

Stormwater And Flood Protection Asset Management Plan 2018 - 2028



Quality Assurance Statement

Version No.	Date	Description	Prepared by	Reviewed by	Approved by
1	8/17	Draft for Council W&I Committee	Various	A Louverdis	SLT
2	24/8/17	Draft approved by W&I Committee Council to inform LTP 2018-28	Various	Councillors	Councillors
3	21/9/17	Approved by Council to inform LTP 2018-28	Various	Councillors	Council
4 Final	15/11/18	Approved by Council	Various	Councillors	Council

Cover Photos:

Orchard Creek and Orphanage Creek

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Executive summary

i The purpose of the plan

The Stormwater and Flood Protection Asset Management Plan outlines the current and future operational requirements needed to meet customers' needs in cost effective manner.

This plan focuses on ensuring assets are operated and maintained to provide the desired level of service, and to meet the current and future community outcomes in a sustainable manner.

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 uncontrolled stormwater discharges.

The overall objective of Asset Management is to:

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

This plan will provide the substantiation for budget forecasts put forward in the Long Term Plan (2018-2028) for stormwater collection and disposal and flood protection.

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. During high rainfall events the rivers and streams transport large volumes of water and sediment with levels of energy that are capable of causing significant damage to property adjoining these areas and within the flood path.

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 12 detention systems. 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 detailed in the figures below and discussed in detail in the Lifecycle Management section.

The inventory of public stormwater services assets owned by Nelson City Council and managed by the Infrastructure division as at June 2016 is shown in Table ES-1

Table ES-1: Summary of Stormwater Activity Assets

Asset Category	Quantity		
	km	m ²	units
Stormwater			
Pipes Up To 600mm	161.1		
Pipes > 600mm	41.0		
Culverts	6.2		
Rocks Rd Culvert	0.3		
Intakes			110
Manholes			4,563
Outfalls (includes 79 with wing walls)			420
Sumps			606
Pump Stations			2
Tide Gates			24
Detention Dams ¹			14
Flood Protection			
Streams/Rivers	31.5		
Bank Protection		59,693	
Channels	1.3		

¹ Detention dams at Todd Valley x 1, Motueka Street x 1, York Valley x 3, Tasman Heights x 2, Bledisloe Reserve x 1, Ngawhatu Valley Road x2, The Ridgeway at Panorama Drive roundabout x 1, Saxton Stream x 1(new), Saxton Field x 1(new), Springlea at Frenchay Drive

Table ES-2: Rivers and Streams

River	Overall Urban River Length (m)
Orphanage Creek	2,320
Orchard Creek	2,910
Poormans Stream	3,060
Arapiki Stream	2,300
Jenkins	2,980
York	4,590
Brook Stream	2,950
Maitai River	4,600
Todd Valley	1,915
Oldham Creek	1,840
Saxton Creek	2,100
Total	31,565

Figure ES-1: Water Catchment Boundaries: North Nelson



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

