Density Polyethylene	.23
Mega Steel Pipe	1
Napp	3.59

[8] Refer to Appendix 1 for asset category codes

Nexusflo	3.75
Other	1.45
Polyethylene 100mm	.01
Pole Construction	.05
Perforated Concrete	.36
Polyvinyl Chloride	104.12
Rock	21.09
Soil	95.79
Steel Concrete Lined	.4
Steel Pitch Lined	.02
Timber	3.01
Unknown	.54
Grand Total	**695.47**

Stormwater Runoff

An integrated combination of measures is used to manage the effects of stormwater runoff that include:

- A ***primary stormwater system*** that is designed to minimise nuisance flooding by collecting and discharging stormwater, resulting from moderate rainfall (up to 1:15yr event) into streams and other watercourses. The primary stormwater system comprises sumps, intakes, pipes, manholes, culverts, open drains, outfalls, rivers and streams.
- A ***secondary stormwater system*** which generally comprises overland flowpaths through private property and along roadways, designed to convey excess floodwater with a minimum of damage when the capacity of the primary stormwater system is exceeded. The provision of secondary flowpaths recognises that it is impractical to provide a primary system that can cope with extreme rainfall events (exceeding 1:15yr event).
- A variety of *grit traps* in the stormwater system designed to reduce the quantities of debris and gravel that enter the primary system and/or are discharged to water bodies.

Design Standards for the Reticulation System

The NTLDM 2019 sets the design standard for the capacity of the primary system at a 1 in 15 year (Q_{15}) flood event for a 2090[9] climate assuming an RCP[10] 8.5 future greenhouse gas concentration scenario. In addition, the NTLDM 2019 requires provision to be made for suitable secondary flowpaths 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.

The NTLDM 2019 states that new reticulation systems are designed to a Q_{15} standard and specified rivers and streams generally to a Q_{100} standard (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

[9] 2090 is a mid-point for the 2081 – 2100 time period adopted for temperature projections.
[10] RCP – Representative Concentration Pathway is a greenhouse gas concentration (not emissions) trajectory adopted by the Intergovernmental Panel on Climate Change (IPCC).

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 stormwater network and urban watercourses 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 the Reticulation System

The Nelson City Council has stormwater pipe assets ranging from new to over 100 years old. The expected base life of stormwater assets can be seen in the table 4-7, and the consequent distribution of pipe length verses installation year can be seen in figures 4-2 and 4-3 below. Figure 4-1 shows the location of stormwater pipes that are older than their expected base life, or will be by the end of this Plan in 2031. A condition assessment will be undertaken for these assets 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 Stormwater Reticulation Assets

Material	Base Life (Years)
Asbestos cement	80
Aluminium	60
Armour coil	60
Brick	80
Cast Iron	80
Concrete	90
Drainage coil	50
Earthenware	80
High Density Polyethylene	80
Perforated concrete	80
Plastic	80
Concrete lined steel	50

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.

Inspections of a number of stormwater pipes in the network have shown them to be in generally good order where good quality materials were used and professional installation techniques followed. In these circumstances only minimal levels of wear and loss of service has been observed and most of pipes are therefore expected to exceed their estimated service life. However some pockets of poor quality pipe material and installation details have also been found, and generally pipes on steep hillslope terrain are more likely to have a lower expected base life. Further investigation will be carried out over this plan to try and identify weak areas of the network and develop a stormwater renewal strategy to prioritise their replacement, update theoretical working life, and bring forward renewals that are forecast for the 2050's and 2060's.

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

Figure 4-1: Stormwater Reticulation Older than Expected Base Life

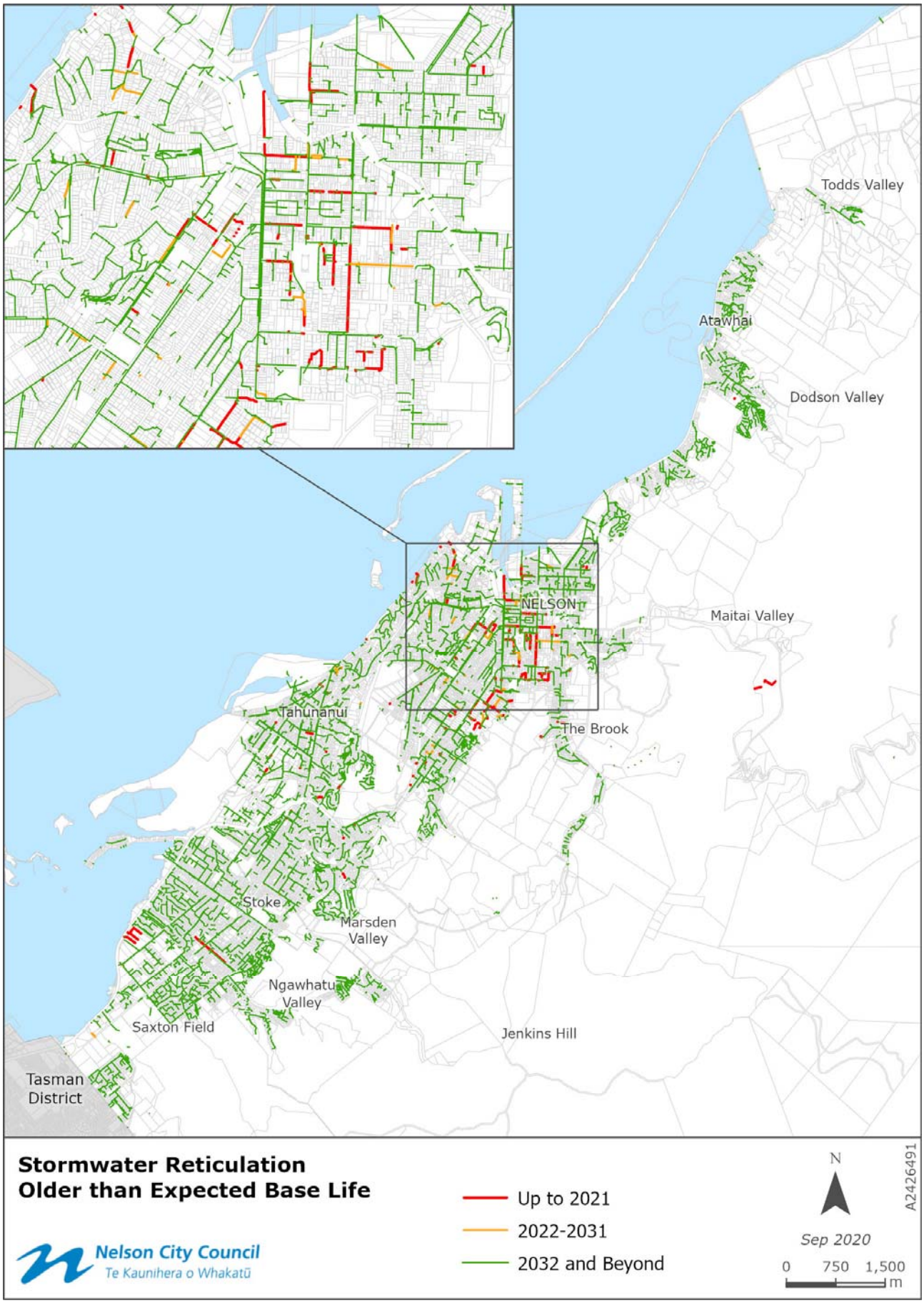


Figure 4-2: Year of Installation by Material and Pipe Length

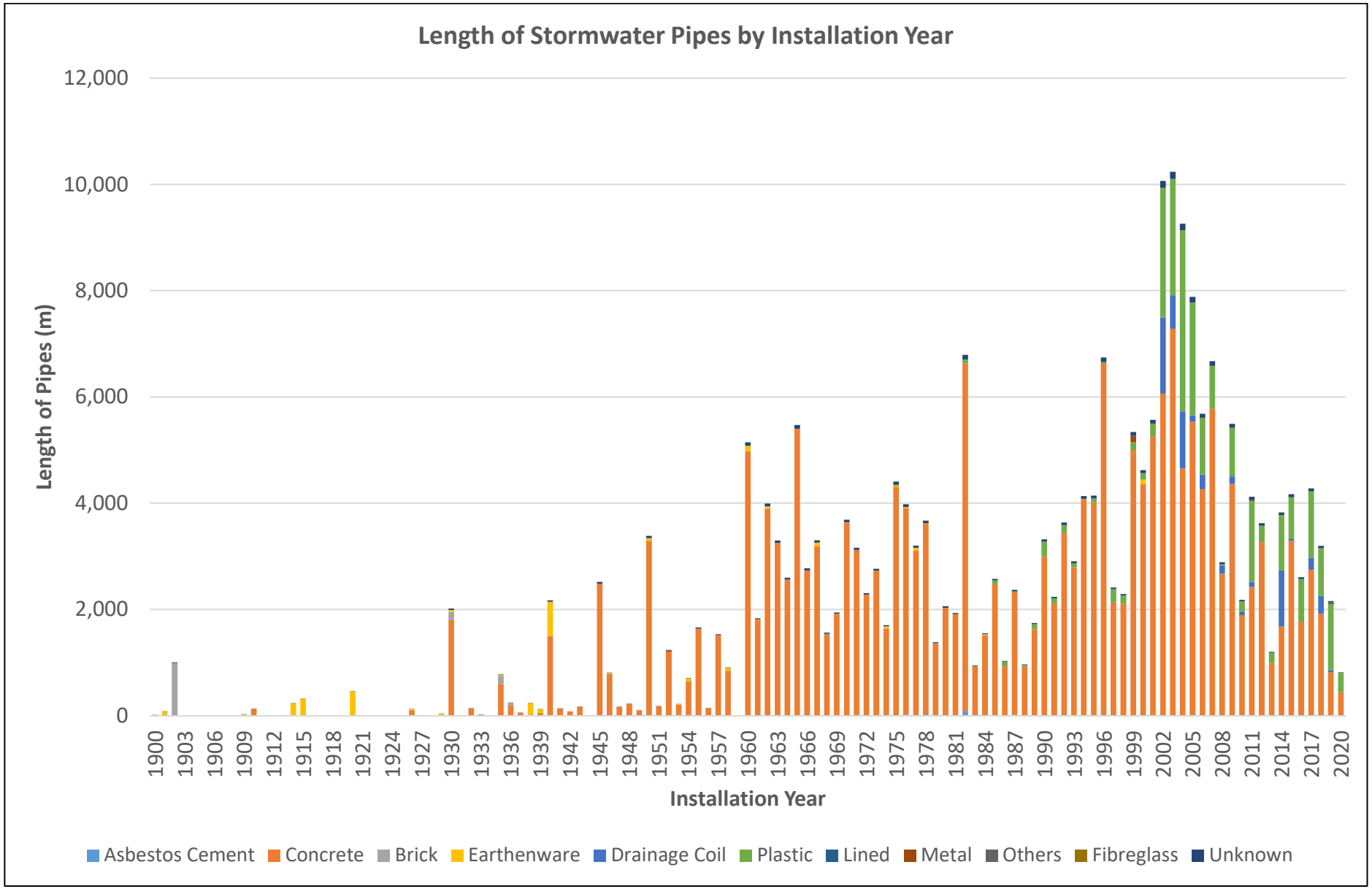


Figure 4-3: Theoretical Renewal Year by Material and Pipe Length

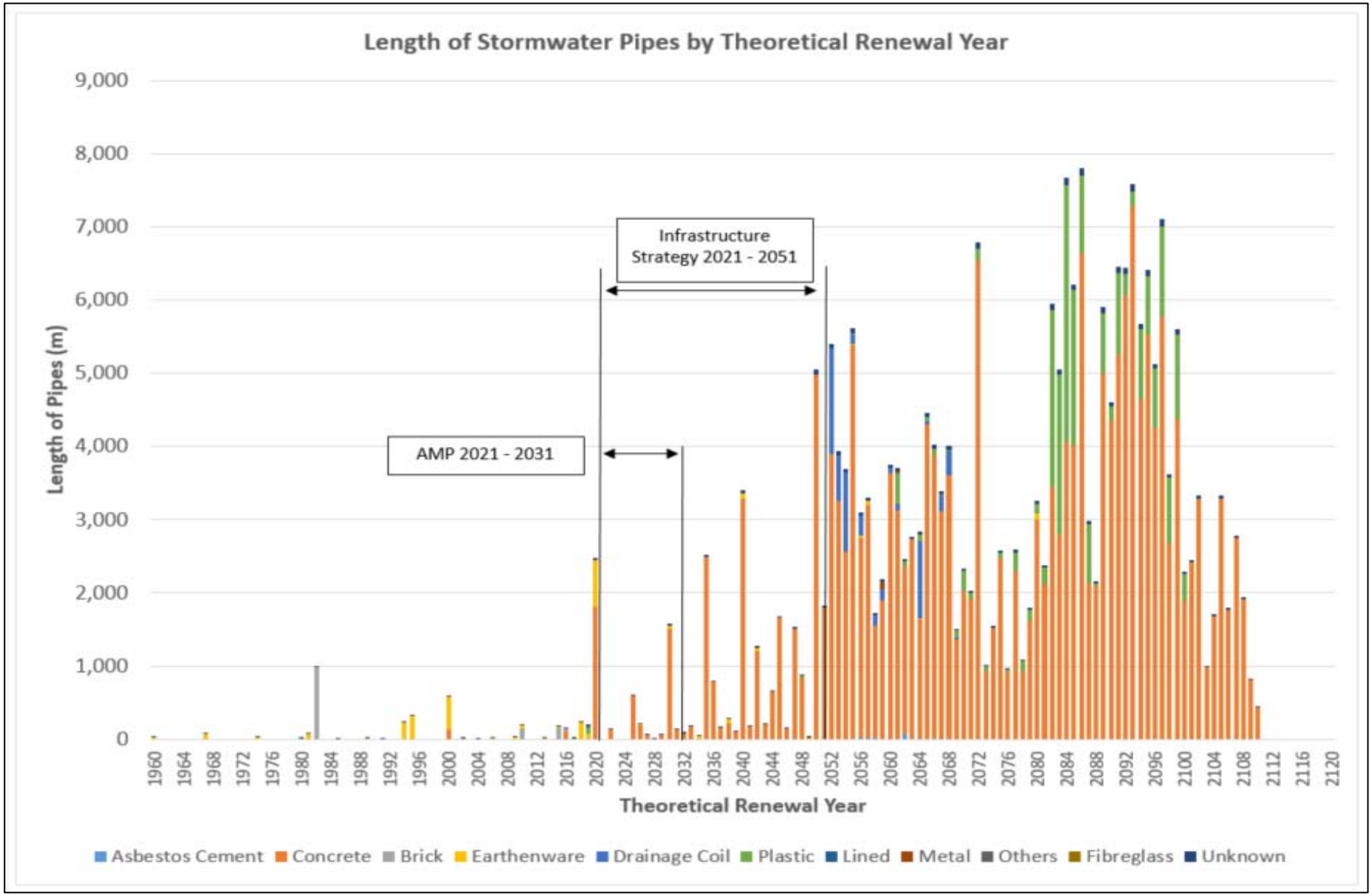
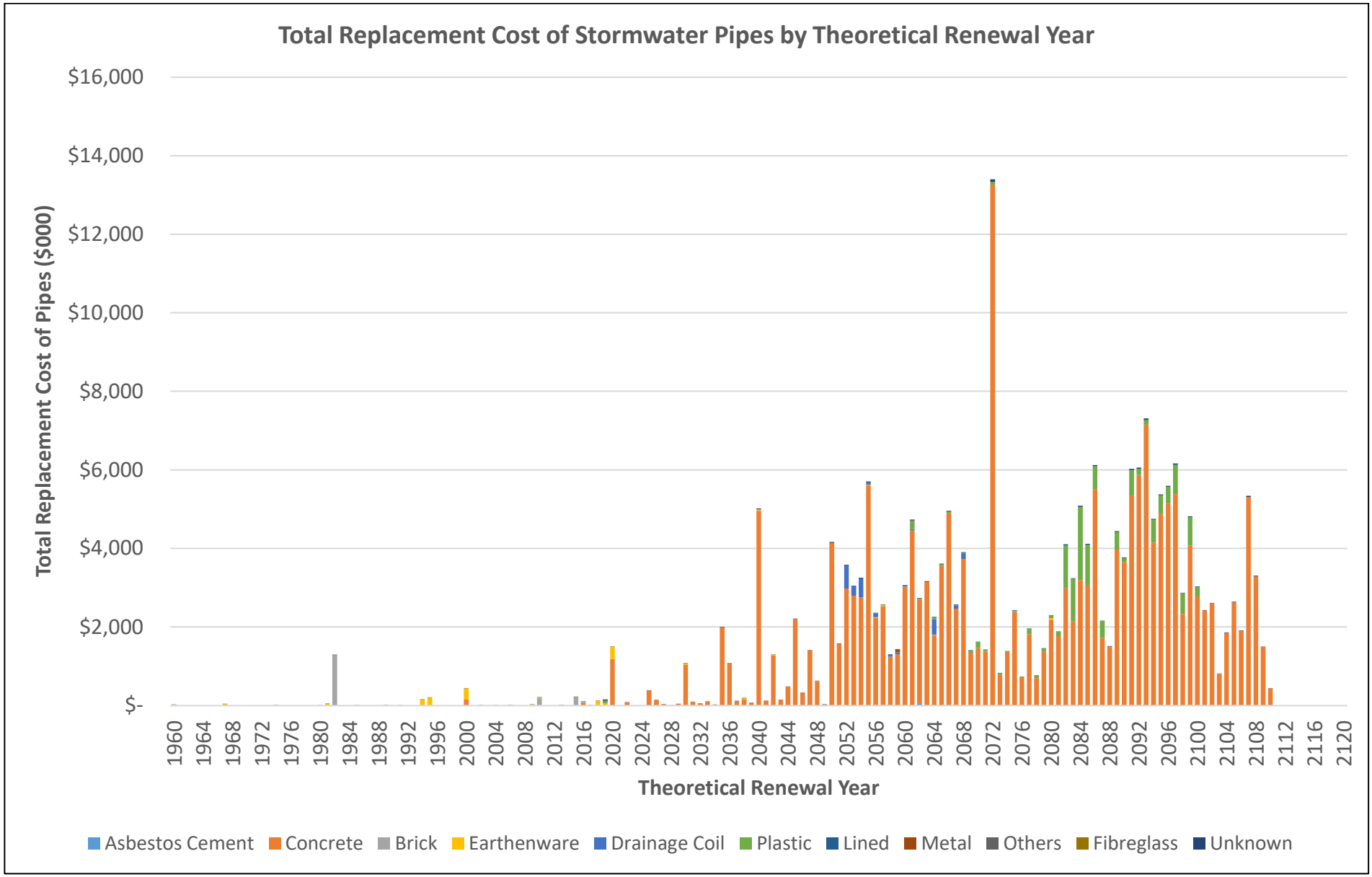


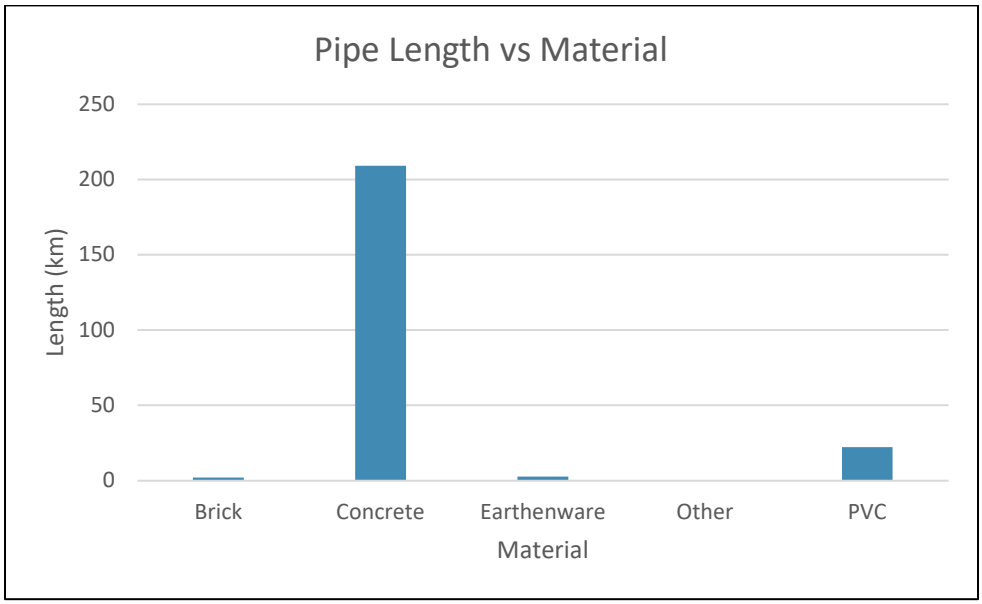
Figure 4-4: Estimated Renewal Cost by Year and Material



The pipe install date distribution increases at a steady rate for the pipes installed from the 1950's to the present date. Appendix A details the abbreviations for the pipe materials (note: figures are rounded up).

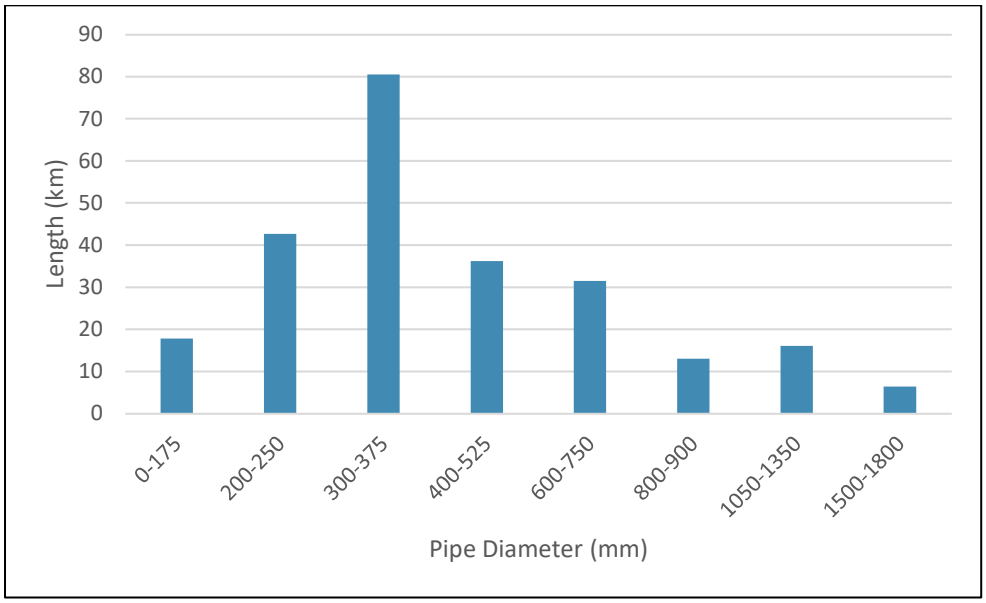
Concrete has been the predominant pipe material used and this can be seen in Figure 4-5.

Figure 4-5: Summary of Pipe Materials



The major proportion of pipe used within Nelson City Council is in the 300mm to 375mm diameter range.

Figure 4-6: Summary of Pipe Length Vs Diameter



Culverts

The Council has approximately 3km of culverts and an additional 1.3km of brick lined culverts installed in the period 1900 – 1936. These are located generally in the central city area and in Ngatiawa Street and are of variable quality, some with bricks dropping out due to loss of mortar jointing and root intrusion through cracks. In some areas the invert has been eroded and cavities have formed behind the culvert wall.

Council has trialled a specialist plastering technique on the Bridge Street culvert. The effectiveness of this will be reviewed but it is anticipated that it may not be cost effective to replicate elsewhere due to the amount of labour required to repair the culvert at Bridge Street prior to plastering. Alternative forms of lining or culvert replacement will need to be considered on a site by site basis.

The large 140m long concrete box culvert in Haven Road/St Vincent Street was installed in 1945. This culvert was inspected by Aurecon in 2010/11 and in 2011/12. Structural issues have been addressed with the installation of temporary propping which is currently being inspected by contractors on a biannual basis. This asset is well into its residual life and its condition is being monitored closely. The current assessed replacement date is in 2025 and funding has been allocated in this Plan for its renewal.

Manholes

There are approximately 4,900 manholes in the NCC Utilities stormwater network ranging from 1050 diameter to deep trap man holes for grit removal.

Stormwater Outfalls

Nelson City Utilities has 126 stormwater outfalls to rivers, streams or the coastal area, of which there are 79 outfalls with wing walls. As of October 2019 the total number of outfalls was 518 including all ownership categories.

Detention Devices

Twenty detention devices vested in Council are located within the city, and are earth or concrete detention structures with basins and controlled outlets. In addition there are 10 other detention devices planned or constructed which have not yet been vested, but are expected to become Council owned assets within the next five years. The location of these detention devices are shown in the two tables below:

Table 4-8: Stormwater Detention Dams and Ponds (Vested)

Location	Catchment
Todd Bush Saddleback Road	Todd Valley Stream
Springlea at Frenchay Drive	Oldham Creek
Koura Road, Farleigh Street SHA (New)	Oldham Creek
Grampian Oaks	Saltwater Creek
York Valley above Westley Place	York Stream
Bishopdale Ave below No.70	York Stream
Clifford Avenue above Cul-de-sac	York Stream
Exeter Street Detention Reserve (New)	Jenkins Creek
The Ridgeway at Panorama Drive	Arapiki Stream
Bledisloe North Reserve	Arapiki Stream
Sanctuary Esplanade at Kingfisher Lane	Poorman Valley Stream

Quail Rise Detention Basin (Western)	Poorman Valley Stream
Quail Rise Detention Basin (Eastern)	Poorman Valley Stream
Bridgewater Lane	Orphanage Stream
Ngawhatu sports field	Orphanage Stream
Saxton Field Detention	Orphanage Stream
Montebello Avenue (New)	Orphanage Stream
Piwakawaka Drive Detention Reserve (New)	Orphanage Stream
Saxton Creek Esplanade Detention Pond	Saxton Creek
Iti Lane (Waimeha) Detention Ponds (New)	Saxton Creek

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

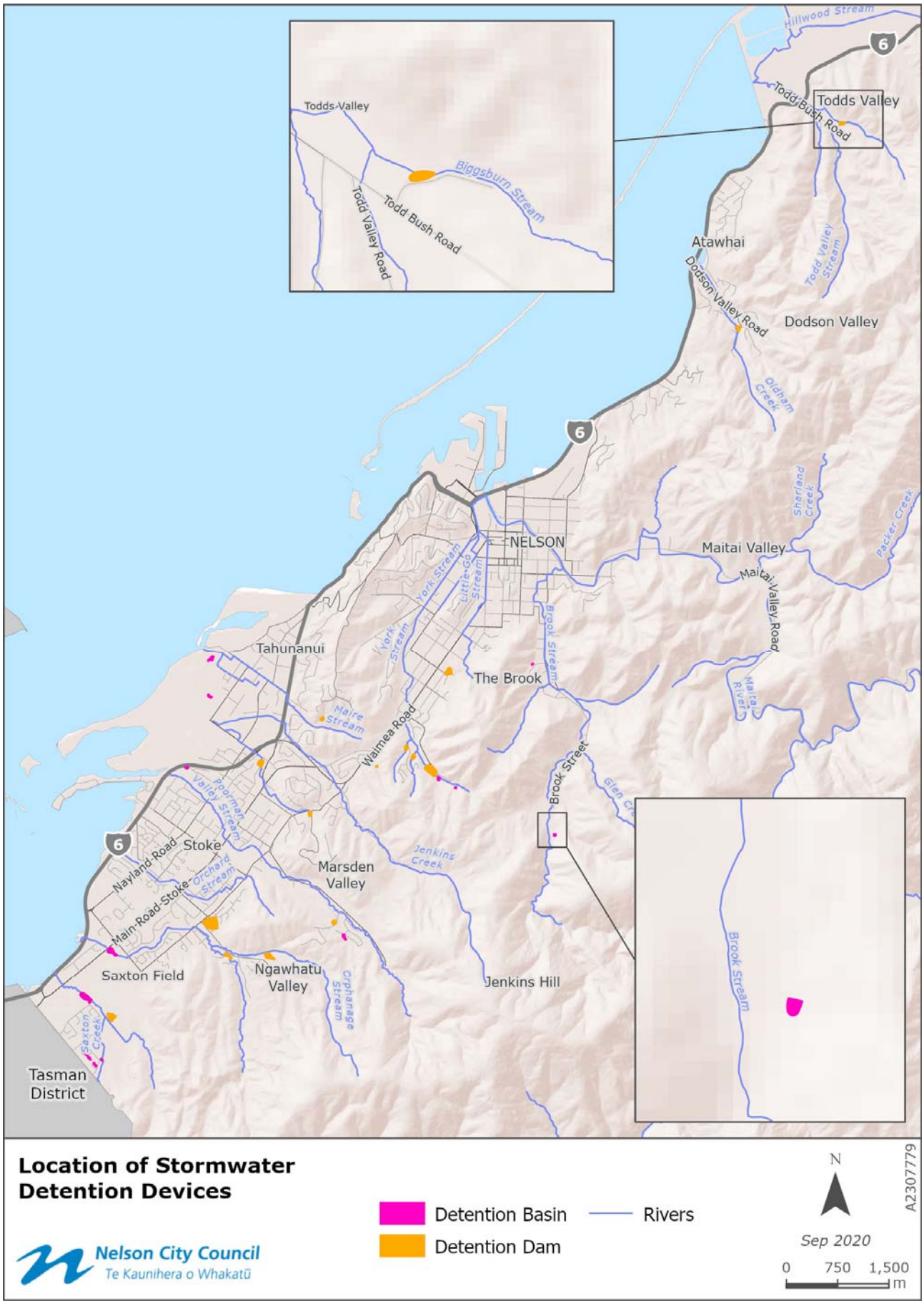
A number have a dual use as both neighbourhood parks/reserves and detention dams as follows:

- Springlea at Frenchay Drive
- Ngawhatu Valley- Playing field and area above Bridgewater Lane
- Saxton pond on Saxton Field
- Grampian Oaks at upper Motueka Street
- Todd Valley at Saddleback Road
- Bledisloe Reserve

Table 4-9: Stormwater Detention Dams and Ponds (Not yet Vested)

Location	Catchment
Bayview Subdivision (x1 Planned)	Oldham Creek
Princes Drive Station Reserve (New)	York Stream
Tasman Heights No.1	Maire Stream
Tasman Heights No.2	Maire Stream
Stag Ridge	Orphanage Stream
Sunningdale Drive (New)	Orphanage Stream
Solitaire Detention Dam (New)	Orphanage Stream
Marsden Valley Homestead Block (x2 New)	Poorman Valley Stream
3B Hill Street Subdivision Detention Pond	Saxton Creek

Figure 4-7: Location of Stormwater Detention Devices



Low Impact Devices (Stormwater Treatment)

Low impact devices (LID) include vegetated swales, rain gardens or roading design that promotes diversion of runoff into green spaces as opposed to a piped system. This promotes infiltration and treatment of stormwater prior to discharge to a watercourse. LID are typically roading assets, but the stormwater activity has an interest in promoting their use and effectiveness to improve stormwater quality. The condition, design and performance of existing LIDs will be reviewed in developing a Stormwater Quality Strategy within the first 3 years of this plan.

Table 4-10: Stormwater Low Impact Design Features (LID)

Location	Catchment	Description
Saddleback Road, Todds Valley	Todd Valley Stream	Mono-camber, no kerb or sumps. Runoff across esplanade reserve to stream and detention pond
26 – 38 Frenchay Drive, Atawhai, Nelson	Oldham Creek	Runoff from road drains into planted/landscaped open drain.
NMIT carpark 15 Alton Street, Nelson	Maitai River	Run off from carpark draining into planted gardens with Aquacell for soakage and storage
Harvey Norman 69 St Vincent Street, Toi, Nelson	York Stream	Run off from carpark draining into planted gardens (69 St Vincent Street) and Hynds sand filter (96 Vanguard Street)
52 Saxton Road West, Stoke (Placemakers)	Orphanage Stream	Run off from carparks draining into Gabion Baskets
743 – 783 Main Road Stoke, Stoke	Orphanage Stream	Runoff from road drains into planted swale drain
Sunningdale Drive, Stoke, Nelson	Orphanage Stream	Runoff from road drains into rain-garden outside numbers 8, 20 and 36. Also planted swale drain opposite to No 36.
Sanctuary Drive, Stoke, Nelson (Marsden Park)	Poorman Valley Stream	Runoff from road drains into planted/landscaped swale drains. Low speed design using tree pits.

Pump Stations

The Nelson City Council operates two stormwater pump stations; Centennial Road installed in 1999 and The Wood pump station installed in 2003. These large pump stations (Centennial $890k and Wood $2.05M) were installed due to excessive flooding in Tahunanui and The Wood areas respectively, especially during storm events that coincided with high tide. These two pump stations operate as follows:

- Centennial Road pump station discharges to Modellers Pond. It operates on average 6x / year.
- The Wood pump station operates on average twice a year. The rising main runs across Neale Park to an outfall in the Haven.

Proposed changes to the Tahunanui Modeller's Pond include filling in the pond, and diverting the discharge from Centennial Road to a vegetated swale with an outlet to the CMA. Installation of stormwater treatment devices is planned to improve the discharge quality.

Pump Station System and Power Failures

All pump stations are monitored by a Supervisory Control and Data Acquisition (SCADA) telemetry system. In the event of a system or power failure the system notifies on-call operators to take the necessary action. Back up mobile electricity generators are available to the pump stations for emergency power supply.

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.

Stormwater Channels on Private Properties

In the recent past little or no maintenance was carried out on these by Council as they have been considered to be the property owners' responsibility. In 2013 Council adopted a revised drainage ownership policy that recognised the likelihood that the Courts' would consider a number of these channels to be public drains.

Rivers and Streams

Rural Rivers

Currently, Council does not take stormwater 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 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.

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

The Nelson City Council presently takes responsibility for the rivers and streams within the city's urban area as set out below:

Table 4-11: 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 intake at South end of Devenish Place to SH6 Atawhai Drive outfall
Oldham Creek (North tributary)	From South end of Strathaven Place to Oldham Creek confluence
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 Ave to Saltwater Creek outfall
Saltwater Creek	From Briscoes covered channel at Vanguard Street to Maitai River confluence
Maire Stream	From 67 Douglas Rd to outfall at end of Parkers Road
Maire Stream Tributary	7 Beatty Street To Maire Stream confluence
Jenkins Creek	From 33 Enner Glynn Rd to South end of Trent Drive at Airport
Arapiki Stream	Panorama Drive detention dam to Jenkins Creek confluence
Poorman Valley Stream	From Vintners Way to SH6 Whakatu Drive outfall
Poorman Valley Stream Tributary	From end of Kingfisher Lane to Poorman Valley Stream
Orchard Stream	Songer Street intake to SH6 Whakatu Drive outfall
Orphanage Stream (North tributary)	From the end of Montebello Avenue detention dam to SH6 Whakatu Drive outfall.
Orphanage Stream (South tributary)	End of Sunningdale Drive to Orphanage Stream confluence
Saxton Creek	From Champion Road box culvert to SH6 Whakatu Drive outfall
Saxton Creek East	From Ara o Ngati Koata (upstream of Summerset) 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 any rain event and look at 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 focus has now moved to assessing what response may be appropriate based on risk. The first step is 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 and increasing the height of the banks. Early indications are that full containment of Q100 flood flows within the "banks" of a modified river channel would be at a very high economic, environmental and cultural cost.

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 but their resilience has yet to be tested in flood flow conditions. The results of the trial are expected to help identify possible environmental enhancement materials for the concrete sections.

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.

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 stormwater 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 must flow overland through the lower Bishopdale/Vanguard Street/St Vincent Street areas to Saltwater Creek.

Secondary Flow Paths

These allow stormwater overflows from watercourses, channels or the piped network to run along roads or private property until such time as they can return to a waterway. It is essential that secondary flowpaths be kept clear of obstructions to reduce the risk of flooding or ponding. Secondary flow paths were initially mapped using the 2015 LIDAR survey, and a second stage of this mapping process is in progress that will identify the extent of these flow paths, taking into consideration the capacity of the reticulation. This Plan includes a project budget line to complete a comprehensive identification of these across the city.

Managing Stream Floods

Computer models of the following streams and rivers were developed in 2016/17 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.

Further modelling is being progressed to update these models with HIRDSv4 storm rainfall that was published by NIWA in late 2018. In addition, catchment flood models will be completed for the Maire Stream and Saxton Creek.

These models have shown that large sections of the existing channels are not able to cope with greater than 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 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 stormwater Activity.

Current Position on Condition Assessment

Presently the following simple approach to condition assessment is being used: Whenever the maintenance contractor is working on pipe 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 pipe types, construction techniques, age, slope and geology to be developed.

Pipe samples will also be recovered, where unexpected failures occur, so that sophisticated condition assessment can be implemented and the data recorded on the Asset Management System.

Likewise channel repairs can be tracked through the INFOR database of work orders and a similar picture developed of higher risk areas.

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 4-12 below details an estimate of the condition of the reticulation.

Table 4-12: Condition of Components Estimates (as % of total)

	Very Good %	Good %	Moderate %	Poor %	Very Poor %	Total
Reticulation	10	40	30	10	10	244km
Intakes	10	40	20	20	10	121
Sumps	20	30	15	15	20	345
Culverts	10	20	40	10	20	2.9 km
Channels	5	30	20	20	25	1.8km
Manholes	20	20	20	20	20	4,924
Tide Gates		30	20	40	10	24
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
- Pipe 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 stormwater activity as indicated in Table 4-13 below.

Table 4-13: Confidence Rating in Attributes, Condition and Performance

Attribute	All Data Estimated	Significant Data Estimated	50% Estimated	Minor Inaccuracies	Accurate	Comment
Attributes						
Reticulation						
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.
Depth						
Material						
Install Date						
Location						
Pipe Length						
Pump Stations– all components						High level of knowledge known on both pump stations due to their recent installation.
Condition - Structural						
Reticulation						Limited inspections to date.
Intakes						
Sumps						
Culverts						
Manholes						Limited inspections to date.
Channels						
Tide Gates						
Pump Stations– all components						High level of knowledge known on both pump stations due to their recent installation.
Condition – Service (Performance)						
Reticulation						Limited inspections; New design standards.
Intakes						
Sumps						
Culverts						
Manholes						Limited inspections to date.
Channels						
Tide Gates						

Attribute	All Data Estimated	Significant Data Estimated	50% Estimated	Minor Inaccuracies	Accurate	Comment
Pump Stations– all components						High level of knowledge known on both pump stations due to their recent installation.

4.1.3. Asset valuations

The replacement costs of the stormwater and flood protection assets are $307.5m at June 2020 as detailed in Table 4-14 below. The majority of the replacement costs ($244M) are the reticulation mains.

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, (dams, Pump stations etc.) 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 4-14: Stormwater and Flood Protection Asset Valuation

Asset Category	June 2020			
	Quantity	Replacement Value (RV)	Depreciated Replacement Value (DRV)	Depreciation (Annual)
	km/units	($)	($)	($)
STORMWATER		**268,231,446**	**171,818,170**	**3,131,424**
Mains Up To 600mm	198.8	135,420,577	85,141,975	1,572,761
Mains > 600mm	45.5	87,385,834	55,186,024	972,268
Channels	1.8	1,038,157	428,941	12,003
Culverts	2.9	8,410,872	5,572,995	89,375
Rocks Rd Culvert	0.3	3,368,828	2,829,467	37,431
Intakes	121	751,295	536,677	9,313
Manholes	4,924	25,237,562	18,386,031	279,904
Outfalls	126	716,147	420,103	12,527
Sumps	345	903,320	640,879	10,001
Pump Stations	2	4,802,847	2,595,774	130,402
Tide Gates	24	196,007	79,304	5,439
FLOOD PROTECTION		**39,197,228**	**29,890,646**	**366,254**
Bank Protection	28.5	35,239,364	26,237,337	342,064
Detention Dams	20	3,957,864	3,653,309	24,190
TOTAL		**307,428,674**	**201,708,815**	**3,497,679**

The 2020 full replacement valuation of the stormwater and flood protection assets is:

Stormwater $268,231,000 and Flood Protection $39,197,000.

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 stormwater 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.

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:

Photo: Maire Stream intake

- 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 Stormwater system. Its objective is to avoid primary system failure
- Reactive Maintenance - Maintenance carried out in response to reported problems or system defects. 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.

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 stormwater 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.

Level of Service Implications

The stormwater 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 stormwater catchments expand, more runoff occurs due to intensification, and more stormwater is transported and pumped.

Risk Implications

Intakes, reticulation mains, 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 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.

Stormwater pumping stations have back up power and the facility at The Wood has standby pumps which will start up in the event of pump failure.

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 4-15: 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 dams – Quarterly Inspections • Stormwater Intakes (Schedules A, B and C) - Monthly or as required • Smaller Deep Traps – Annual inspections and clean out of gravel • Control gates and tidal flaps – Monthly Inspection • Non-return chambers – 6 Monthly Inspections • Stormwater pumping stations – Monthly Inspections • Stormwater pumping Backup Generators – Quarterly Inspections

Strategy	Objective/ Description
	• 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. Stormwater quality: The following mechanisms are being implemented: • Road sweeping (under transport activity management plan) • Sump cleaning: Council's road maintenance contract requires every Council owned sump and Transit New Zealand owned sump in the urban area be cleaned out annually. All sumps and associated pipework to be 95% clear of debris at all times. • Sump filters: These are being trialled in the CBD as a partnership project with the transport team. • Low Impact Devices: These are transport assets and include vegetated swales to promote infiltration and filtering of the Stormwater.
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 pumping stations 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 stormwater facilities. The Supervisory Control and Data Acquisition system provides surveillance of the operation of pumping stations in the stormwater system 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 stormwater are in the range $1.0M to $1.3M, and for flood protection in the range $300k to $750k per annum over the next 10 years.

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 is 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 pipes and equipment 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 pipes, intakes and detention dams.

Lifecycle Implications

Pipes and equipment 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 stormwater assets have been separated into "discrete" and "non-discrete" assets.

- "Discrete" assets are assets such as pumping stations, which are separately identifiable, accessible and which can readily be inspected.

- "Non-discrete" assets are assets such as buried pipelines 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 reticulation portion of the network – intakes, pipes, detention devices, outfalls, valves and associated chambers, pump stations and rising mains. River works are considered separately.

Table 4-16: 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 pipe/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. Pipelines 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, wastewater infiltration studies, 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 stormwater infrastructure. Low impact urban design is used where appropriate. Investment is made in new technologies to rehabilitate existing reticulation where appropriate, for example by re-lining a pipe, 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.

Under Stormwater a number of pipes and culverts have exceeded their expected base lives as shown in Figure 4-1. Many of these are brick lined (ceramic) culverts, with the balance primarily old concrete pipes.

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 stormwater pipe 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 stormwater upgrade strategies
- Implementation of new flood protection strategies
- Upgrade of stormwater network to service future development areas
- Upgrade of stormwater network to service intensification areas, including pipe capacity upgrades and / or stormwater detention.
- Investment in green infrastructure to achieve improvements in stormwater quality for priority sub-catchments.

- Creation of new hydraulic models for the stormwater network and stream/ river flood models
- Installation of monitoring instrumentation for stormwater flows and stormwater quality.

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 the stormwater strategies and flood protection strategies in the various areas of the city.

Demand Implications

The capital works proposed will address the need for increased network capacity and/or detention to reduce stormwater flows. Stormwater network extensions are also planned to service areas of urban growth. Failure to meet growth requirements will impact on levels of service.

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 stormwater and 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 stormwater and 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 4-17: 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) • Stormwater and Flood Protection Strategies, and • Customer service requests. A provisional forward capital works programme is maintained and updated at least annually.

Criteria	Objective / Description
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. Upgrade projects to accommodate growth may be partly or wholly funded through Development Contributions.
Prioritisation of Upgrade Projects	Upgrade projects are justified and prioritised using a risk based process undertaken for stormwater and flood protection strategies. 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 stormwater 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, water assets)
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 stormwater and flood protection systems. 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 4-18: Creation/Acquisition/Augmentation Strategies

Strategy	Objective / Description
Project Design	All asset upgrade works will be designed and constructed in accordance with NTLDM 2019 that promotes design solutions for the stormwater 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 stormwater management objectives with amenity, recreation, ecological and cultural values relating to stormwater disposal to freshwater and marine environments

Strategy	Objective / Description
	• 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. • 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 the stormwater system is predicted to be in the range $5.0M to $12.0M per annum over the 10 years, including level of service upgrades, renewals and growth projects. Level of service upgrades account for the elevated expenditure of over $9.0M per anum over the first 3 years. Major projects to be included within the first 3 years include: Haven Road, Washington Valley, Rutherford Street, Konini Street, Wastney Terrace, Centennial Park stormwater outfall and Tahunanui Hills stormwater upgrades. The slight spike above $8.0M per annum in years 2029/30 and 2030/31 relates to an increase in projected expenditure on growth projects and Level of Service upgrades

Capital expenditure on flood protection is above $11.0M per annum for the first 2 years and reduces after 2022/23 when the construction of the Saxton Creek Stage 4 upgrade is expected to be largely complete. This project is expected to receive co-financing of $7.5M through the Ministry of Business Innovation & Employment - Provincial Development Unit's COVID Response and Recovery Fund (CRRF). From 2023/24 – 2028/29 capital expenditure is forecast to be in the range $1.5M - $4.0M per annum but increases over the last 3 years of the 10 year plan to above $5.0M per annum due to 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 Stormwater or flood protection systems. In some situations there can be revenue resulting from asset disposal.

Table 4-19: 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 stormwater services. Redundant pipes are removed where their alignment clashes with replacement pipelines or backfilled where their existence is considered dangerous. This is to ensure collapse does not occur. Possible use of abandoned pipes 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.
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 stormwater pipelines 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 stormwater 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 stormwater and 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 stormwater and 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[11]. 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 and flood protection Activity 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)

2 = Minor (54% of Stormwater network)

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

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. 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:

- The 2 stormwater pumping stations (The Wood and Centennial Road)
- Stormwater rising mains to stormwater pumping station outfalls
- Detention Dams
- Large pipes and box culverts (culverts under roads may be transport assets)
- Stormwater reticulation that services critical assets
- All urban sections of rivers and streams

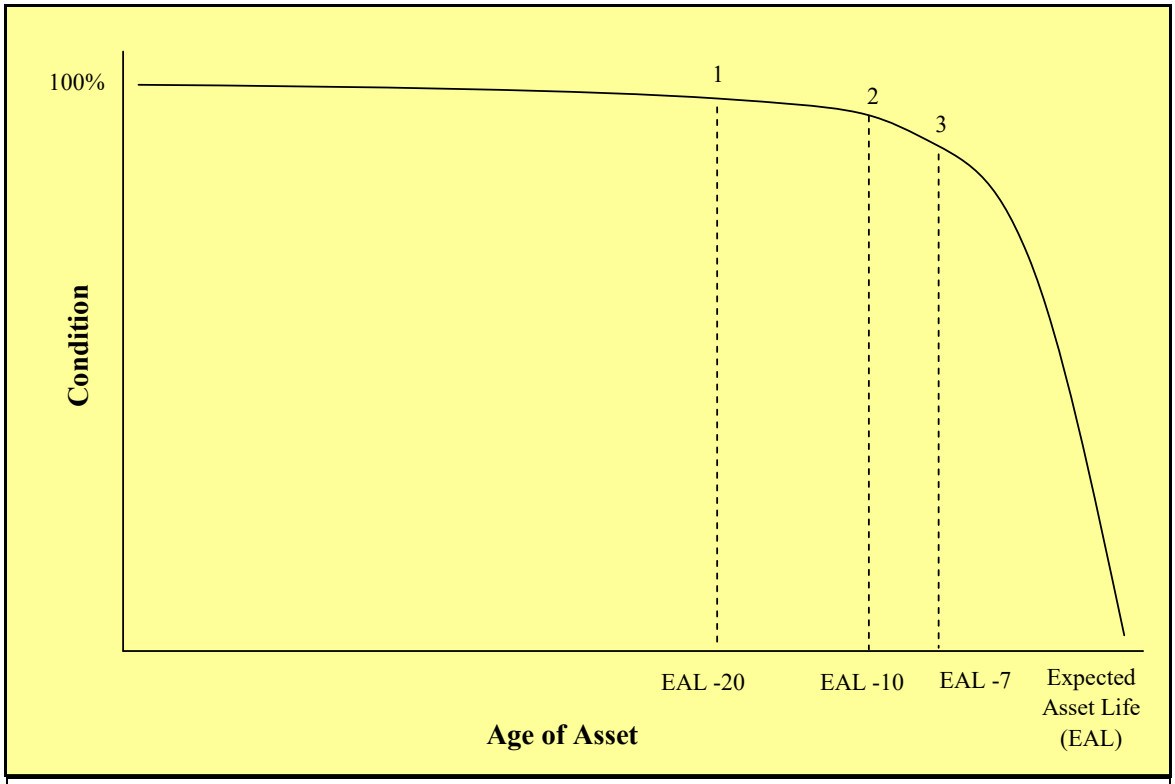
For risk management purposes, critical assets should be identified separately and assessed in greater detail as part of the activity management planning process.

By contrast non-critical assets are relatively quickly and easily repaired or replaced and their failure do 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.

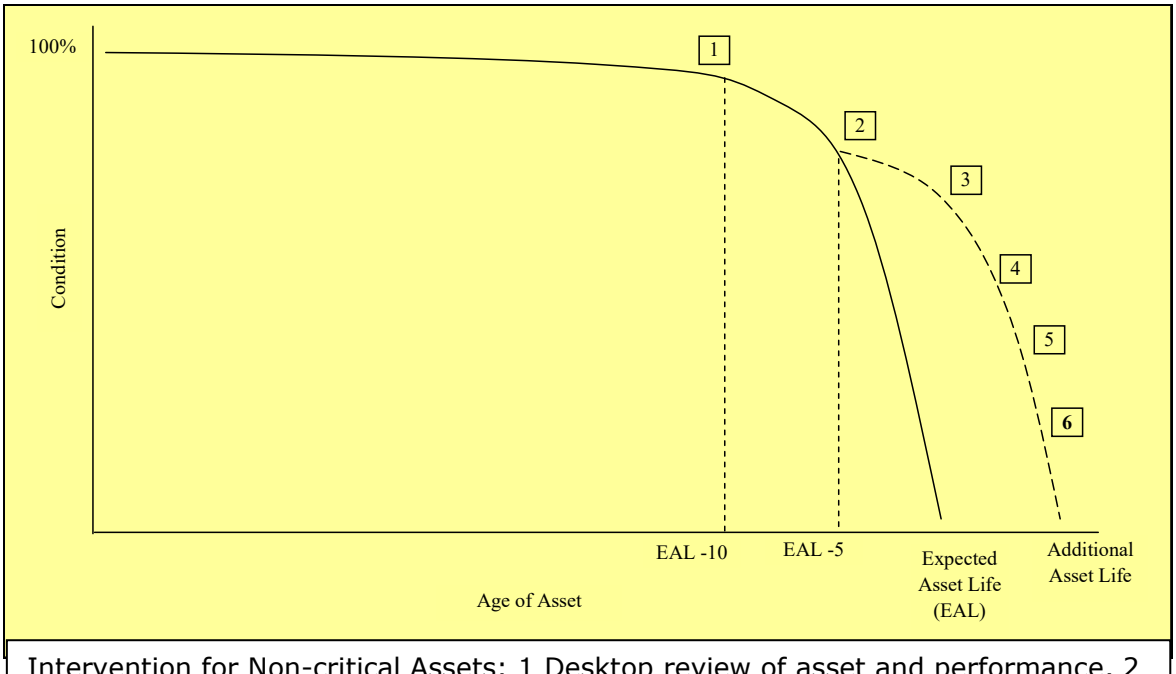
The following shows the nature and timing of interventions for both critical and non-critical assets.

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 Stormwater Strategies, 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) 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.

The stormwater and flood protection risks have no high or extreme risk levels. The stormwater and flood protection Risk Assessment can be found in Appendix Table M-1. It includes information about how the risks could be further treated (i.e. further controls implemented or choices made to reduce risk levels).

There are a number of medium level risks identified for this 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. 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 stormwater and flood protection assets such as detention dams, stormwater reticulation, flood gates and pumping stations. 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 stormwater and flood protection assets to earthquake risk. Refer to potential risk issue 2 below.

- **Stormwater discharges fail to meet water quality standards:** This relates to new attribute limits that may be set in the Whakamahere Whakatū Nelson Plan in order to meet target attributes for freshwater management units (Refer to Appendix N). The consequence may be revocation or variations made to the global stormwater discharge consent. Note this risk also applies to the Transport activity due to road drainage. Proposed risk treatment includes
  - Stormwater Quality Improvement Strategy
  - Capital investment in stormwater treatment infrastructure
  - Stormwater quality monitoring to establish baseline, detect trends and evaluate the impacts of interventions.

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: The level of service provided by existing stormwater and 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 the stormwater network from natural hazards.

Issue 3: Planned levels of service for stormwater and flood protection will not be met unless assets are maintained, renewed and upgraded

Issue 4: Management of increased stormwater flows associated with urban intensification and growth

Issue 5: Meeting new freshwater quality objectives and standards set under the Whakamahere Whakatū Nelson Plan, the National Policy Statement for Freshwater Management (NPS-FM), and the National Environmental Standard for Freshwater Management (NES-FM).

Issue 1: The level of service provided by existing stormwater and 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. Future upgrades of the stormwater network are based on ensuring the work is designed for demand and predicted climate conditions at 2090, which is close to the anticipated service life of new stormwater assets.

A challenge for central Nelson's stormwater system is low-lying areas of reclaimed land in the central city. As with other utilities, the stormwater activity is likely to be impacted by sea level rise because the outlet to the network is in many instances the sea or tidal margins and the reticulation is essentially gravity based, with pipes of varying depth, age and integrity. The lower lying areas of the city generally have level terrain, and the low grades require larger diameter pipes to achieve the same level of service. This is particularly the case where the outlet to the coast, or river, is submerged during high tide. Achieving the desired level of service for Stormwater reticulation in these areas will become more challenging if sea level projections eventuate.

In some parts of town, particularly around Wakatu Square, Tahaki Street, Vanguard Street, and eastern parts of The Wood, seawater flows back up the system during very high tides and causes low level flooding. An investigation is currently underway reviewing how this backflow can be prevented. Additional Pump stations may be required to manage future ground water levels associated with high tide. However the existing sites are mostly positioned on lower level ground with potential for direct tidal impact so the resilience of these sites will be assessed through the natural hazards resilience project and improvements identified.

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 Protection Strategies for priority catchments. The Maitai catchment is the first to be assessed and preliminary options for flood management have been developed for consultation in 2020/21.

Options for addressing the flooding risk to urban properties are being considered for three 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, which is consistent with the NTLDM 2019. 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 the stormwater network from natural hazards.

Council has initiated 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 are overlaid on asset attribute data (including asset criticality grades) to inform the risk assessment for these assets. This generates a shortlist of highly critical at risk assets (exposed to natural hazards), and will provide the basis for developing resilience improvement projects. Our intention is to review and update the risks set out in the risk register Appendix M following this assessment so that the information is all on a consistent basis.

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
- 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.

Particular natural hazards risks for stormwater assets include the near fault proximity of the network, possible impacts of liquefaction on existing and future infrastructure, impacts of flooding and the long term planning required as a result of climate change.

In February 2018 the remnants of two tropical cyclones hit the Nelson Tasman region. Both caused extensive damage. Ex-tropical cyclone Fehi on 1 February 2018 caused significant coastal damage due to a combination of a king tide, low barometric pressure and gale force northerly winds creating large waves. Within the city seawater damaged buildings on Rocks Road and back flowed through sumps in low lying areas. Significant surface flooding occurred particularly at the Wakatu Industrial Estate, Hathaway Terrace and Wakatu carpark. Council is currently identifying options that would reduce the risks of tidal inundation to areas of the CBD and The Wood.

The Christchurch Earthquakes of 2010 /2011 led to significant damage to that city's infrastructure including pump stations and the underground pipe network from direct shaking and liquefaction. Liquefaction was seen in Christchurch to be an extreme risk to the network through floating manholes and sand and silt infiltration into pipelines and manholes. Further work is proposed in this Plan to build on the hazard vulnerability studies carried out by Treasury in 2017 in response to the recent Canterbury and Kaikoura Earthquakes. This includes completing the natural hazards strategy to increase the resilience of the network to seismic events, as well as the effects of climate change.

Stormwater upgrades in the Tahunanui Hills are planned to be implemented under this Plan to reduce the risks of land subsidence within the area of the slump

Issue 3: Planned levels of service for stormwater and flood protection will not be met unless assets are maintained, renewed and upgraded

Council proposes to develop a stormwater renewal strategy to address the increasing level of anticipated renewals required 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 pipes and detention basins) and assets approaching end of design life.

Upgrades to the stormwater network are proposed to be prioritised through Stormwater Strategies developed for the following areas under this Plan:

- Stoke
- Central Nelson
- Tahunanui
- Port Hills
- Atawhai

The Stormwater Strategies will incorporate flood risk assessments based on Stormwater network and secondary flowpath modelling, as well as watercourse assessments to identify ecological and physical issues and constraints within the receiving environment.

As of mid-2020, the Stoke Stormwater Strategy has been largely completed, Stormwater network modelling for the Central Nelson Stormwater Strategy is well progressed, and network modelling for Tahunanui and Port Hills is due to be initiated imminently.

Issue 4: Management of increased stormwater flows associated with urban intensification and growth

Future Development Areas have been identified for Nelson under the Nelson Tasman Future Development Strategy. The focus areas for the first ten years is the City Centre and Victory although Washington Valley will also have additional capacity during this time to provide for intensification of development. Funds have been allocated within this Plan to upgrade stormwater servicing including:

- Upsizing pipes where additional capacity is required
- Providing additional stormwater detention capacity where appropriate to offset the expected increase in runoff due to intensification.

The Intensification Action Plan identifies that more integrated planning will be undertaken through neighbourhood plans for each of the intensification areas. This is expected to provide opportunities for improved stormwater quality outcomes, for instance through installation of vegetated swales along road corridors, and rain gardens or infiltration devices in existing reserve areas. These initiatives will require collaboration with the Transport and Park and Reserves Activities.

Issue 5: Meeting new freshwater quality objectives and standards set under the Whakamahere Whakatū Nelson Plan, the National Policy Statement for Freshwater Management (NPS-FM), and the upcoming 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 stormwater quality. Consequently it is possible that new stormwater discharges to freshwater environments will be made a discretionary activity under the new Nelson Plan. Funding is provided in this Plan to develop a Stormwater Quality Improvement Strategy and establish monitoring of stormwater quality within the network. 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 or mechanical failure and blockages)
- Failure to service growth and intensification areas prior to development, resulting in uncontrolled stormwater discharge.
- Risk of compromising amenity, recreation and ecological values, particularly in-stream values

- Stormwater discharge quality that prevents the achievement of freshwater quality targets and implications for stormwater discharge consents.
- Cost and uncertainty associated with interventions that seek to improve stormwater quality,

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
- 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[12]:

- 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.

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

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 stormwater and flood protection assets:

- Design of Stormwater 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 Stormwater network models and catchment flood models to identify network and channel capacity for both present day and future time bands. These models also identify the secondary flow paths which result from system under capacity.
- Development of Stormwater Strategies and Flood Protection Strategies 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 detention dams/pump stations and the piped network across the city, in particular in mapped liquefaction susceptible areas, fault corridors and within the Tahunanui Hills. The work will link with similar projects in the wastewater and water supply activities.
- Use of resilient materials in the Stormwater network, for example the installation of more flexible HDPE pipe in areas of land subsidence and across identified faults. The design of the Tahunanui Hills Stormwater upgrade incorporates HDPE pipe across slump block boundaries, reducing risk of damage to the network in the event of block movement, as well as facilitating repairs.
- Development of a GIS based collector application to better record identified issues with the stormwater and 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 3 Waters 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"[13]

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

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.

The Ministry for the Environment recommends the adoption of four 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 RCP 8.5 H+ scenario (which translates to 1.5m sea level by 2130);
- Adapt to hazards by conducting risk assessment using a range of scenarios and using the dynamic adaptive pathways approach for changes in land use and redevelopment;
- 1.0m for existing coastal development and asset planning; and
- 0.65m for non-habitable short-lived assets with functional need to be at the coast and either low-consequences or readily adaptable (including services).

Nelson City Council will follow this approach to factor future sea level rise into its technical assessments of climate change related coastal 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 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.

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.

Table 5-1: Stormwater Insurance Provisions

Components / Items	Marsh Top of the South collective				Aon Si collective
	Public Liability	Professional Indemnity	Buildings and Contents	General Insurance	
Reticulation					✓
Pump Stations					
- Electrical				✓	
- Mechanical				✓	
- Structural				✓	
Staff	✓	✓			
Council Vehicles				✓	
Private property damage related to stormwater 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. The $180m was deemed to be the mean 1 in 750 year ARI (annual return interval) loss estimate.

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"

Exercises are carried out approximately every six months to ensure staff are familiar with the procedures documented in the Nelson City Council Emergency Management Procedures Manual.

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 participated in the 2015/16 Nelson Tasman Engineering Lifelines Group project as a life line utility. And 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	Stormwater Status
Risk Reduction	Identifying hazards, describing risks, and taking actions to reduce the probability or consequences of potential events.	Asset Management Risk Register Stormwater Strategies Flood Protection Strategies
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.

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.

6. Financial summary

This Section sets out financial statements, funding strategy, depreciation forecast and charges for the Stormwater 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
  - Orphanage Stream Upgrade
  - Little Go Stream Upgrade (Rutherford Stage 1)
  - Mount St / Konini St Stormwater Upgrade
- New Projects
  - Maitai Flood Mitigation Project
  - Jenkins Creek Upgrade
  - Poormans Valley Stream Upgrade
  - Whakatu Drive Secondary Flowpath
  - Washington Valley Stormwater Upgrade
  - Main Road Stoke / Maitland Stormwater Upgrade
  - Tahunanui Hills Stormwater Upgrade
  - Brooklands Stormwater Upgrade
  - Wastney terrace Stormwater Upgrade
  - York Stream Upgrade

Table 6-1: Projected Capital Expenditure 2021 – 2031

Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Stormwater	**11,916,079**	**9,401,000**	**9,451,000**	**6,821,000**	**5,876,000**	**5,441,000**	**6,866,300**	**6,606,000**	**8,621,000**	**8,466,000**
Renewals	**160,000**	**270,000**	**350,000**	**195,000**	**1,625,000**	**1,630,000**	**710,300**	**210,000**	**510,000**	**200,000**
651073101485. Stormwater Renewals	30,000	40,000	60,000	60,000	80,000	80,000	80,000	80,000	80,000	80,000
651073202086. Stormwater Pump Station Renewals	80,000	50,000	100,000	20,000	-	-	450,000	80,000	380,000	70,000
651073902864. Tide Gate Renewals	-	-	30,000	-	-	-	30,300	-	-	-
651073121917. Haven/St Vincent Culvert renewal	50,000	150,000	120,000	70,000	1,500,000	1,500,000	100,000	-	-	-
651073901447. Stormwater Detention Dam Renewals	-	30,000	40,000	45,000	45,000	50,000	50,000	50,000	50,000	50,000
Capital Growth	**916,000**	**916,000**	**1,006,000**	**1,946,000**	**1,046,000**	**1,046,000**	**1,646,000**	**1,976,000**	**2,666,000**	**3,811,000**
651076102863. Network Capacity Confirmation for Growth Areas	-	-	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
651076102961. York Terrace	100,000	100,000	60,000	1,000,000	50,000	-	-	30,000	20,000	350,000
65107691. Vested Assets	816,000	816,000	816,000	816,000	816,000	816,000	816,000	816,000	816,000	816,000
651076103326. Intensification City Wide	-	-	-	-	-	50,000	150,000	150,000	1,000,000	1,115,000
651079103149. Atawhai SW Strategy Implementation	-	-	-	-	-	50,000	150,000	200,000	50,000	1,000,000
651076103322. Intensification AP N270 City Centre	-	-	100,000	100,000	150,000	100,000	500,000	750,000	750,000	500,000

Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Capital Increased LOS	**10,840,079**	**8,215,000**	**8,095,000**	**4,680,000**	**3,205,000**	**2,765,000**	**4,510,000**	**4,420,000**	**5,445,000**	**4,455,000**
651077803311. Stormwater Network Models	80,000	80,000	80,000	20,000	20,000	20,000	50,000	20,000	20,000	20,000
651079101041. Nayland-Honey Tye Way	40,000	-	-	-	-	-	-	-	-	-
651079101057. Capital: Poynters Cres	-	40,000	30,000	300,000	10,000	-	-	-	-	-
651079101071. Capital: Shelbourne St s/w upgrade	-	-	-	30,000	120,000	10,000	-	-	-	-
651079101173. Capital: Freshwater Improvement Programme	80,000	150,000	250,000	300,000	300,000	300,000	300,000	300,000	300,000	200,000
651079102054. Washington Valley Stormwater Upgrade	2,954,802	2,190,000	2,180,000	100,000	-	-	-	-	-	-
651079102061. Main Road Stoke / Arapiki - Maitland Stormwater Upgrade	25,000	25,000	100,000	200,000	200,000	200,000	1,700,000	3,080,000	2,800,000	800,000
651079102074. Capital: Milton: Grove-Cambria	-	-	-	60,000	100,000	70,000	700,000	50,000	800,000	-
651079102079. Capital: Mount St / Konini St	140,000	40,000	2,000,000	100,000	-	-	-	-	-	-
651079102095. Airlie St	970,000	50,000	-	-	-	-	-	-	-	-
651079102145. Bellevue Heights Stormwater	50,000	30,000	300,000	30,000	-	-	-	-	-	-
651079102777. Tahunanui Hills Stormwater Catchment 9 - Moana Ave to Rocks	50,000	100,000	100,000	50,000	1,500,000	1,500,000	1,000,000	100,000	-	-
651079102778. Tahunanui Hills Stormwater Catchment 4 - Bisley Ave	60,000	60,000	30,000	500,000	50,000	-	-	-	-	-
651079102817. Brooklands	30,000	50,000	30,000	1,500,000	100,000	-	-	-	-	-
651079102818. Cawthron Crescent	95,877	30,000	20,000	400,000	50,000	-	-	-	-	-
651079102822. Examiner	140,000	10,000	-	-	-	-	-	-	-	-
651079102833. Kowhai	-	-	-	-	-	-	-	30,000	10,000	500,000
651079102834. Mahoe/Orsman/Matipo	-	-	-	-	40,000	40,000	200,000	20,000	-	-
651079102850. Rutherford Stage 1 - Stormwater Upgrade	50,000	3,500,000	2,510,000	100,000	-	-	-	-	-	-
651079102851. Rutherford Stage 2 - Box Culvert	-	-	-	-	-	100,000	200,000	200,000	100,000	1,500,000

Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
651079102855. Tahunanui Hills Stormwater Catchment 3 - Days Track	40,000	950,000	50,000	-	-	-	-	-	-	-
651079102858. Totara/Hutcheson	-	60,000	30,000	450,000	40,000	-	-	-	-	-
651079102859. Trafalgar Square	-	-	-	20,000	100,000	-	-	-	-	-
651079102862. Natural Hazards Risk Remediation	-	-	-	-	-	-	-	50,000	200,000	100,000
651079102875. Ariesdale/Thompson Tce	40,000	40,000	-	-	-	-	-	-	-	-
651079102957. Orakei/Tamaki/Rangiora Intersection	-	-	-	-	50,000	20,000	200,000	20,000	-	-
651079102971. Beatson Road	-	-	30,000	60,000	20,000	350,000	30,000	-	-	-
651079103010. Toi Toi stormwater improvements	49,400	200,000	20,000	-	-	-	-	-	-	-
651079103083. Minor Stormwater Improvements Programme	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
651079103089. Strawbridge Sq Stormwater improvements	50,000	30,000	20,000	390,000	30,000	-	-	-	-	-
651079103461. Haven Road Fountain Place to Saltwater Creek	2,800,000	-	-	-	-	-	-	-	-	-
651079111059. Private Drains/Sub	-	50,000	-	50,000	-	50,000	-	50,000	-	50,000
651079111060. Pvt/Public Drains	65,000	40,000	65,000	40,000	65,000	40,000	65,000	40,000	65,000	40,000
651079111069. Tosswill to Tahuna Stormwater Upgrade	100,000	-	-	-	-	-	-	-	-	-
651079111106. Athol Street Storm water	60,000	-	-	-	-	-	-	-	-	-
651079111109. Ashdonleigh Grove Storm water	-	-	-	-	-	-	-	30,000	20,000	80,000
651079111111. Annesbrook Drive Storm Water	-	40,000	60,000	30,000	510,000	40,000	-	-	-	-
651079111114. Marsden Road storm water	-	-	-	-	-	-	20,000	40,000	-	-
651079111121. Railway Reserve (Bishopdale - St Vincent) stormwater improve	-	-	30,000	50,000	20,000	120,000	10,000	-	-	-
651079112473. Wastney Terrace stormwater (pvt drain prgm)	1,550,000	100,000	-	-	-	-	-	-	-	-
651079112815. Bisley Avenue	50,000	70,000	250,000	20,000	-	-	-	-	-	-
651079113143. Haven Rd open channel upgrade	-	-	-	-	-	25,000	25,000	25,000	350,000	20,000

Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
651079113145. Nikau Rd open channel upgrade	-	-	-	-	-	-	30,000	10,000	150,000	10,000
65107997. LoS: investigation, options, testing, engagement	-150,000	-150,000	-150,000	-150,000	-150,000	-150,000	-150,000	-150,000	-150,000	-150,000
651079103380. Vanguard Street LOS	40,000	300,000	30,000	-	-	-	-	-	50,000	100,000
651079102845. Port Hills SW Strategy Implementation	-	-	-	-	-	-	-	50,000	100,000	100,000
651079102854. Stoke SW Strategy Implementation	-	-	-	-	-	-	-	75,000	150,000	150,000
651079102852. Central Nelson SW Strategy Implementation	-	-	-	-	-	-	-	100,000	200,000	200,000
651079102856. Tahuna SW Strategy Implementation	-	-	-	-	-	-	100,000	250,000	250,000	705,000
651079201379. Centennial Park pump station outfall and stormwater Treatmen	1,350,000	100,000	-	-	-	-	-	-	-	-

Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Flood Protection	13,540,500	11,591,000	1,967,000	2,297,000	2,497,000	2,417,000	2,287,000	3,692,000	5,632,000	6,162,000
Renewals	-	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
652073113379. Channel Bank Renewal	-	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Capital Increased LOS	13,540,500	11,561,000	1,937,000	2,267,000	2,467,000	2,387,000	2,257,000	3,662,000	5,602,000	6,132,000
652079101100. Capital: York Stream Channel Upgrade	-	-	-	-	-	80,000	80,000	50,000	500,000	300,000
652079101178. Maitai flood management	200,000	250,000	350,000	750,000	1,000,000	1,000,000	1,000,000	1,000,000	1,500,000	2,000,000
652079102080. Capital: Arapiki Stream	-	-	-	-	-	-	30,000	70,000	30,000	600,000
652079111088. Capital: Todds Valley Stream upgrade	-	-	-	-	-	-	-	30,000	100,000	100,000
652079111387. Brook Stream fish passage	60,000	40,000	100,000	100,000	100,000	100,000	-	-	-	-
652079112625. Jenkins & Arapiki (airport) - Flood Protection	110,000	30,000	450,000	40,000	-	-	-	-	-	-
652079112690. Minor Flood improvement prgm	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
652079112721. Wakapuaka Flats Stormwater Network Upgrade	-	-	-	-	-	-	-	50,000	20,000	50,000
652079112867. Orchard Stream	-	-	-	-	-	-	-	30,000	100,000	150,000
652079112868. Jenkins Stream stormwater upgrade	-	-	-	50,000	90,000	140,000	100,000	750,000	750,000	500,000
652079112969. Poormans Stream	-	-	-	50,000	100,000	150,000	100,000	800,000	850,000	500,000
652079122866. Whakatu Drive (Storage World)	300,000	-	-	-	-	-	-	-	-	-
652079122964. Saxton Creek Stage4 Upgrade	12,268,500	10,444,000	-	-	-	-	-	-	-	-
652079123289. Orphanage Stream - bunding Saxton Road East	70,000	-	-	-	-	-	-	-	-	-
652079902052. Brook Stream Catchment Improvements	100,000	115,000	300,000	250,000	100,000	150,000	150,000	100,000	550,000	500,000
652079902103. Inventory of Urban Streams	115,000	75,000	150,000	100,000	30,000	30,000	30,000	30,000	200,000	30,000
652079902657. Flood Mitigation	80,000	150,000	150,000	80,000	80,000	150,000	80,000	65,000	65,000	65,000

652079902962. Secondary Flow Paths	-	-	-	50,000	100,000	80,000	-	-	-	-
65207997. LoS: investigation, options, testing, engagement	-103,000	-103,000	-103,000	-103,000	-103,000	-103,000	-103,000	-103,000	-103,000	- 103,000
652079103450. Coastal Response Strategy Implementation	-	100,000	100,000	300,000	500,000	500,000	500,000	500,000	800,000	1,000,000
652079113338. Maire Stream Upgrade Stage 2	-	50,000	80,000	60,000	400,000	40,000	-	-	-	-
652079902872. Upgrade Urban Streams	70,000	80,000	100,000	100,000	-	-	-	-	-	-
652079103447. Coastal Erosion Modelling	-	50,000	100,000	100,000	-	-	-	-	100,000	-
652079103444. Coastal Inundation Modelling	200,000	200,000	50,000	-	-	-	150,000	150,000	-	-
652079102073. Capital: Oldham Creek	-	-	-	-	-	30,000	100,000	100,000	100,000	400,000
652078102509. Trafalgar Park and Hathaway Tce	30,000	40,000	70,000	300,000	30,000	-	-	-	-	-

Table 6-2: Projected Operational Expenditure 2021 – 2031

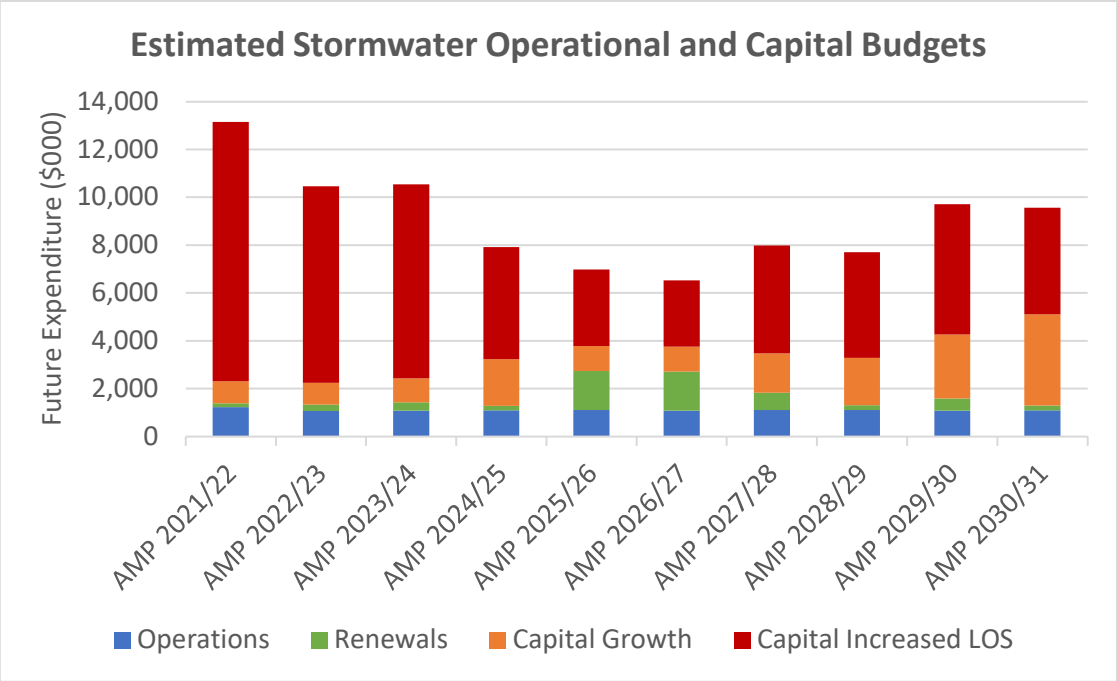
Group Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Stormwater	**1,231,095**	**1,062,055**	**1,081,095**	**1,092,755**	**1,108,525**	**1,083,235**	**1,114,065**	**1,101,825**	**1,082,705**	**1,097,535**
Base Expenditure	**363,095**	**360,055**	**394,095**	**418,655**	**377,305**	**384,875**	**378,535**	**386,115**	**379,785**	**387,385**
65102010. Stormwater Reticulation Programmed Maintenance	60,000	60,000	60,000	60,600	61,210	61,820	62,440	63,060	63,690	64,330
65102017. After Hours Duty Officer	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500
651020301128. Stormwater Monitoring Sites	15,000	20,000	25,000	25,000	30,000	30,000	30,000	30,000	30,000	30,000
651020310635. Building Act Compliance: Dams	22,000	22,000	23,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
651020310688. Freshwater Compliance	10,000	10,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
651020312318. Mtce: Environmnt Monitor Strms	25,000	25,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
65102617. Electricity	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
65102621. Rates	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,730
65102637. Insurance	167,230	167,230	167,230	167,230	167,230	167,230	167,230	167,230	167,230	167,230
65102670. Weather Forecasting	2,935	2,935	2,935	2,935	2,935	2,935	2,935	2,935	2,935	2,935
65102710. Legal Fees	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
65102720. Valuation Fees	3,200	10,160	3,200	10,160	3,200	10,160	3,200	10,160	3,200	10,160
651027302732. Stormwater Risk Management Plan	-	-	25,000	40,000	-	-	-	-	-	-
651027303364. Climate Change - Emissions Reduction Strategy	15,000	-	-	-	-	-	-	-	-	-

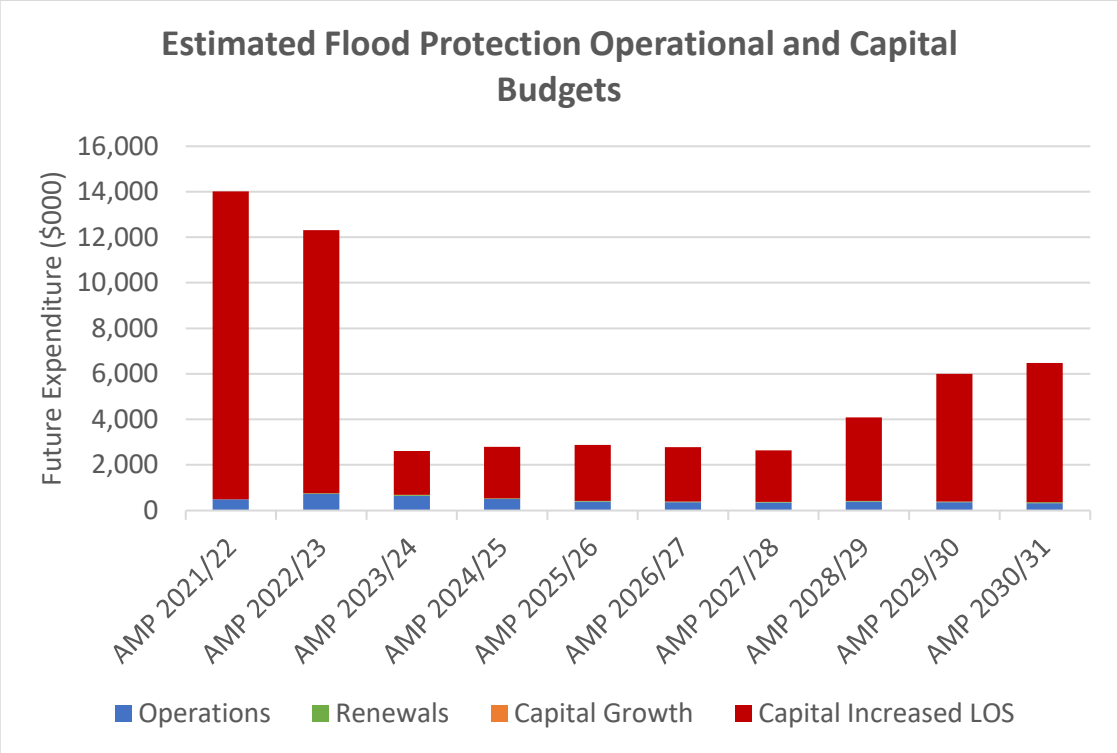
Group Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Unprogrammed Expenses	**210,000**	**210,000**	**210,000**	**212,100**	**214,220**	**216,360**	**218,530**	**220,710**	**222,920**	**225,150**
65103010. Stormwater Reticulation Reactive Maintenance	210,000	210,000	210,000	212,100	214,220	216,360	218,530	220,710	222,920	225,150
Programmed Expenses	**658,000**	**492,000**	**477,000**	**462,000**	**517,000**	**482,000**	**517,000**	**495,000**	**480,000**	**485,000**
65104010. Mtce: Wakapuaka Land Drainage	7,000	7,000	7,000	7,000	7,000	7,000	7,000	-	-	-
651040102090. Mtce & Assessment St Vincent/Hastings Culvert	5,000	5,000	5,000	5,000	5,000	5,000	5,000	-	-	-
65104032. Condition and Performance Assessments	40,000	20,000	25,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
651043102862. Natural Hazards Risk Assessment	-	-	-	30,000	40,000	40,000	30,000	-	-	-
65104372. Prelim Capex - investigation, options, testing	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
651047302808. Network Capacity Confirmation for Growth Areas	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
651047302845. Port Hills SW Strategy	-	-	20,000	70,000	40,000	-	-	-	-	-
651047302856. Tahuna SW Strategy	70,000	60,000	-	-	-	-	-	-	-	-
651047303149. Atawhai SW Strategy	-	-	-	-	50,000	50,000	70,000	-	-	-
651047308018. Fresh Water Quality Assessments	60,000	50,000	50,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
651047308019. Secondary Flow Paths Assessment	-	-	-	-	-	-	40,000	50,000	40,000	50,000
651047308151. Stormwater Quality Strategy	78,000	-	-	-	-	-	-	-	-	-
651047601593. Storm and flood protect asset mgmt support	-	20,000	20,000	-	20,000	20,000	-	20,000	20,000	-
651047302857. Stormwater Renewal Strategy	78,000	-	-	-	-	-	-	60,000	50,000	60,000
651047302852. Central Nelson SW Strategy	50,000	60,000	80,000	-	-	-	-	-	-	-
651040311444. Stormwater Detention Pond Maintenance	105,000	105,000	105,000	115,000	120,000	125,000	130,000	130,000	135,000	140,000

Group Account	2021/22 AMP (2021/31)	2022/23 AMP (2021/31)	2023/24 AMP (2021/31)	2024/25 AMP (2021/31)	2025/26 AMP (2021/31)	2026/27 AMP (2021/31)	2027/28 AMP (2021/31)	2028/29 AMP (2021/31)	2029/30 AMP (2021/31)	2030/31 AMP (2021/31)
Flood Protection	**478,978**	**718,978**	**643,978**	**490,478**	**381,988**	**353,527**	**345,065**	**386,624**	**358,212**	**319,801**
Base Expenditure	**79,278**	**79,278**	**79,278**	**79,828**	**80,378**	**80,948**	**81,508**	**82,078**	**82,668**	**83,248**
65202031. Flood Protection Open Channel Programmed Maintenance	55,000	55,000	55,000	55,550	56,100	56,670	57,230	57,800	58,390	58,970
65202621. Rates	180	180	180	180	180	180	180	180	180	180
65202637. Insurance	24,098	24,098	24,098	24,098	24,098	24,098	24,098	24,098	24,098	24,098
Unprogrammed Expenses	**95,000**	**95,000**	**95,000**	**95,950**	**96,910**	**97,879**	**98,857**	**99,846**	**100,844**	**101,853**
65203031. Open Channel Reactive Maintenance	95,000	95,000	95,000	95,950	96,910	97,879	98,857	99,846	100,844	101,853
Programmed Expenses	**304,700**	**544,700**	**469,700**	**314,700**	**204,700**	**174,700**	**164,700**	**204,700**	**174,700**	**134,700**
652043100800. River management Projects	11,700	11,700	11,700	11,700	11,700	11,700	11,700	11,700	11,700	11,700
65204372. Capex investigation, options, testing, engagement	103,000	103,000	103,000	103,000	103,000	103,000	103,000	103,000	103,000	103,000
652043723449. Coastal Response Strategy and Business Cases	50,000	150,000	150,000	150,000	-	-	-	-	-	-
65204032. Condition and Performance Assessments	10,000	10,000	15,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
652043723448. Coastal Response Feasibility Assessments	100,000	200,000	150,000	-	-	-	-	-	-	-
652040323445. Beach profile surveys	-	40,000	40,000	-	40,000	40,000	-	40,000	40,000	-
652040323446. Coastal structures condition Assessment	30,000	30,000	-	30,000	30,000	-	30,000	30,000	-	-

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

Figure 6-1: Stormwater and Flood Protection Budgets – Ten Years





6.1.1. Trends from the previous 4 years

Figures 6-2 and 6-3 outline expenditure over recent years. Vested assets are included.

Figure 6-2: Recent Expenditure on Stormwater

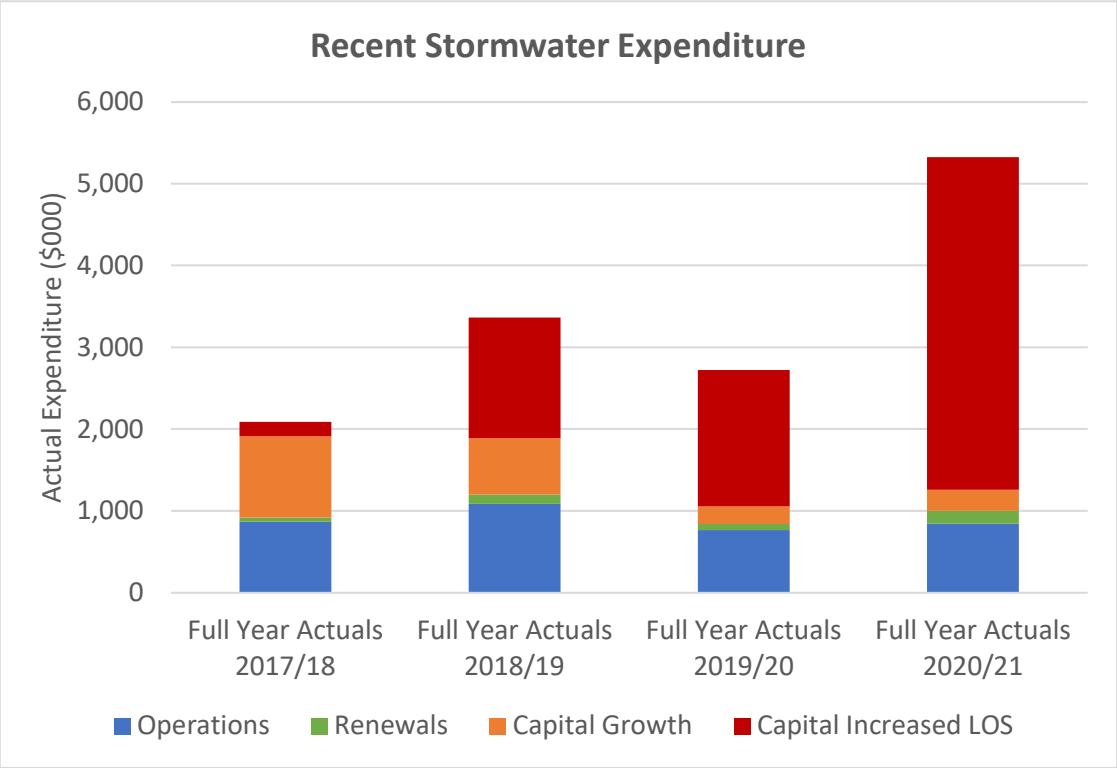
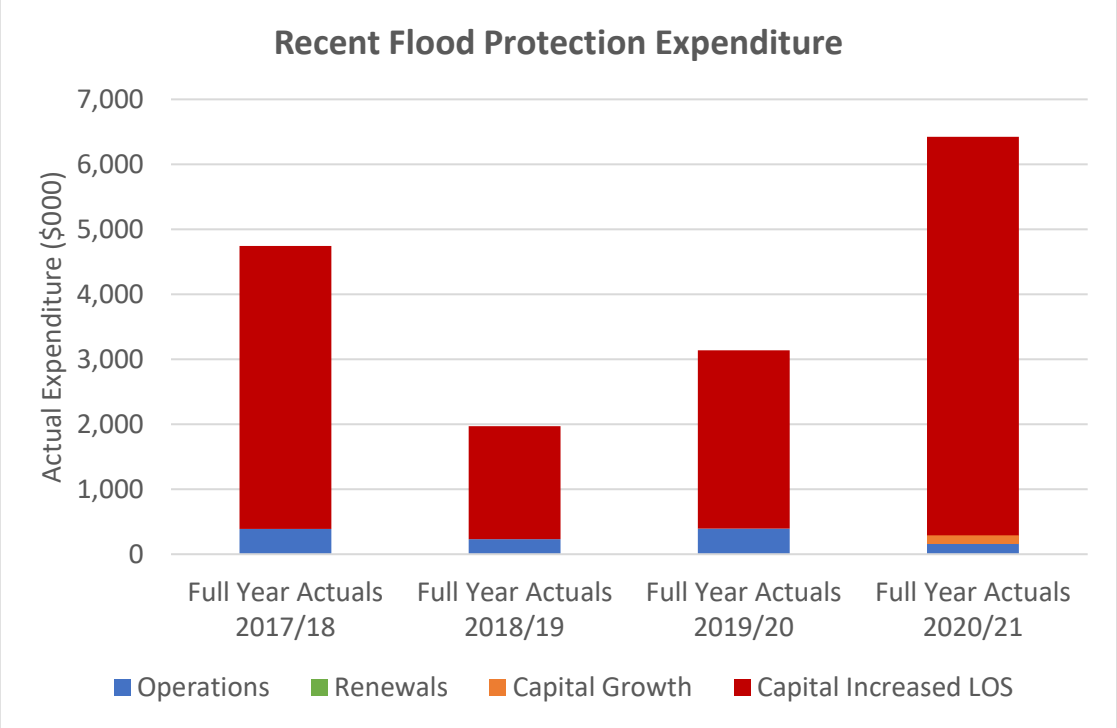


Figure 6-3: Recent Expenditure on Flood Protection



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 - STORMWATER

Distribution of Benefits

The community benefits anticipated from this activity are:

- Disposes of stormwater and keeps urban areas (roads, land amenities, shops etc) free from floods
- Contributes to public health and safety and maintains quality of life
- Enhances amenity and property values
- Individual benefits
- All landowners with stormwater runoff receive a private benefit

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

The benefits of funding Council's stormwater activity apply to all those who live in the areas where Council provides a stormwater system. Therefore Council uses a fixed rate as the most equitable form of funding this activity.

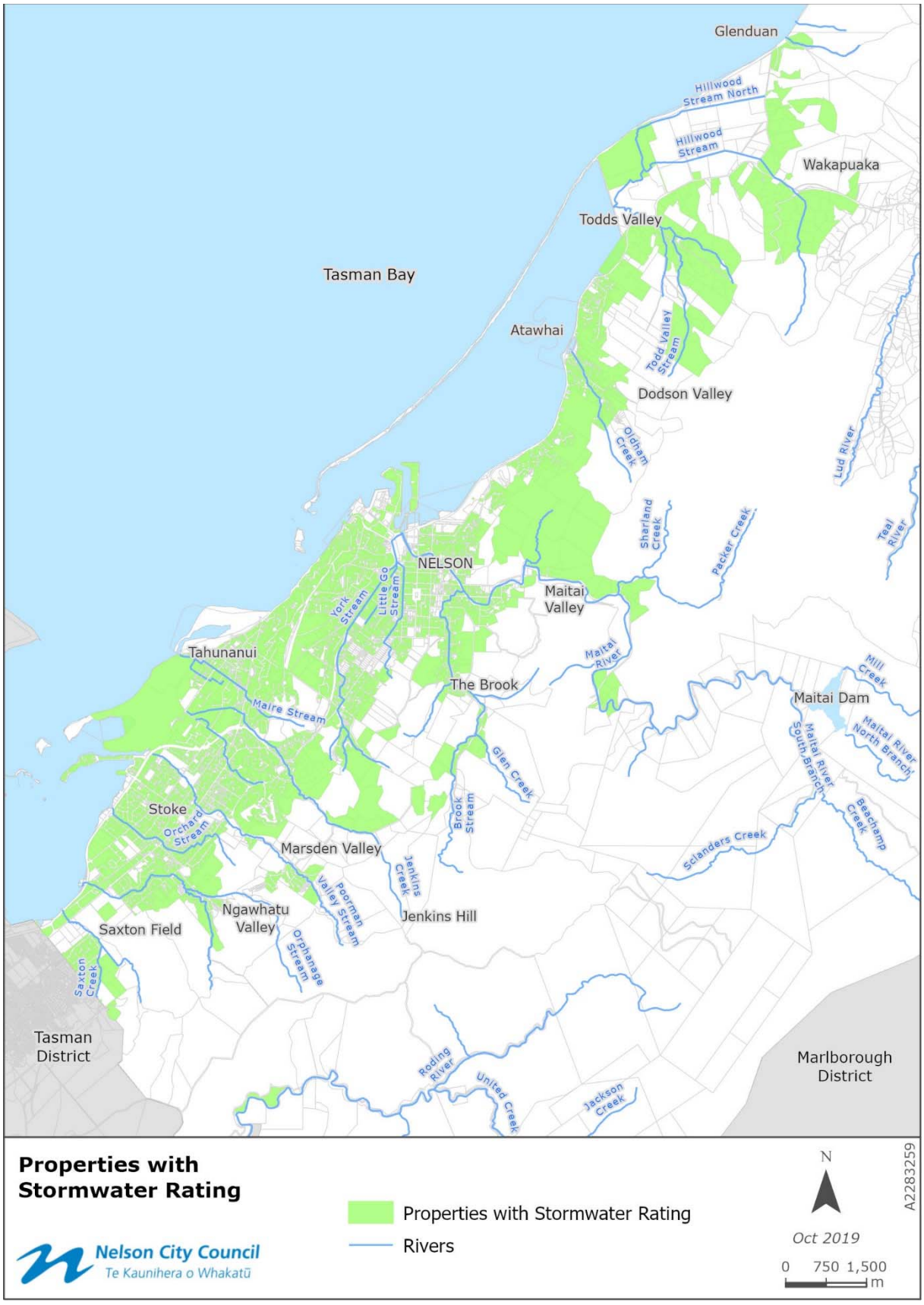
The stormwater rate is a separate fixed rate under section 16 of the Local Government (Rating) Act 2002 to recover the funding required by Council for Stormwater services. It is payable by all ratepayers other than properties in excess of 15 Ha throughout the city, and all properties east of Gentle Annie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

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

Creation/Acquisition/Augmentation

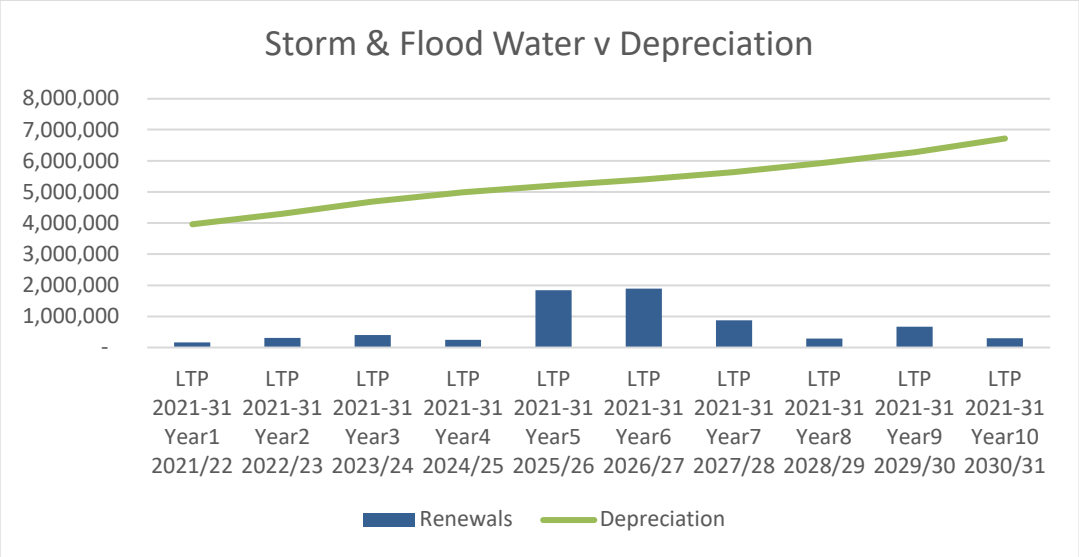
Nelson City Council will review funding requirements and strategies to achieve equitable funding of upgrade works through development contributions.

Figure 6-4: Properties where a fixed stormwater rate is levied



6.3. Valuation forecasts

Figure 6-5: Forecasts of depreciation compared with renewals



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

Historically, the estimated depreciation of stormwater assets, based on expected asset life, has exceeded the value of stormwater renewals. The reason for this is that where the renewal of a stormwater asset 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. Therefore the above figure needs to be compared with figure 6-1, which 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 stormwater and 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.

The most efficient, equitable, safe and cost-effective means of disposing of stormwater is a council-provided system for the Nelson urban area.

Stormwater reticulation will be designed for a Q15 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.

No new environmental legislation will be imposed during the next decade that would require a higher level of service for stormwater reticulation than Q15.

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

No significant effects on stormwater and 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. The general rules are as follows:

- Sumps in legal road are a roading asset.
- Connections from sumps in legal road to the stormwater system are a roading asset until they meet a pipe of diameter 250mm or greater which originates from outside the legal road.
- All manholes are stormwater 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 culverts are Stormwater assets.
- Culverts which run parallel to legal road and are generally stormwater assets. However there are a few exceptions such as the 160 metre box culvert on the Jenkins Creek adjacent to the SH6, which is an NZTA asset.
- Large culvert networks and waterways that follow the road 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 stormwater 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 are forecasted in the range of 2.94% – 3.19%.	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: 30% 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	Maintenance cost of service for Reticulation and Treatment will be within -5% and +10% of budget.	Low	Historically maintenance costs % variations for reticulation have been low.
7	Depreciation based on estimated useful lives not on condition of pipework.	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:

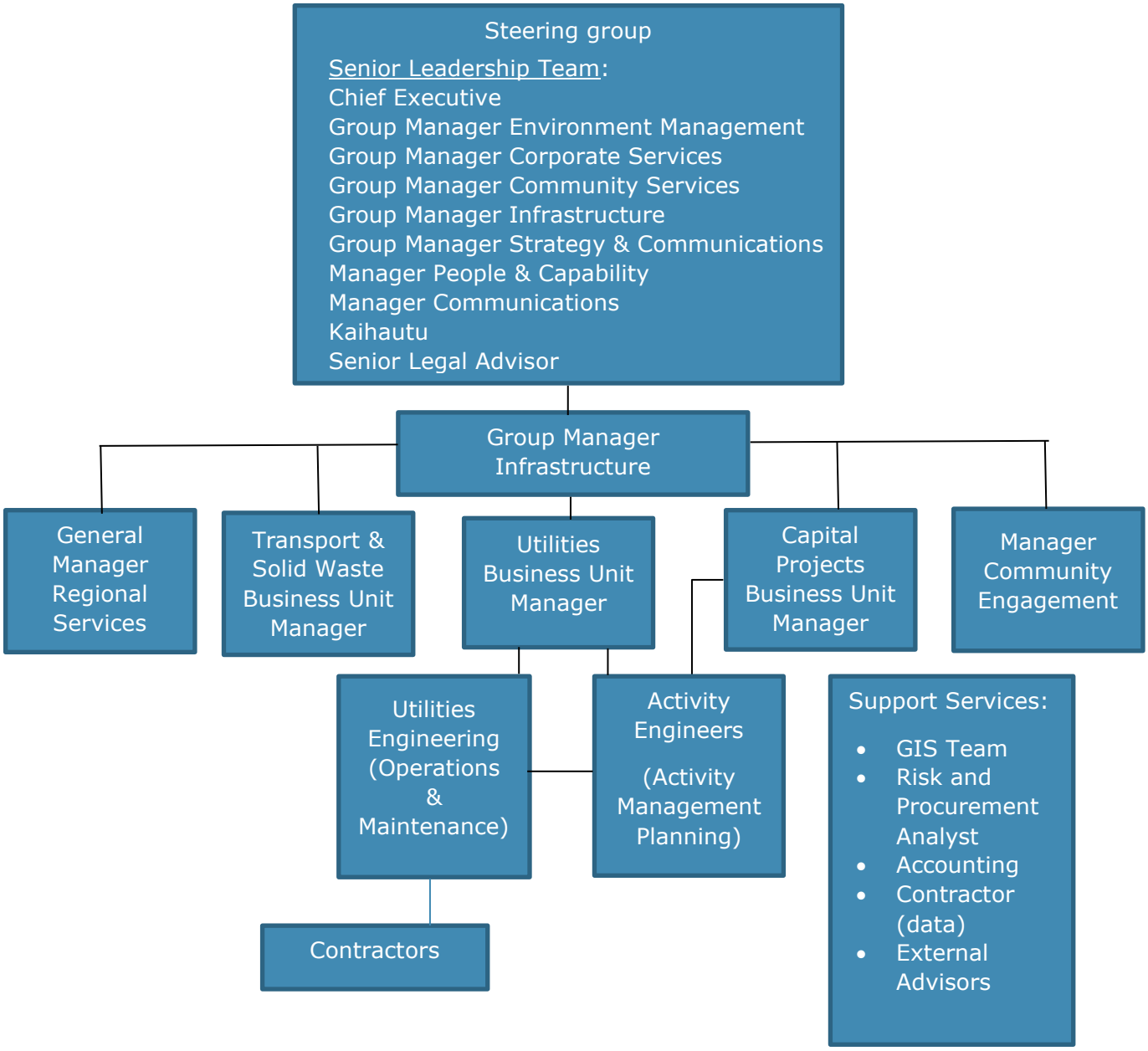
- Improved governance and accountability
- Enhanced service management and customer satisfaction
- Improved risk management
- Improved financial efficiency
- More sustainable decisions

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 a register maintained to record training history. 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 a Utilities Business Unit Manager post and new Activity Engineer positions for each of the 3 Waters.
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 stormwater service to the achievement of Community Outcomes is shown in Section 2 of this Plan.
Service Levels	A clear statement of the stormwater 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 stormwater 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 reticulation network and the catchment wide flood models for streams and rivers. 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	
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,

Strategy	Objective/ Description
	service standards, improved knowledge of assets, corporate strategy/ policy and process.
Risk Management	Risk Management is an essential part of Asset Management. A Risk Management Plan is a new requirement for Stormwater network operators and further detail on this is expected from Central Government in 2021. Stormwater activity risks will also be managed by implementing the Risk Register including risk controls for the Stormwater 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 stormwater and 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	Expenditure programmes for the Stormwater and Flood Protection activity indicates Council funding and budgets with a 10 year projection. 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 stormwater activity is managed in a financially sustainable manner over the long term. The financial requirements for the provision of the stormwater 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 stormwater activity Operation and maintenance of the stormwater system Asset replacement Asset development to ensure that the ability of the stormwater activity to deliver an acceptable level of service is not degraded by growth in Nelson City Council.

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

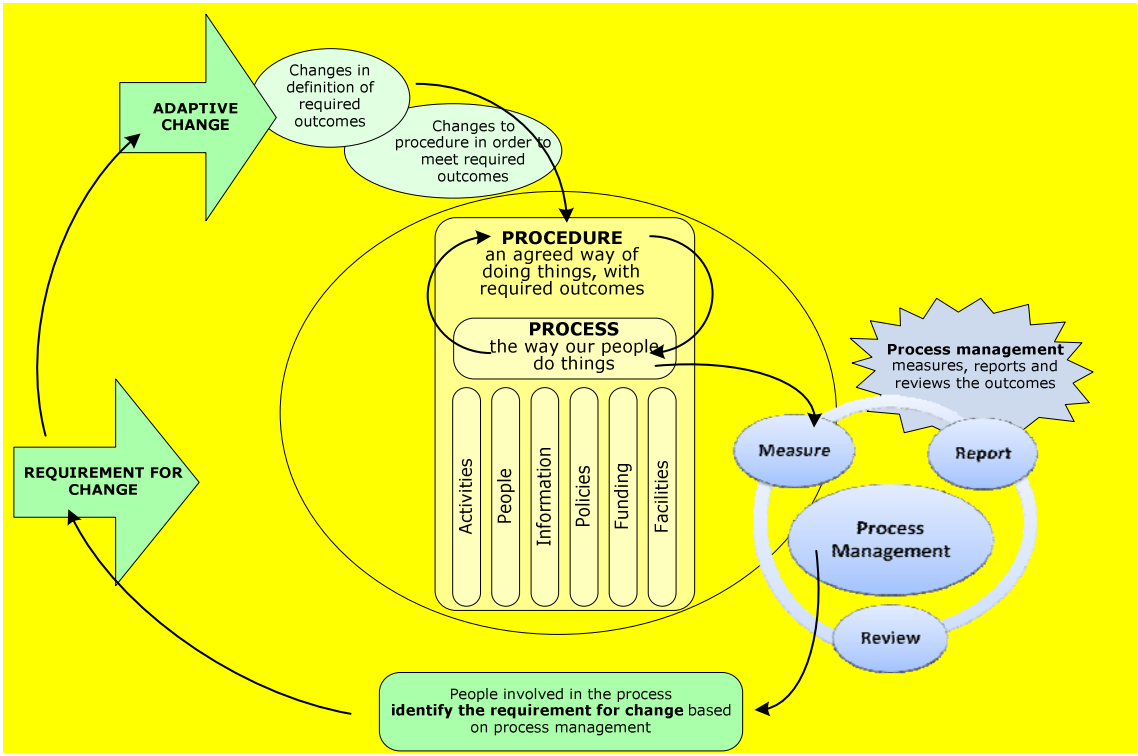


Table 7-2: Quality Management System

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**

1: Define the Process: Document the Procedure

- Defining all the activities required and undertaken to achieve the required outcomes
- 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.

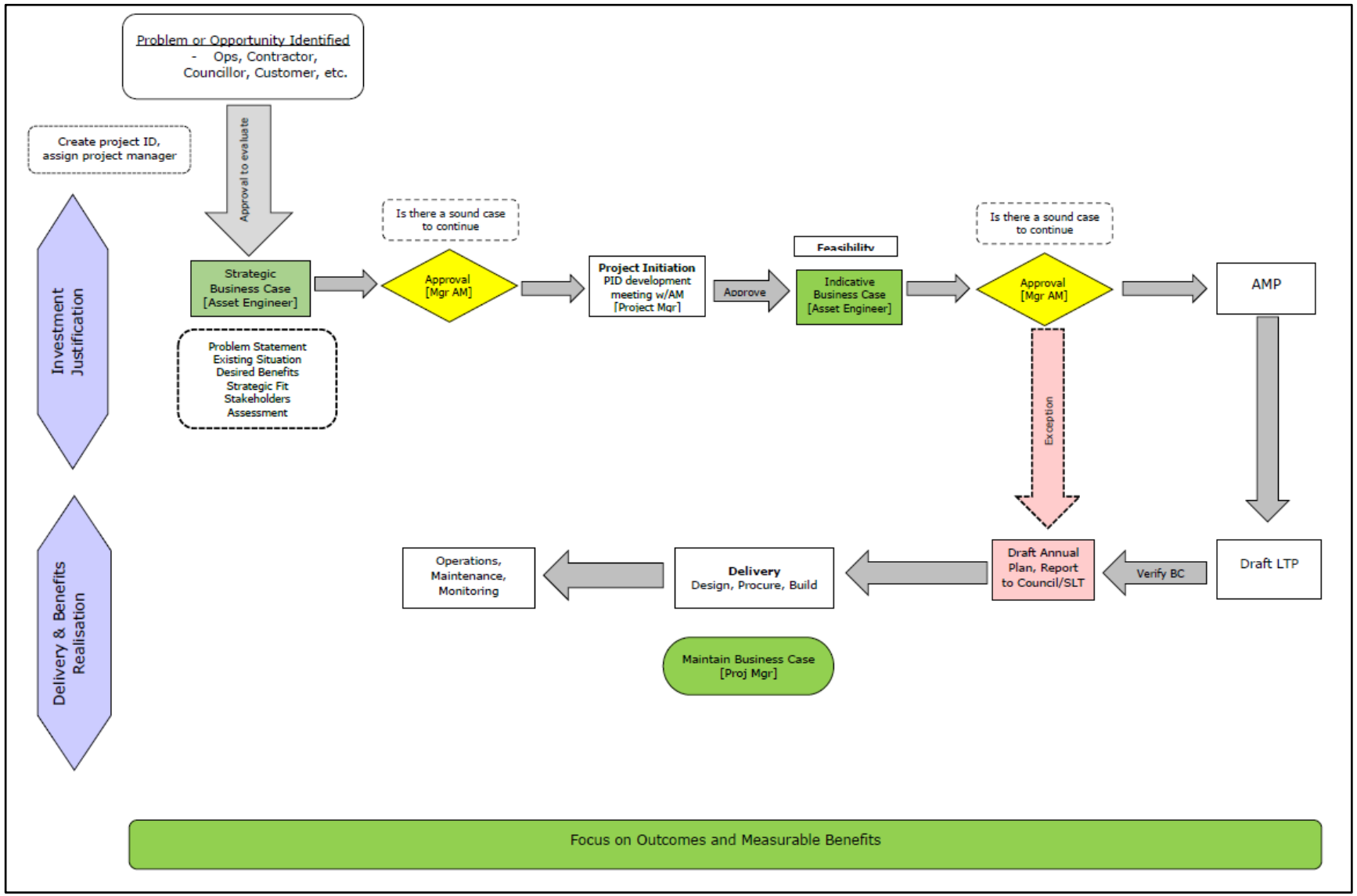
People involved with processes identify and initiate change:

- 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

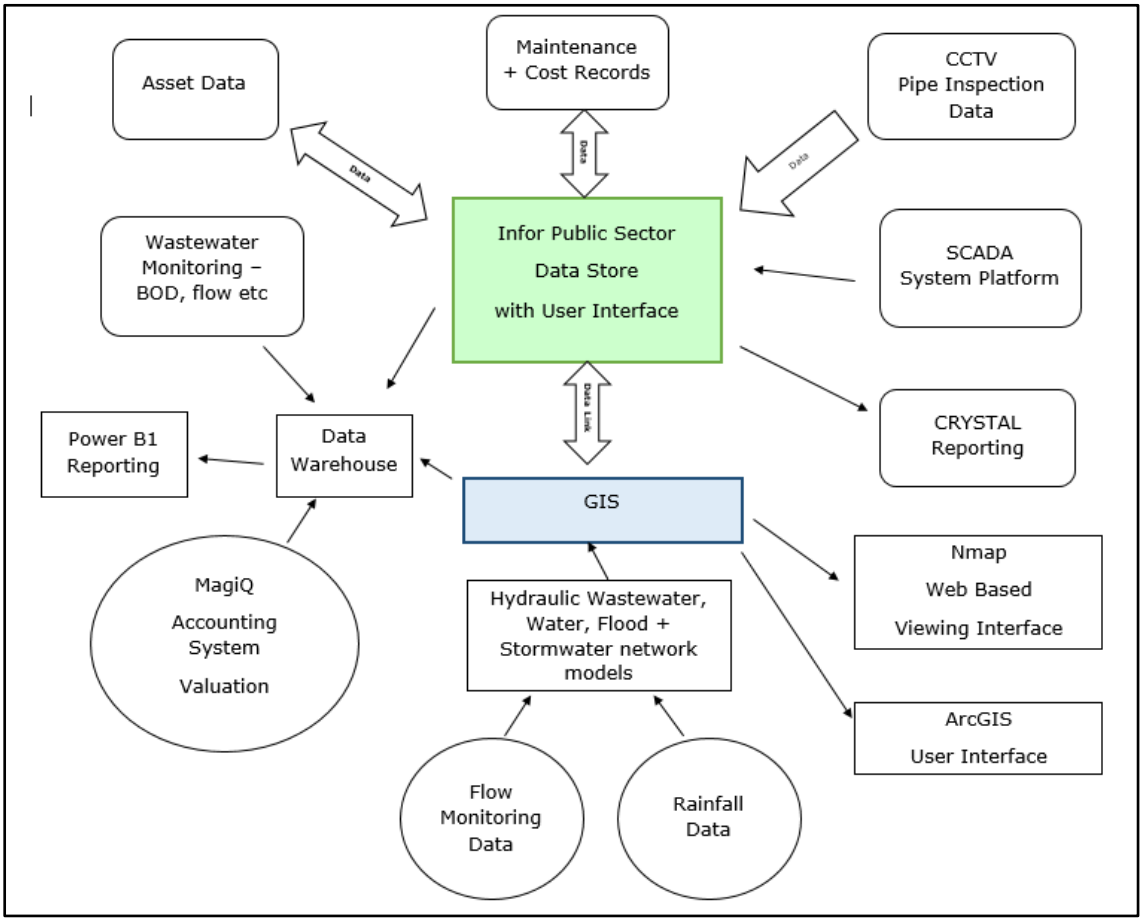
Asset Management Information Systems provide an understanding of assets to optimise lifecycle costs, identify required work, record completed work and cost of work. It benefits general management, long-term planning and data analysis.

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 stormwater and 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 delivered 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 stormwater 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.

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

Supervisory Control and Data Acquisition System

The Supervisory Control and Data Acquisition system (SCADA) provides surveillance of the operation of pumping stations in the stormwater system and provides alarms when equipment fails or when operating parameters are exceeded. SCADA also records operating data from the pumping stations.

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.

Council has a "Kingfisher" and "Intouch" system at the base station (rationalisation of system occurred in 2005). The system is used to monitor and control critical aspects of all Nelson City Council treatment plants and pump stations, 67 sites are presently monitored that include:

- Waste Water Treatment Plants
- Stormwater Pump Stations
- Wastewater Pump Stations
- Water Treatment Plants
- Water Pump Stations and Reservoirs

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 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.

Review and Future Upgrade

In 2016/17 an extensive upgrade of this package was completed.

Council's strategy for the ongoing use and development of SCADA is:

- Maintain SCADA at a high level to ensure system reliability and ongoing reporting ability.
- Increase availability of information to the in-house Business Units in a format that will enable increased efficiencies in operation and management.
- Develop the reporting functions of the system.
- Develop further use of the system to control plant and equipment.

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 stormwater and 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 2018 – 2028 Asset Management Plan (AMP) Gap Analysis and Appropriate Practice scores have been made for this Plan. Across the 16 IIMM competency descriptors, asset management maturity assessed for the 2018 – 2028 AMP was at a 'core' level for 8 descriptors, and at an 'intermediate' level for 8 descriptors. Whilst there are both downwards and upwards adjustments made to competency scores relative to 2018 – 2028 AMP, there is an overall improvement shown in Figure 8-1 for this Plan, with 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:

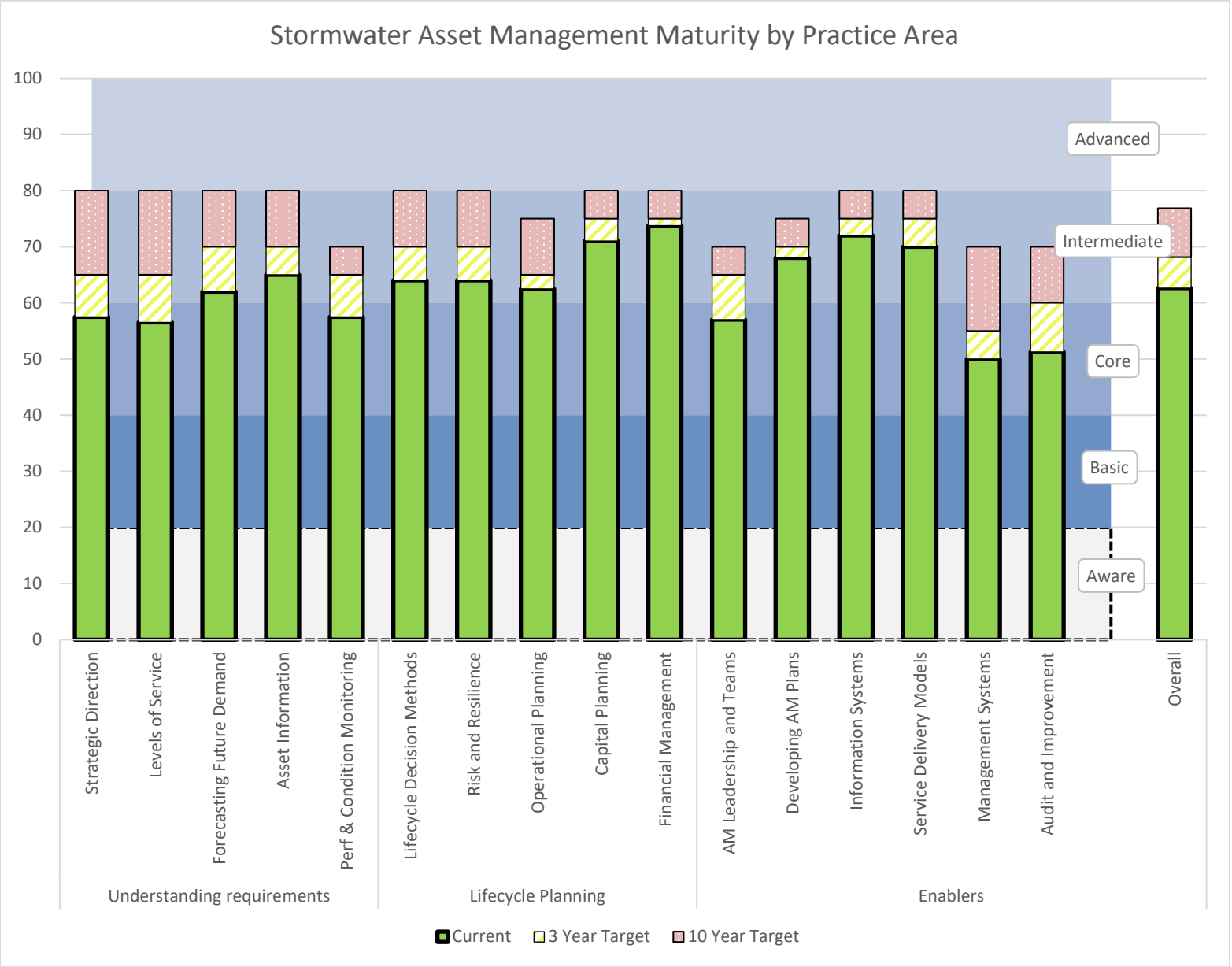
- **Understanding requirements**: This category includes 5 descriptors with 3 at core maturity and 2 at intermediate maturity level-. Maturity level for 'Forecasting Future Demand' has increased to 'intermediate' level due to strategic planning undertaken for the Nelson Tasman Future Development Strategy and the Intensification Action Plan, as well as the stormwater network modelling that is currently being undertaken which predict future network flows and flow paths. Demand management is also considered for all new developments in line with standards in the NTLDM 2019.

- **Lifecycle Planning:** This category includes 5 descriptors with all 5 assessed to be at the 'intermediate' maturity level. Maturity level for 'Lifecycle Decision Methods' was previously just below the threshold for intermediate maturity level and is now assessed to be above the threshold due to the following factors: Improvement in information available to support AM decisions due to network modelling and progress made on stormwater strategies, completion of project business cases to support the 2021 – 2031 AMP, incorporation of decision frameworks in the 2021 – 2031 AMP (Refer to Appendices E and F). In addition sensitivity analysis has been undertaken for the flood modelling which will be used as the basis of asset design.

- **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 2018 – 2028 AMP.

Target maturity for 3 year and 10 year periods has been updated. Target maturity of 80% (Threshold level between 'intermediate' and 'advanced' maturity) over the next ten years has been set for 10 of the descriptors, with lower target levels for the other 6 descriptors. This represents an increase in target levels relative to the 2018 – 2018 AMP which had a target level of 80% set for 8 of the descriptors, and lower target levels for the balance of descriptors.

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.

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 stormwater and flood protection activity	2	Activity Management	On-going
	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 & infiltration)	2	Activity Management	Staff cost
	Develop Risk Management Plans (Statutory Requirement)	2	Activity Management	Budgeted
	Complete computer flood modelling for streams and rivers	1	Activity Management	Budgeted
	Complete stormwater network modelling to inform Stormwater Strategies	2	Activity Management	Budgeted
	Complete Stormwater Strategies for the five urban areas: Stoke, Tahunanui, Central Nelson, Port Hills, Atawhai, taking into consideration future climate change.	2	Activity Management	Budgeted
	Complete a Stormwater Quality Improvement Strategy to enable freshwater quality targets in the Nelson Plan to be met.	2	Activity Management	Budgeted
	Complete a Stormwater renewal strategy to manage the bow wave of renewals expected from the 2050's onwards	3	Activity Management	Budgeted
	Review condition assessments and improve accessibility of this information	2	Operations	Staff cost

Area of AM Practice	Improvement Programme	Priority	Responsibility	Funding status
	Ongoing refinement of lifecycle decision making and financial forecasts, including review of asset life expectancy	2	Activity Management	Staff cost
	Include a more detailed strategy for critical assets such as open channels and streams and rivers taking into consideration future climate change (Flood Protection Strategies)	3	Activity Management	Budgeted
	Improve accuracy of data through review and modification of collection, storage, and auditing	3	Operations	Staff cost
	Develop drain ownership policy based on new NTLDM standards to guide operations and maintenance activities. Update GIS asset ownership to align with this policy.	2	Activity Management	Staff and consultant cost
	Expand focus on inter-relationship of network components and development of improved strategies for maintenance, renewals, and upgrades	3	Activity Management	Budgeted
	Investigate reporting processes and procedures from Infor and maintenance contractors to ensure that the appropriate levels of service and asset management reporting is available	2	Operations	Staff cost
	Investigate better reporting options regarding blockages to pipe network so that service requests identify whether a roading or stormwater issue	2	Operations	Staff cost
	Update customer service information collection processes to include specific information that relates to stormwater and flood protection levels of service, such as incidents resulting in flooding of habitable floors.	1	Activity Management	Staff cost (completed)
	Improve reporting on response times. The median time reported was previously based on 50% of requests	1	Operations	Staff cost (completed)
	Extend stormwater network into priority catchments for the Inflow & Infiltration Reduction Programme	2, 3	Activity Management	

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 stormwater and 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.

Council will report variations in the adopted annual plan budgets against the original activity management plan forecasts and explain the level of service implications of budget variations.

Internal Review

Internal reviews will be taken 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.

Examples of types of benchmarking that are to be considered include tracking progress, responsiveness to service calls, operation costs i.e. $/m/year and energy costs. Refer to Appendix H for 2018/19 benchmarking of stormwater performance criteria.

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
- Resource consent monitoring as required by consents
- Operations and Maintenance reports

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

9. 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 for a particular, or range of, business activities. Activities may include marketing,

Term	Definition
	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.
IMS	Hansen IMS software - Asset Management software product purchased as result of PAMS project.
InTouch	The brand of Graphical User Interface (GUI).

Term	Definition
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 (i.e. sewage disposal) 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.
NZPIM	New Zealand Gravity Pipe Inspection Manual - National manual for inspecting and scoring stormwater pipes. Published by Water New Zealand - Fourth Edition March 1999.
NZWWA	New Zealand Water and Wastes Association - National industry association formed for the advancement and application of fundamental and practical knowledge to natural water resources, water use and wastes.
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.
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.

Term	Definition
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.
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.
TKN	Total Kjehldahl Nitrogen. TKN is the combination of organically bound Nitrogen and Ammonia. The combination of the organic nitrogen and the inorganic nitrogen (NH_4 Ammonia, NO_3 Nitrate, NO_2 Nitrite) make up the total nitrogen.
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.

Term	Definition
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
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)
LTP	Long Term Plan
MCA	Multi-Criteria Analysis
NAMS	National Asset Management Steering Group
NPV	Net present value
NTLDM	Nelson Tasman Land Development Manual 2019
NZPIM	New Zealand Gravity Pipe Inspection Manual – 4th edition
P/S	Pump station
QA/QC	Quality Assurance and Quality Control
RCRRJ	Reinforced concrete rubber ring joint pipe
RMA	Resource Management Act
SCADA	Supervisory control and data acquisition
SS	Suspended solids
TA	Territorial Authority

APPENDIX B: BIBLIOGRAPHY

Appendix Table B-1: Bibliography – Stormwater and Flood Protection

Title	Date	Author
Stormwater and Flood Protection Asset Management Plan 2018 - 2028	2018	Nelson City Council
The Development of Business Process Mapping for Asset Management Systems	2000	Opus International Consultants Ltd
New Zealand Infrastructure Assets Grading Guidelines	1999	NZWWA
New Zealand Gravity Pipe Inspection Manual – 4th Edition	2019	Project Max Ltd and City care Water
High Intensity Rainfall Design System v4 (HIRDSv4)	2018	NIWA
The High Intensity Rain Fall Analysis for Nelson Urban Area	2008	NIWA
Nelson City Council Dams Inventory Summary Report	2010	Tonkin + Taylor
Network Capacity for Growth (Stormwater) Prepared for Nelson City Council	2016	MWH
Earthquake Loss Estimate Analysis for Infrastructure Assets	2017	AON and Tonkin + Taylor
Active Faults Database	2019	GNS
Review of slope instability and erosion risk assessment methodologies,	2019	Tonkin + Taylor
Coastal Inundation in Nelson City	2019	Tonkin + Taylor
Coastal Inundation in Nelson City – The Wood and CBD	2019	Tonkin + Taylor
'Coastal Erosion Hazard, First Pass Assessment	2018	Tonkin + Taylor
Nelson City Council Long Term Council Plan 2018-28	2018	NCC
2018 Valuation of Stormwater and Flood Protection Assets	2018	Nelson City Council
Whakatū Nelson freshwater sub-catchment summary of current state, values and issues requiring a Plan response	2018	The Catalyst Group
Reticulated Stormwater Quality Improvement Plan	2007	Nelson City Council

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	AQUA	AQUA CELL
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	INFT	INFILTRATION TRENCH
Type	LATL	LATERAL
Type	NAPP	NOT APPLICABLE
Type	POLY	POLYTHENE FORMED BOX
Type	POND	POND
Type	PSTN	PUMP STATION
Type	RETN	RETENTION
Type	RIDR	RIDER MAIN
Type	RSMN	RISING MAIN
Type	RVR	RIVER
Type	SLEV	SLEEVE AROUND PIPE
Type	SLOT	SLOTTED DRAIN
Type	STOR	STORAGE FACILITY (PIPEWORK)
Type	STPB	STOPBANK
Type	STRM	STREAM
Type	SUBS	SUBSOIL DRAINS
Type	SURC	SURCHARGED MAIN
Type	SWAL	SWALE
Type	TRMT	TREATMENT PLANT (PIPEWORK)
Type	UNKW	UNKNOWN
Material	ACBK	ASBESTOS CEMENT - BLACK
Material	ACMT	ASBESTOS CEMENT
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	HELA	HELCOIL – ALUMINIUM
Material	HELS	HELCOIL – STEEL
Material	MDPE	POLYETHYLENE - MEDIUM DENSITY
Material	NAPP	NOT APPLICABLE
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 stormwater services.

Appendix Table D-1: GAP Analysis and Appropriate Practice

Stormwater				Maturity Levels								w				
Reference	Question	IIMM Descriptors		Aware	Basic	Core	Intermediate	Advanced								
		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	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap
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.			57.5	65	80		
		Strategic context (internal / external) analysed and AM implications understood.								25%	55					
		AM Policy sets out AM expectations, objectives and accountabilities								25%	50					
		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.			56.5	65	80		
		Customer engagement to understand level of service requirements.								25%	45				Done through LTP & Annual Plan. Don't facilitate wide customer group discussions	
		Levels of service and performance measures defined								25%	71				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%	40				Not done for changes to L.O.S.	Analysis to be done once SW network models developed
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.			62	70	80		
		Historical demand / consumption of services recorded and trends analysed history recorded								20%	75					
		Demand factors identified and analysed								20%	70					
		Demand forecast models developed								20%	60				FDS / IAP process includes identification of areas	Better use of model
		Demand management strategies identified and impacts on future demand quantified								20%	55					Better use of model
		Risk associated with demand uncertainty understood, scenarios are developed and managed								20%	50					Better use of model
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.			65	70	80		
		Asset hierarchy defined and data requirements for each level of the hierarchy specified.								20%	60					
		Basic physical information captured against assets (age, material, type, etc)								20%	60					
		Spatial / location information recorded or links to GIS from asset register (if separate)								20%	70					
		Asset age / life / replacement cost recorded at asset level (information for valuation / renewals)								20%	65					
		Asset criticality data recorded at asset level								20%	70				T+T Asset Criticality Analysis Completed	
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.			57.5	65	70		
		Condition and performance monitoring programmes established								25%	60				Critcality defined, remaining life defined, budget allocated to condition and performance assessment.	
		Condition data captured in asset register								25%	50				System under development	
		Performance data captured in asset register (eg: service outages)								25%	55					Accessability and use. How much of the network can we isolate.
		Works costs recorded at asset level								25%	65					

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.			**64**	**70**	**80**		
		Good information available to support AM decisions.								20%	60				Development of SW network models and Decision matrix	Stormwater Renewal Strategy
		Options developed and analysed (including 'do nothing')								20%	65				In place for Capital investment only	
		Agreed frameworks / techniques applied to support decision making								20%	70				Business case format	
		Decision frameworks are aligned to straregic 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**	**80**		
		Risk policy / framework in place								20%	80				Corporate framework in place	
		Risks are identified and recorded in risk register.								20%	80					
		Risk actions are identified, monitored and reported.								20%	40					Risk Management Plan
		Strategy for management of critical assets in place								20%	55				Critical assets defined	
		Assessments of network resilience to major hazards								20%	65				1st Stage completed	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.			**62.5**	**65**	**75**		
		Operational programmes and processes are developed and optimised								25%	60				Reduced from 2018 AMP	Asset condition App to be developed
		Operational objectives and intervention criteria are defined								25%	65					
		Emergency response arrangements are in place and tested								25%	60				Reduced from 2018 AMP	Updating emergency management
		Operational performance is monitored and improvements identified								25%	65					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.			**71**	**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%	75				Business cases completed for 2021 AMP	Complete Business Cases beyond year 3
		Capital projects are prioritised within and between activities and work areas								25%	65				Decision matrix developed	Complete Stormwater Strategies
		Renewal forecasts are modelled based on age, condition, performance								25%	65				Reduced from 2018 AMP	
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.			**73.75**	**75**	**80**		
		Budget categorisation supports analysis of asset-specific financial requirements								25%	75					
		Long term financial forecasts are developed								25%	70					
		Assets are revalued in accordance with financial reporting standards								25%	80					Wider range of tendered rates
		Supporting assumptions and forecasting methodologies are documented and auditable.								25%	70					Wider range of reference material

Asset Management Enablers																	
IIMM 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			**57**	**65**	**70**		
		Leadership supports and actively advocates investment in AM.								20%	65				Resources allocated have increased	
		AM roles and role interfaces are defined.								20%	60					Improve job description and organisational structure
		Resources (internal and external) to support an effective 'AM System' are in place.								20%	60				Resources allocated have increased	Need extra contractor resources or capital projects engineer
		All staff understand AM and their role / contribution to the AM System.								20%	55					
		AM capability requirements are reviewed and provided								20%	45				No change from 2018 AMP	
IIMM 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.			**68**	**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. Reduced from 2018 AMP.	Improve use of AMP content to be more user friendly and appropriate
		AMPs are integration with other business processes / plans								20%	55					Requires better integration of AMP development process
		AMPs are communicated to / approved by Council / Executive/ key stakeholders								20%	90					
IIMM 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.			**50**	**55**	**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%	50				Business cases/PIDs/Data Analysis/Computer models	
		Processes are subject to review, audit and continual improvement								25%	45					Requires audit process
		AM System is aligned / certified to ISO 55001								25%	45					
IIMM 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			**72**	**75**	**80**		
		IS records asset data within a hierarchy								20%	80				No change from 2018 AMP	
		IS enables tracking of service requests and scheduling of planned maintenance								20%	80				No change from 2018 AMP	
		IS suports AM analysis (performance evaluation, valuation / renewal forecasting)								20%	70				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
IIMM 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.			**70**	**75**	**80**		
		Service delivery roles / functions defined (O&M, capital project delivery, etc)								25%	70					Documenting
		Functions allocated to roles / teams / contracts								25%	70					Documenting
		Service delivery options are evaluated and a strategy for outsourcing is in place								25%	70				Nelmac contract	Documenting
		Contracts / SLAs are in place for outsourced / in house service delivery								25%	70					Documenting
IIMM 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.			**51.25**	**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%	55					Document it
		Project scope / brief developed for major improvement tasks.								25%	45					Strategies to be completed
		Progress against the AM improvement programme is regularly monitored and reported to management								25%	50					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 stormwater 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 - Fish passage - Maintain or improve freshwater quality - Reduction of siltation - Reduction of Inflow and infiltration causing wastewater overflows.	15%	To ensure that stormwater upgrades do not negatively affect the ecological value of the open channel sections e.g. consideration to fish passage if required. Stormwater quality is maintained or improved so that receiving environment water quality targets are met. Provision of new stormwater connections could reduce inflow and/or infiltration issues, and thereby reduce the risk of wastewater overflows.	
Improved access for maintenance of the stormwater network	10%	To ensure sufficient easements are in place to protect council assets located within private property. To relocate stormwater systems 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					

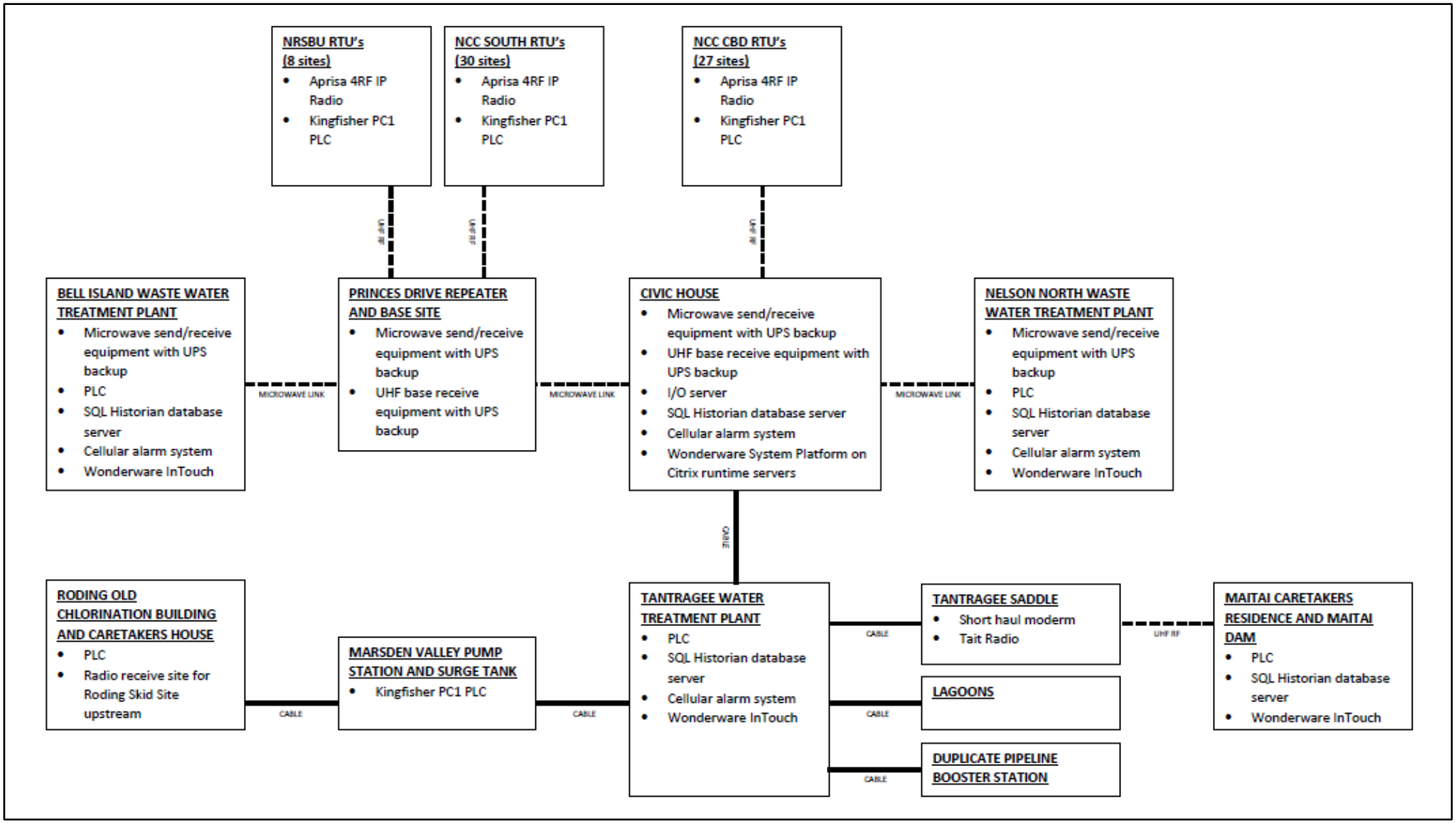
APPENDIX F: DECISION CRITERIA (Renewals)

Appendix Table F-1: Decision Criteria (Renewal)

Indicator or Attribute	Definition	Weight
Public stormwater asset	Does the section meet the criteria for a public stormwater 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 stormwater 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 stormwater 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

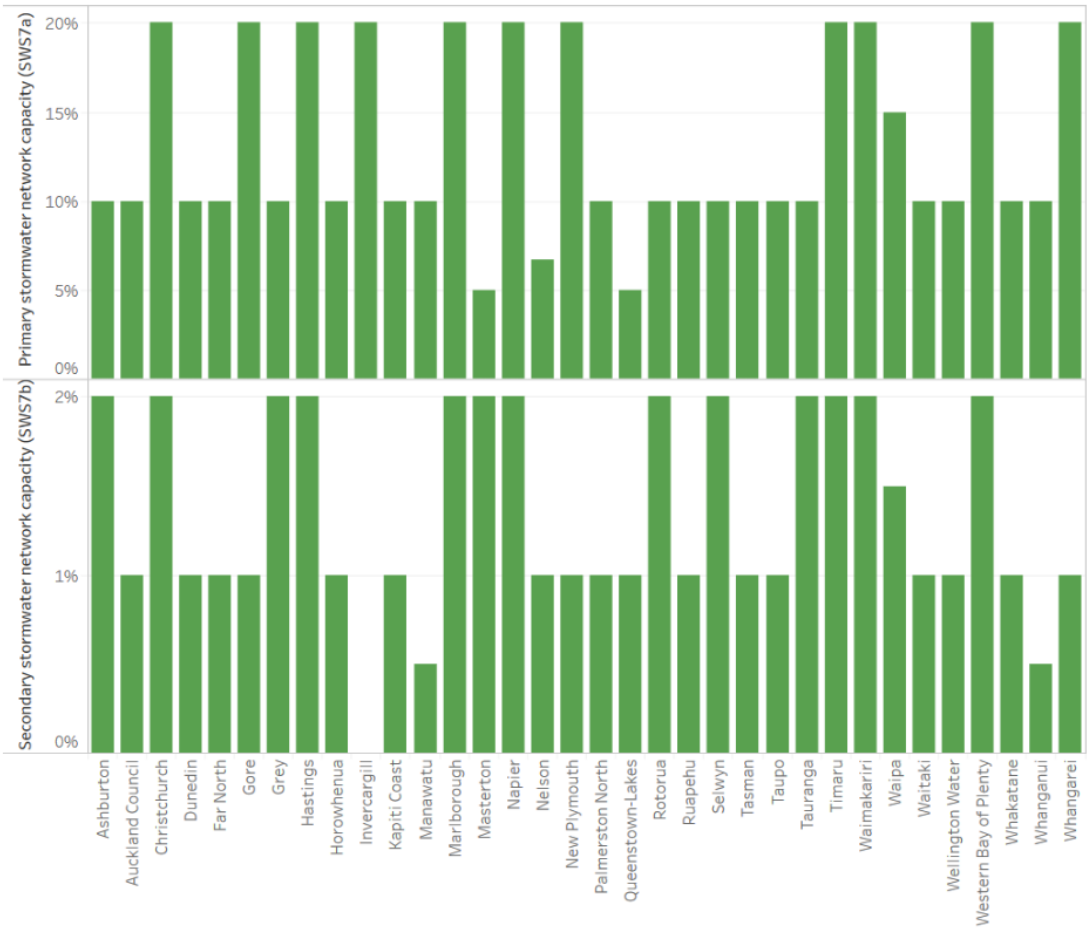
Appendix Figure G-1: Supervisory Control and Data Acquisition (SCADA)



APPENDIX H: WATER NZ BENCH MARKING 2018 - 2019

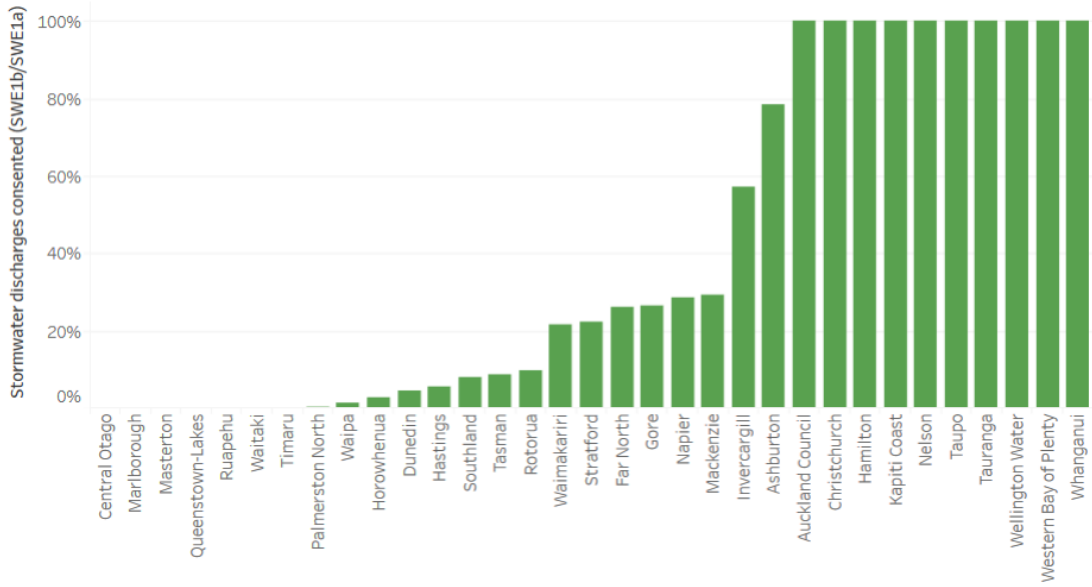
Appendix Figure H-1: Level of Service for Primary and Secondary Systems

The annual exceedance probability targeted during the design of the primary and secondary stormwater network

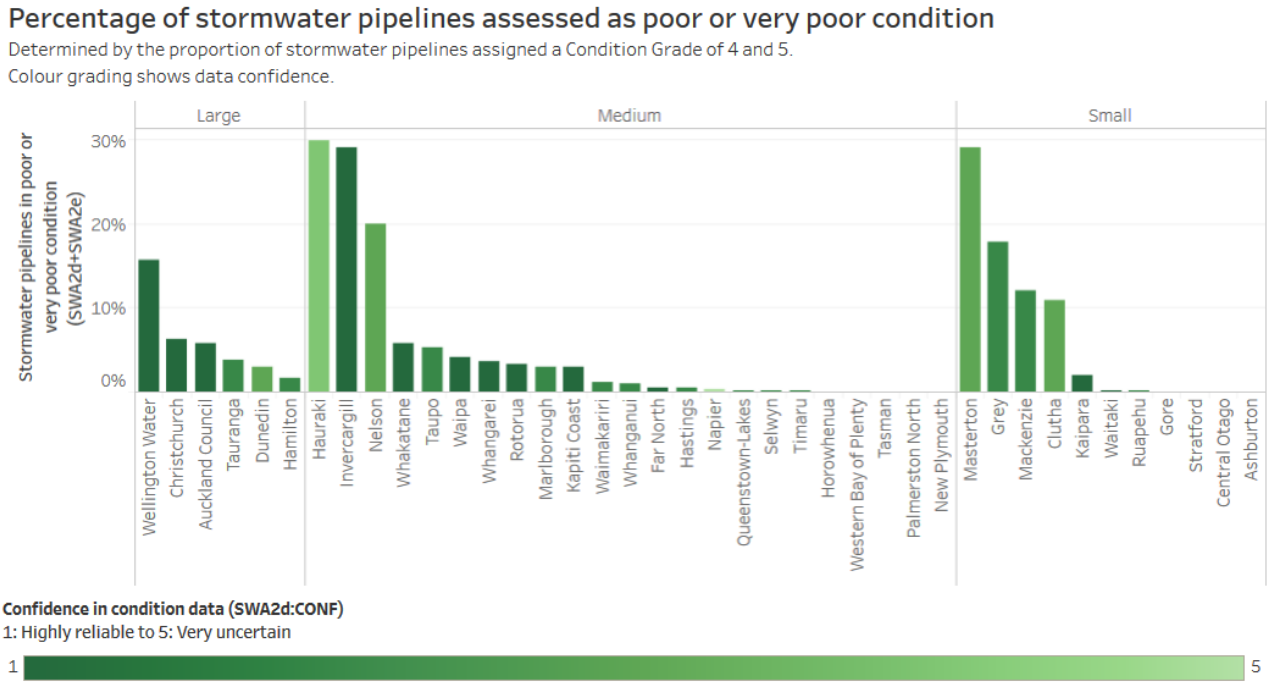


Appendix Figure H-2: Consented Stormwater Discharges

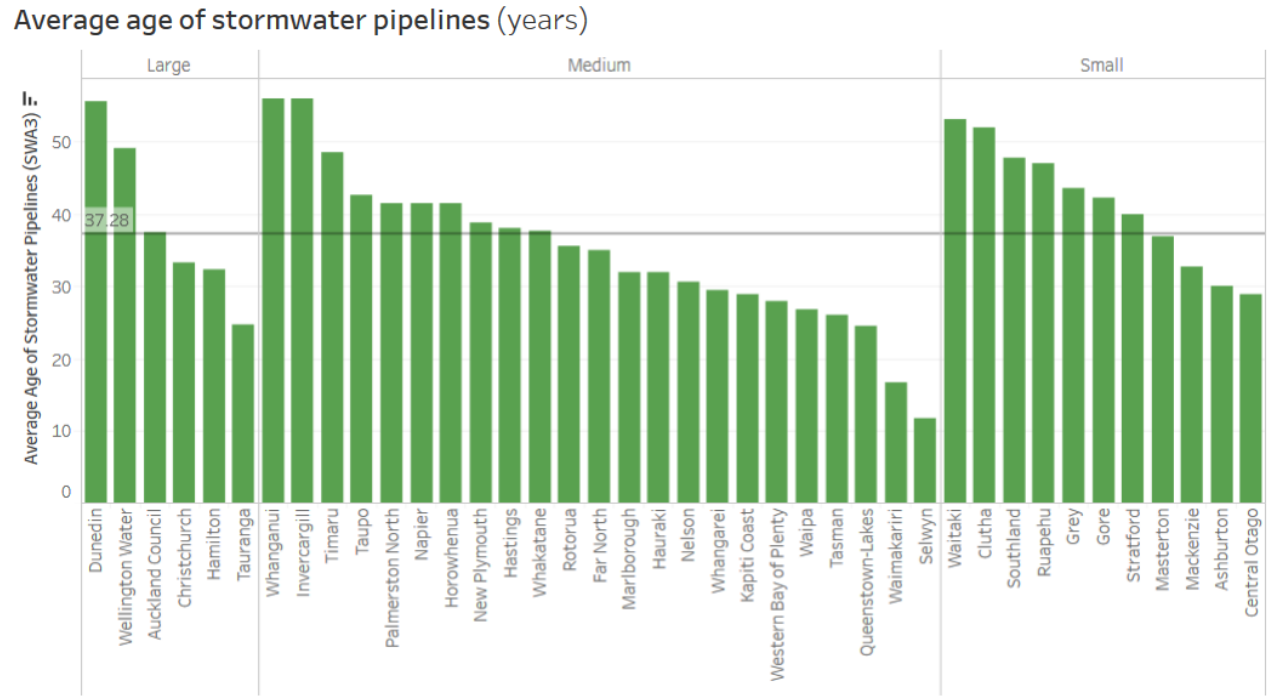
Proportion of stormwater discharges with a consent



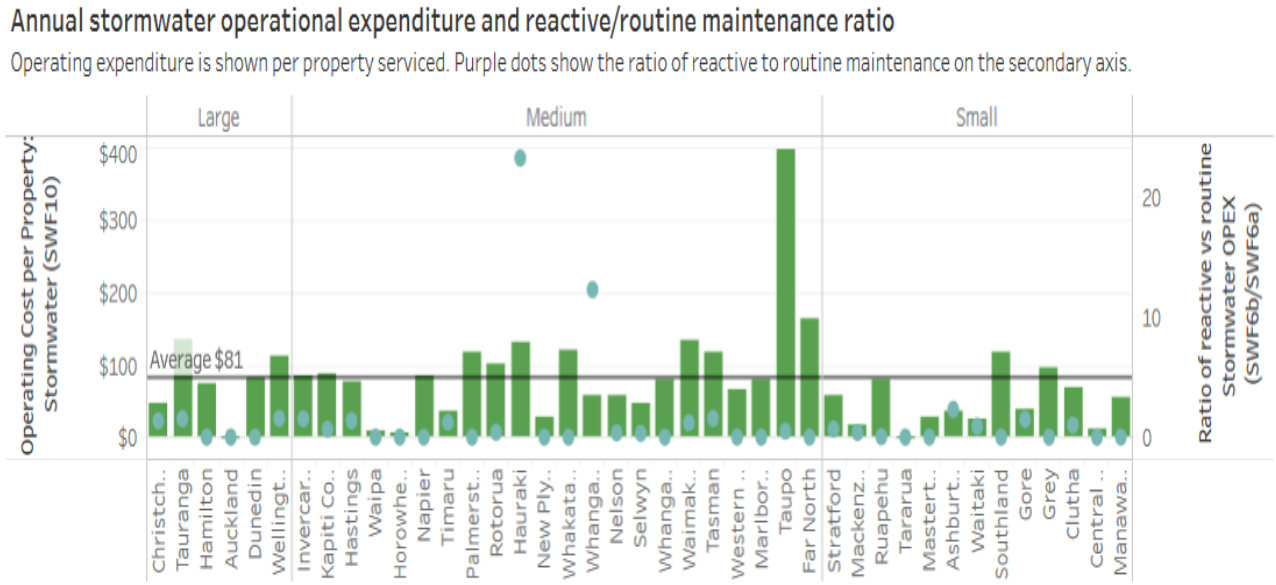
Appendix Figure H-3: Stormwater Pipe Condition



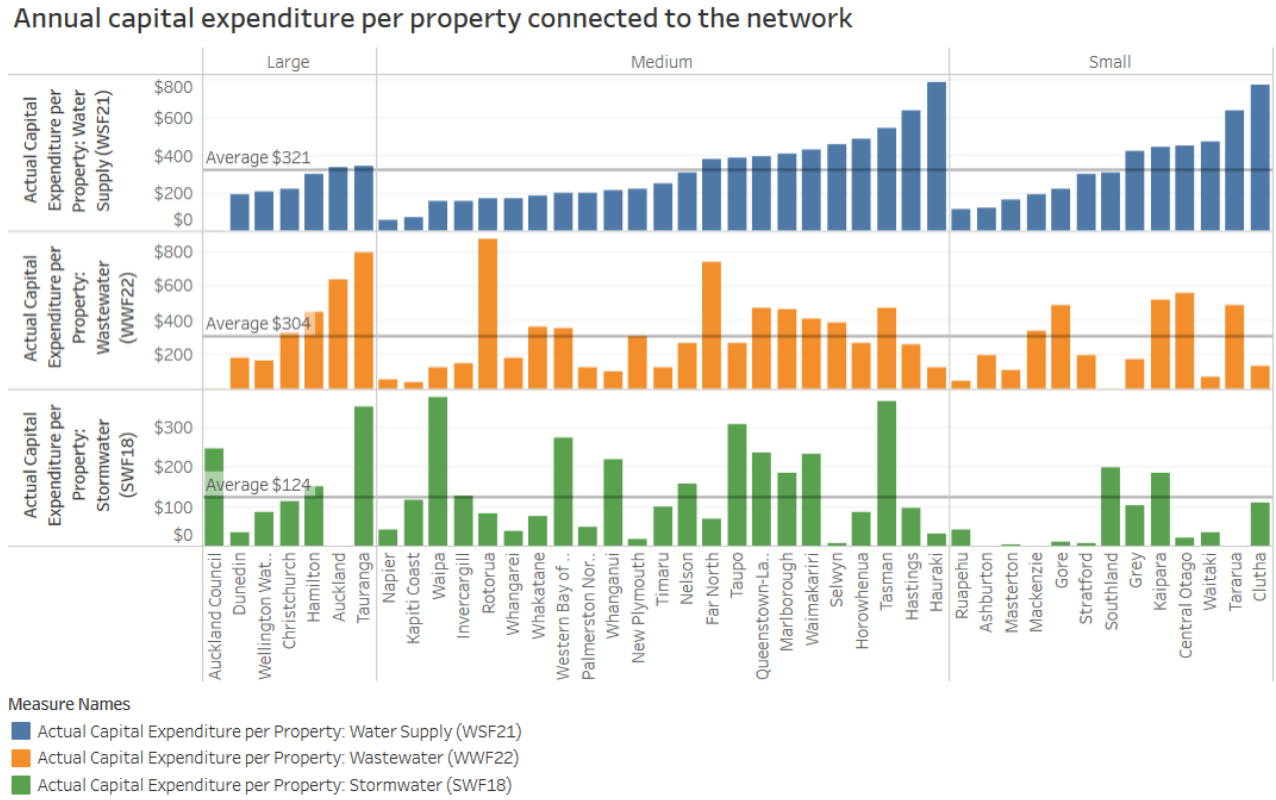
Appendix Figure H-4: Average Age of Stormwater Pipes



Appendix Figure H-5: Operational expenditure per property connected



Appendix Figure H-6: Capital expenditure per property connected (3 Waters)



APPENDIX I: CEMARS ACTION PLAN

Appendix Figure I-1: CEMARS Action Plan

CEMARS ACTION PLAN

1. **Introduction:**

The purpose of this plan is to provide a range of projects ranked in order of priority to enable Council to reduce its greenhouse gas emissions. This plan has been compiled based on activities and projects identified in Council's CEMARS (Certified Emissions Measurement and Reduction Scheme) Emissions Inventory for the baseline year 2017/18 (Appendix One). The assessment period for achieving reductions in greenhouse gas emissions is over five years from 2018 to 2023.

2. **Funding:**

Confirmed projects are funded through existing funding. All investigation work will be carried out within existing project budgets, or through the funding allocated for climate change through the 2019 Annual Plan. Opportunities to secure external funding, such as business energy reduction funding through EECA (Energy Efficiency and Conservation Authority), will be reviewed during the investigations where appropriate.

Subsequent actions identified will need to be funded through the Long Term Plan business case process, or other processes as appropriate.

3. **Primary emissions sources for 2017/18 (baseline year):**

Refer to Section 1.2 for Stormwater emissions in 2017/18

4. **Projects:**

(Projects highlighted in green are priority projects for emissions reduction)

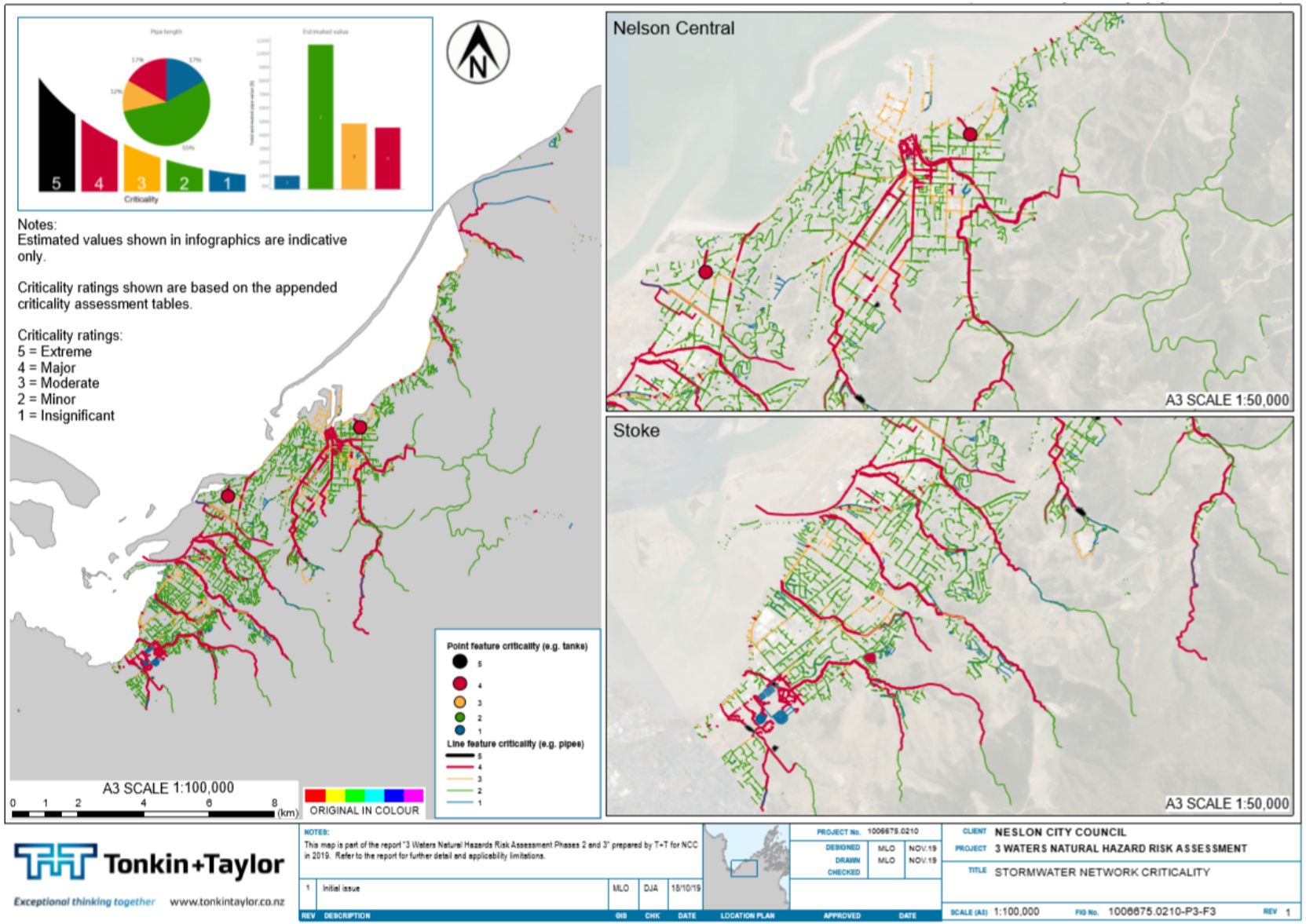
CONFIRMED PROJECTS FOR YEAR 1 (2018/19)			
Responsible	**Action**	**Completion date**	**Objective**
Infrastructure/Transport	Replace existing street lights with energy-efficient LED streetlights	June 2019	Reduce electricity usage
Corporate Services/Property	Procure two electric vans to replace one existing and one proposed new vehicle	June 2019	Reduce fossil fuel usage
CONFIRMED PROJECTS FOR YEAR 2 (2019/20)			
Responsible	**Action**	**Completion date**	**Objective**
All	Design and deliver carbon reduction plan	June 2023	Manage Council carbon reduction
Corporate Services/Property	Implement electric vehicle first policy when replacing existing or procuring new vehicles.	June 2023	Reduce fossil fuel usage
Years 1 to 5 (2019/2020) PROJECTS FOR INVESTIGATION (all projects will be subject to standard business case approval process where required) PRIORITY WILL BE GIVEN TO INVESTIGATION WITH BEST POTENTIAL TO REDUCE EMISSIONS			
Responsible	**Action**	**Completion date**	**Objective**

Infrastructure	Investigate collaboration with the NRSBU/NTRLBU to evaluate/reduce emissions from assets jointly-owned with Tasman District Council	June 2020	Reduce emissions
Infrastructure/ Utilities	Investigate emissions from Nelson North Wastewater Treatment Plant	June 2020	Reduce emissions
All/Senior Leadership/Strategy/Asset and Activity Managers	Investigate building climate change impact assessment into Council planning processes, including asset and activity management plans, policies, management plans and strategies	June 2020	Reduce emissions
Corporate Services	Establish feasibility of assessing carbon impact during the procurement process, including developing policy and criteria to guide significant purchases towards lower emission options, eg in infrastructure and building investments (new builds and refurbishments), equipment, electricity supply and service contracts	June 2020	Reduce emissions
Corporate Services	Investigate reducing and offsetting air travel	June 2023	Reduce emissions
Community Services/Facilities	Investigate energy efficiency opportunities such as energy audits on Council facilities that have emissions greater than 10tCO2e/yr	June 2023	Reduce electricity usage
Corporate Services/Finance	Investigate zero carbon energy suppliers	June 2020	Reduce emissions
Activity management/all	Investigate installing solar PV systems at Council buildings and facilities	June 2023	Reduce electricity usage
Senior Leadership Team	Investigate encouraging CCOs to measure, report and reduce carbon emissions	June 2020	Reduce emissions

Corporate Services/Property	Investigate removal of oil boilers and replacement with heat pumps	June 2020	Reduce fossil fuel usage
Corporate Services/Property	Water heating improvements at Riverside Pool	June 2020	Reduce electricity usage
Corporate Services/Parks	Investigate replacing park lighting with LEDS	June 2023	Reduce electricity usage
Infrastructure/transport & Corporate Services/Parks	Investigate installing outdoor lighting controllers on LED lights to reduce power use late at night	June 2023	Reduce electricity usage
Corporate Services/Parks	Investigate reducing nitrogen fertiliser use	June 2023	Reduce emissions
Corporate Services/Parks	Investigate replacement of grazing land with carbon forestry	June 2023	Increase carbon sequestration
Science and Environment	Investigate reducing waste at Council facilities	June 2023	Reduce emissions

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	

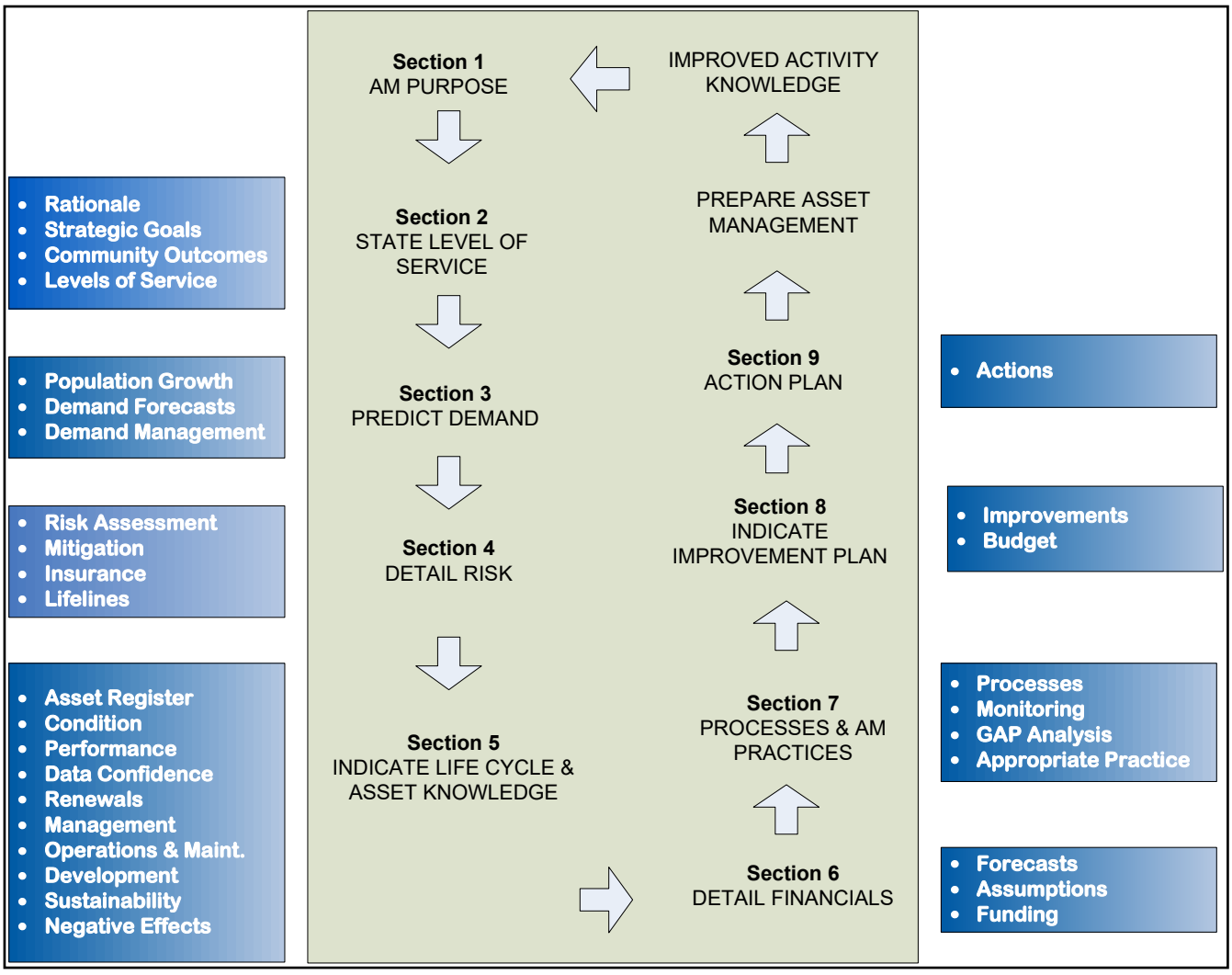
Notes:

	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

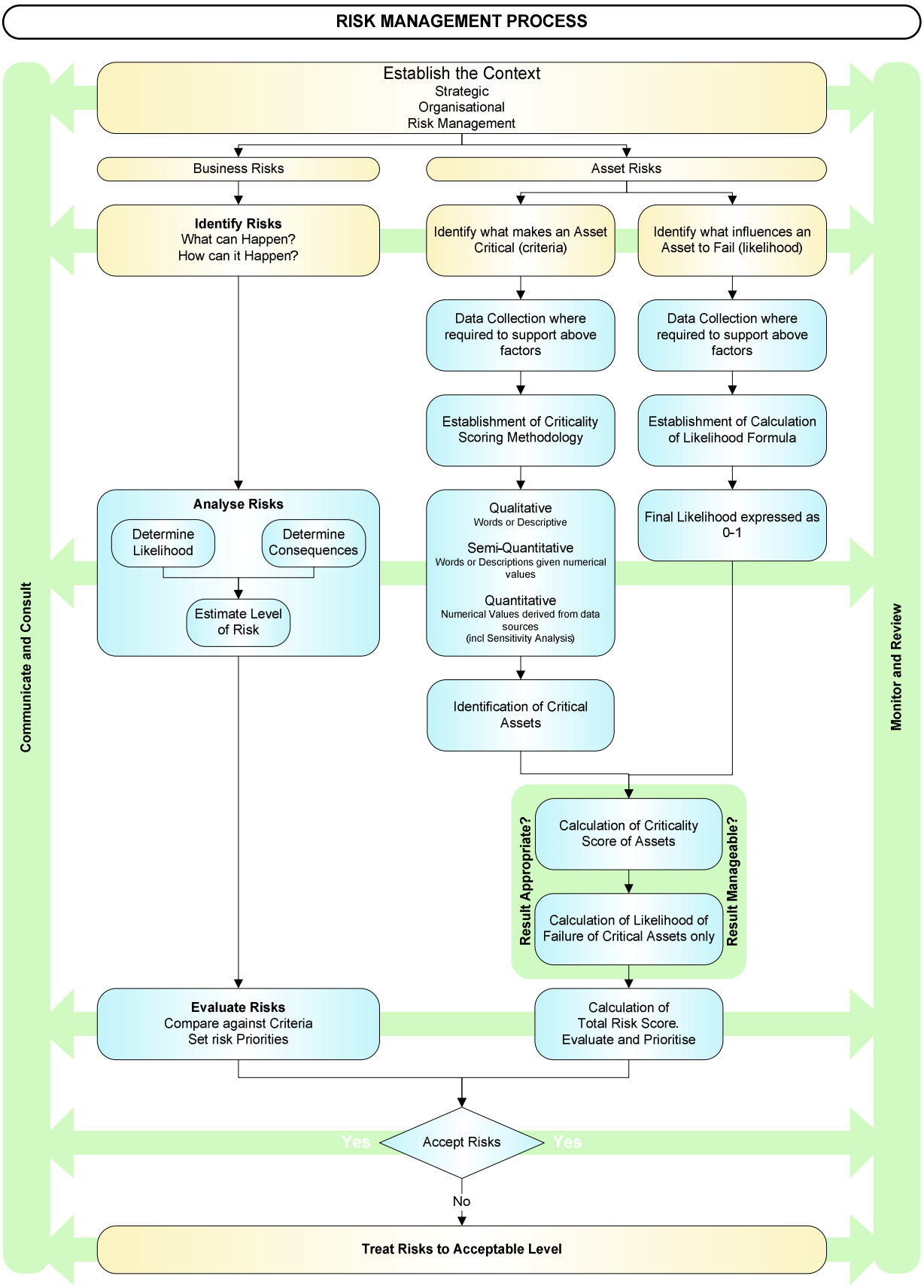
A mixture of the top down and bottom up approaches have been taken to develop this Plan, using existing data followed by data improvement. The structure of this plan mirrors the logical process followed for activity management planning as shown in Figure K-1 below.

Appendix Figure K-1: Activity Management Process



APPENDIX L: RISK MANAGEMENT PROCESS

Appendix Figure L-1: Risk Management Process



APPENDIX M: RISK REGISTER

Appendix Table M-1: Stormwater and Flood Protection Risk Register

STORMWATER AND FLOOD PROTECTION RISK REGISTER	Objectives • Environmental Protection for the built and natural environment from stormwater discharges • Reliability – an operational stormwater network • Contractor response – provide a prompt, reliable and timely response to service requests and system failures • Protection for the urban built and natural environment from floods through upgrading, maintaining, repairing and renewing assets to standards in this AMP	Assessed by Phil Ruffell Reviewed by Toby Kay

Identification			Analysis: Residual Risk				Response	Treatments
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level		
FLOOD EVENT (STORM RAINFALL)	**RIVERS / STRUCTURES**							
Flood event where river/stream /channel has insufficient capacity for Q20/Q50/Q100 flood	Maitai River - Urban (Hanby Park to The Haven)	Flooding of multiple (approx. 2000) properties adjoining river and in wider flood path, erosion of banks and foundations of structures. Potential health and safety issues. Debris build up on structures	Existing stopbanks and flood walls. Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Major (4)	Rare (1)	Medium (4)		Inspect and maintain existing capacity. Respond to damage after event. Upgrade sections to capacity identified through risk-based approach.
Flood event where river/stream /channel has insufficient capacity for Q20/Q50/Q100 flood	Maitai River - Rural (Hanby Park to dam)	Flooding of adjoining rural and residential properties (approx. 50), erosion of banks and foundations of structures. Minor health and safety issues. Contamination from sewerage systems may occur. Debris build up on structures	Regular inspections and maintenance programme in residential sections. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Moderate (3)	Rare (1)	Low (3)		Inspect and maintain existing capacity. Respond to damage after event.

Identification			Analysis: Residual Risk				Response	Treatments
Event Description	**Asset Group**	**Consequence**	**Existing Controls**	**Consequence**	**Likelihood**	**Current Risk Level**		
Flood event where river/stream /channel has insufficient capacity for Q20/Q50/Q100 flood	Maitai stop bank (Hanby Park)	Failure of Maitai stopbank causing flooding of approx. 45 properties, erosion of banks, and foundation of structures. Significant health and safety issues	Regular inspections carried out under utility provider's maintenance contract. Civil Defence and emergency management response. Respond to damage after event.	Extreme (5)	Rare (1)	Medium (5)		Engineering certification of structure required. Upgrade stop bank to provide higher level of protection identified through risk-based approach.
Flood event where river/stream /channel has insufficient capacity for Q20/Q50/Q100 flood	Ten named streams in urban reaches of city	Flooding of multiple adjoining properties (approx. 4,000), erosion of banks and foundations of structures. Potential health and safety issues. Contamination from sewerage system may occur. Debris build up on structures	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Major (3)	Rare (1)	Medium (4)		Respond to damage after event. Upgrade sections to capacity identified through risk-based approach.
Flood event where open channel has insufficient capacity for Q15/Q50/Q100 flood	Open channel or ditch	Flooding of adjoining properties, erosion of banks and foundations of structures. Minor health and safety issues. Contamination from sewerage system may occur. Debris build up on structures	Regular inspections and maintenance programme of public drain sections. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Moderate (3)	Rare (1)	Low (3)		Respond to damage after event. Upgrade public drain sections to capacity identified through risk-based approach and identify secondary flow paths.
Flood event after period of inadequate maintenance	Rivers and open channels (including structures)	Flooding of adjoining properties, erosion of banks and foundations of structures. Minor health and safety issues. Debris build up on structures	Regular inspections and maintenance programme of public drain sections. Civil Defence and emergency management response.	Moderate (3)	Possible (3)	Medium (9)		Regular inspections and maintenance programme for public drains
DROWNING	Rivers and open channels	Localised health impact to one person	No assessment been made of risk item	Moderate (3)	Rare (1)	Low (3)		

Identification			Analysis: Residual Risk				Response	Treatments
Event Description	**Asset Group**	**Consequence**	**Existing Controls**	**Consequence**	**Likelihood**	**Current Risk Level**		
FLOOD EVENT	**PIPED NETWORK**							
Flood event to existing piped network where insufficient capacity for Q15 @2090	Pipes ≥ 300dia	Flooding occurrence causing significant property and infrastructure damage. Minor health and safety issues. Contamination from sewerage system may occur	Regular inspections and maintenance programme. Civil Defence and emergency management response.	Minor (2)	Unlikely (2)	Low (4)		Respond to damage after event. Upgrade pipes to Q15/2090 and identify secondary flow paths
Flood event after period of inadequate maintenance	Intake structures ≥300dia	Intakes block with debris. Flooding to localised adjoining properties	Culverts, intakes and outfalls regularly monitored and maintained under service providers maintenance contract	Minor (2)	Possible (3)	Medium (6)		Respond to damage after event. Upgrade intakes to Q15/2090 and identify secondary flow paths.
FLOOD EVENT	**DETENTION DAMS**							
Flood event where downstream reticulation/ open channel has insufficient capacity for Q20/Q50/Q100 flood	Detention dam	Detention dam capacity exceeded causing flooding of adjoining property and streets. Major health and safety issues. Traffic hazard due to secondary flow	Regular inspections and maintenance programme. Civil Defence and emergency management response.	Major (4)	Rare (1)	Medium (4)		Inspect and maintain design capacity. Respond to damage after event. Upgrade sections to capacity identified through risk-based approach
FLOOD EVENT	**STREETS WITHOUT RETICULATION**							
Flood event where street has insufficient capacity for Q15//Q100 flood	Various locations	Flooding occurrence causing significant property and infrastructure damage. Minor health and safety issues. Contamination from sewerage system may occur	Civil Defence and emergency management response	Minor (2)	Unlikely (2)	Low (4)		Respond to damage after event. Install pipes to Q15/2090 and identify secondary flow paths.

Identification			Analysis: Residual Risk				Response	Treatments
Event Description	**Asset Group**	**Consequence**	**Existing Controls**	**Consequence**	**Likelihood**	**Current Risk Level**		
FLOOD EVENT	**PUMP STATIONS**							
Flood event > Q15 @2100 event in catchments served by pump station	Pump station	Serious flooding occurrence causing significant property and infrastructure damage. Minor health and safety issues. Contamination from sewerage system may occur	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Minor (2)	Unlikely (2)	Low (4)		Respond to damage after event. Increasing design capacity further would be uneconomical
Electrical failure during flood event	Pumps, Rising mains	Flooding of adjoining properties. Minor health and safety issues. Contamination from sewerage system may occur.	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Contractor to attend with backup generators.	Minor (2)	Unlikely (2)	Low (4)		Respond to damage after event
FLOOD EVENT	**RIVERS / STREAMS / PIPED NETWORK**							
Flood event coinciding with high tide	Lower river and stream reaches, low lying basin areas	Flooding occurrence causing property and infrastructure damage. Major health and safety issues. Contamination from sewerage. Pump systems at Tahunanui and The Wood will mitigate the consequences to a limited extent.	Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response. The remaining risk can be insured.	Moderate (3)	Unlikely (2)	Medium (6)		Respond to damage after event. Upgrade sections to capacity identified through risk-based approach.
FLOOD EVENT	**SECONDARY FLOWPATHS**							

Identification			Analysis: Residual Risk				Response	Treatments
Event Description	**Asset Group**	**Consequence**	**Existing Controls**	**Consequence**	**Likelihood**	**Current Risk Level**		
Flood event where secondary flowpath has insufficient capacity for > Q15 flood event	Secondary flowpaths	Flooding of adjoining properties, erosion of banks and foundations of structures. Minor health and safety issues. Contamination from sewerage system may occur. Debris build up on structures	Emergency Procedures Manual. Civil Defence and emergency management response.	Minor (2)	Unlikely (2)	Low (4)		Regular inspections and maintenance programme of all structures. Emergency Procedures Manual. Civil Defence and emergency management response.
STORM SURGE	**RIVERS / OPEN CHANNELS**							
STORM SURGE	Open channel and piped network	Flooding occurrence causing inundation of properties at lower elevation than RL 3.0m. Property damage (potentially at Otterson Street, Hathaway Court, Tahaki Street, Wakatu carpark Vanguard Street and adjoining properties). Minor health and safety issues.	Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response. Respond to damage after event. The Stormwater and Flood Protection activity does not specifically address flooding from coastal storm surge.	Minor (2)	Unlikely (2)	Low (4)	This activity addresses flood risk from storm rainfall, and not specifically from storm surge.	Flood gates to prevent tidal inflows, bunding or flood walls to prevent open channel overflow where flood risk also due to storm rainfall, stormwater pumping for basin areas. Note this risk is expected to increase over time due to sea level rise.
EARTHQUAKE/ FLOOD EVENT/ LANDSLIP/TRAFFIC IMPACT	**RIVERS/ STREAMS/ PIPED NETWORK**							
EARTHQUAKE	Maitai River/ Structures	Major release of water from Maitai Dam in upper catchment causing damage to structures, erosion, and flooding. Major health and safety issues. Contamination from sewerage system may occur.	Emergency Action Plan Emergency Procedures Manual. Civil Defence and emergency management response. Respond to damage after event. Upgrade sections to capacity identified through risk-based approach.	Extreme (5)	Rare (1)	Medium (5)		Civil Defence and emergency management response.

Identification			Analysis: Residual Risk				Response	Treatments
Event Description	**Asset Group**	**Consequence**	**Existing Controls**	**Consequence**	**Likelihood**	**Current Risk Level**		
EARTHQUAKE / LANDSLIP	Brick or earthenware >80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues.	Regular inspections and maintenance programme. Emergency Action Plan.	Moderate (3)	Unlikely (2)	Medium (6)		Renew asset
EARTHQUAKE / LANDSLIP	Concrete >80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues.	Regular inspections and maintenance programme. Emergency Action Plan.	Minor (2)	Rare (1)	Very Low (2)		Renew asset
EARTHQUAKE / LANDSLIP	Brick or earthenware 45 - 80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues.	Regular inspections and maintenance programme. Emergency Action Plan.	Minor (2)	Rare (1)	Very Low (2)		Repair and monitor condition and performance, replace at-risk assets
EARTHQUAKE / LANDSLIP	Concrete 45 - 80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues.	Regular inspections and maintenance programme. Civil Defence and emergency management response.	Minor (2)	Rare (1)	Very Low (2)		Repair and monitor condition and performance, replace at-risk assets
Earthquake coinciding with Q15 flood event	Stormwater pumping Stations	Pump station failure causing serious flooding occurrence causing significant property and infrastructure damage. Minor health and safety issues. Contamination from sewage system may occur	Pump stations designed to withstand earthquakes and not located over known fault lines. Centennial Road pumping station is located in potential liquefaction prone area.	Moderate (3)	Rare (1)	Low (3)		Natural hazards resilience project to identify risks and increase network resilience to natural hazards events (including earthquakes).

Identification			Analysis: Residual Risk				Response	Treatments
Event Description	**Asset Group**	**Consequence**	**Existing Controls**	**Consequence**	**Likelihood**	**Current Risk Level**		
Earthquake coinciding with flood event	Detention Dams	Structure failure of detention dam causing major release of water from upper catchment causing damage to structures, erosion, and flooding. Major health and safety issues.	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response. Respond to damage after event	Extreme (5)	Rare (1)	Medium (5)		Engineering certification of large structure/s required under new Dam Safety regulations. Natural hazards resilience project to identify risks and increase network resilience to natural hazards events
STORMWATER ASSETS NOT INSTALLED TO NCC ENGINEERING STANDARDS ON NEW DEVELOPMENT								
	Piped network/ Secondary flow paths/ Detention dams	Unknown asset failure may cause flooding. Minor health and safety issues. Contamination from sewage system may occur.	Inspection and sign off of plans and construction by Nelson City Council staff	Minor (2)	Unlikely (2)	Low (4)		
TRAFFIC IMPACT/VANDALISM	ALL	Damaged or broken asset	Regular inspection and maintenance. Service requests.	Insignific ant(1)	Unlikely (2)	Very Low (2)		
STORMWATER QUALITY								
Stormwater discharges fail to meet attribute limits specified in Whakamahere Whakatū Nelson Plan	Piped network/ open channels	Global stormwater discharge consent is called in for review. Potential for infringement notices.	Stormwater first flush monitoring, debris socks on stormwater outlets, Environmental Inspections Ltd monitoring and enforcement	Moderate (3)	Possible (3)	Medium (9)		Stormwater Quality improvement Strategy (Utilities and Roading), Green infrastructure, Stormwater filtration devices. Stormwater quality monitoring.

Appendix Table M-2: Consequence Rating (Impact)

Rating	Safety	Health	Asset Performance/ Service Delivery	Environmental/ Historical/cultural	Financial	Political / Community/ Reputational	Relationship with Iwi	Legal compliance	Information/ decision support
Exterme (5)	Multiple fatalities of workers or public (MF)	Significant loss of life expectancy for multiple persons or incapacity for more than 1000 person days	Service not provided for more than 5000 person days	Permanent environmental damage on a nationally significant scale and/or permanent loss of nationally significant building, artwork, or other valued entity	Overspend, loss (i.e. spend without result) or income loss of > $5m OR >100% of business unit budget	Major loss of public confidence in Council (>2000 opponents via social media or other mediums) Negative international mainstream media coverage; shareholder or key stakeholder outage; or loss of a key customer	Major breakdown of relationship affecting multiple areas. Refusal to resolve without one or more major concessions from council	Litigation/ prosecution or civil action successful resulting in major (>50% of maximum available) fine/costs awarded and/or imprisonment of council officer.	Multiple errors in information and analysis and presentation misleading (intentionallly or not) or not understandable by non- specialists
Major (4)	Single fatality of workers or public (SF)	Single loss of life expectancy or incapacity for between 100 and 1000 person days	Service not provided for less than 5000 person days but more than 500 person days	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	Overspend, loss (i.e. spend without result) or income loss of > $1m and <$5m OR between 70% and 100% of business unit budget	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	Significant breakdown of relationship largely in in one area. Some concessions from council sought before substantive issue considered by iwi grouping affected	Litigation/ prosecution or civil action successful resulting in minor fine(<50% of max available)/ costs awarded.	One major error in information, analysis incomplete and presentation ambiguous
Moderate (3)	Notifiable injury of workers or public.	Incapacity for between 20 and 100 person days	Service not provided for less than 500 person days but more than 50 person days	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	Overspend, loss (i.e. spend without result) or income loss of > $0.5m and <$1m OR between 30% and 70% of business unit budget	Some negative public reaction likely (30-200 opponents via social media or other mediums) Repeated complaints; Regulatory notification; or negative stakeholder, local media attention	Major relationship damaged in a single area but amenable to negotiation	Documented Breach of legislation, no legal action or prosecution or civil action not successful.	Information correct but presentation/ analysis insufficient to support decision on the day
Minor (2)	Serious injury on one person requiring medical treatment (MA)	Incapacity for between 1 and 20 person days	Service not provided for less than 50 person days but more than 5 person days	Medium term environmental impact at a local level and/or development compromising the integrity of a registered historical, cultural or archaeological site	Overspend, loss (i.e. spend without result) or income loss of > $100k and <$500k OR between 10% and 30% of business unit budget	Minor public reaction likely (<30 active opponents via social media or other mediums) Workforce attention; limited external attention;	Relationship damage resolvable through normal communication/ consultation mechanisms	Formal warning of breach from legislative authority.	Information correct, analysis complete but presented in a way which could be misinterpreted
Insignificant (1)	Minor injury requiring only first aid or less (FA)	Incapacity for less than 1 person day	Service not provided for between 1 & 5 person days	Short term and temporary impact requiring no remedial action and/or restorable loss damage to historical/ cultural record	Overspend, loss (i.e. spend without result) or income loss of > $10k and <$100k OR between 5% and 10% of business unit budget	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.	Iwi/ tribe/ hapu public dissatisfaction resolvable through routine communication	Breach of minor legislation/ no legal action	Small errors in information or presentation - no effect on decision

Appendix Table M-3: Risk Matrix – Consequences x Likelihood

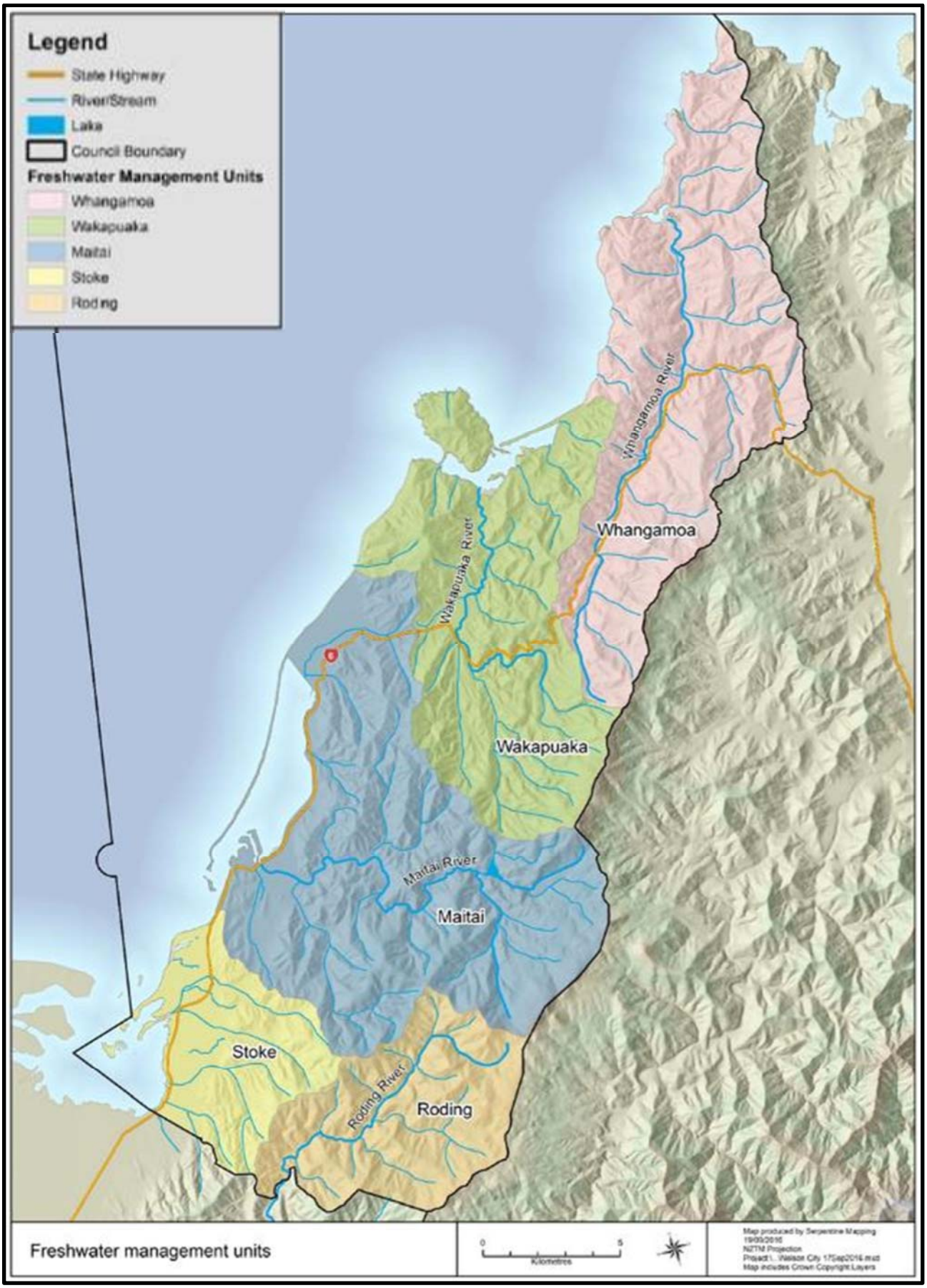
CONSEQUENCES					LIKELIHOOD of the given consequence occurring			
Insignificant(1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)	Descriptor	Qualitative guidance statement	Indicative Probability range %	Indicative frequency range (years)
Medium (5)	Medium (10)	High (15)	Very High (20)	Very High (25)	Almost certain (5)	The consequence can be expected in most circumstances OR *A very low level of confidence/information*	>90%	>1 occurrence per year
Medium (4)	Medium (8)	High (12)	High (16)	Very High (20)	Likely (4)	The consequence will quite commonly occur OR *A low level of confidence/information*	20% - 90%	Once per 1-5 years
Low (3)	Medium (6)	Medium (9)	High (12)	High (15)	Possible (3)	The consequence may occur occasionally *A moderate level of confidence/information*	10% - 20%	Once per 5-10 years
Very Low (2)	Low (4)	Medium (6)	Medium (8)	High (10)	Unlikely (2)	The consequence may occur only infrequently *A high level of confidence/information*	2% - 10%	Once per 10 - 50 years
Very Low (1)	Very Low (2)	Low (3)	Medium (4)	Medium (5)	Rare (1)	The consequence may occur only in exceptional circumstances *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 and baseline 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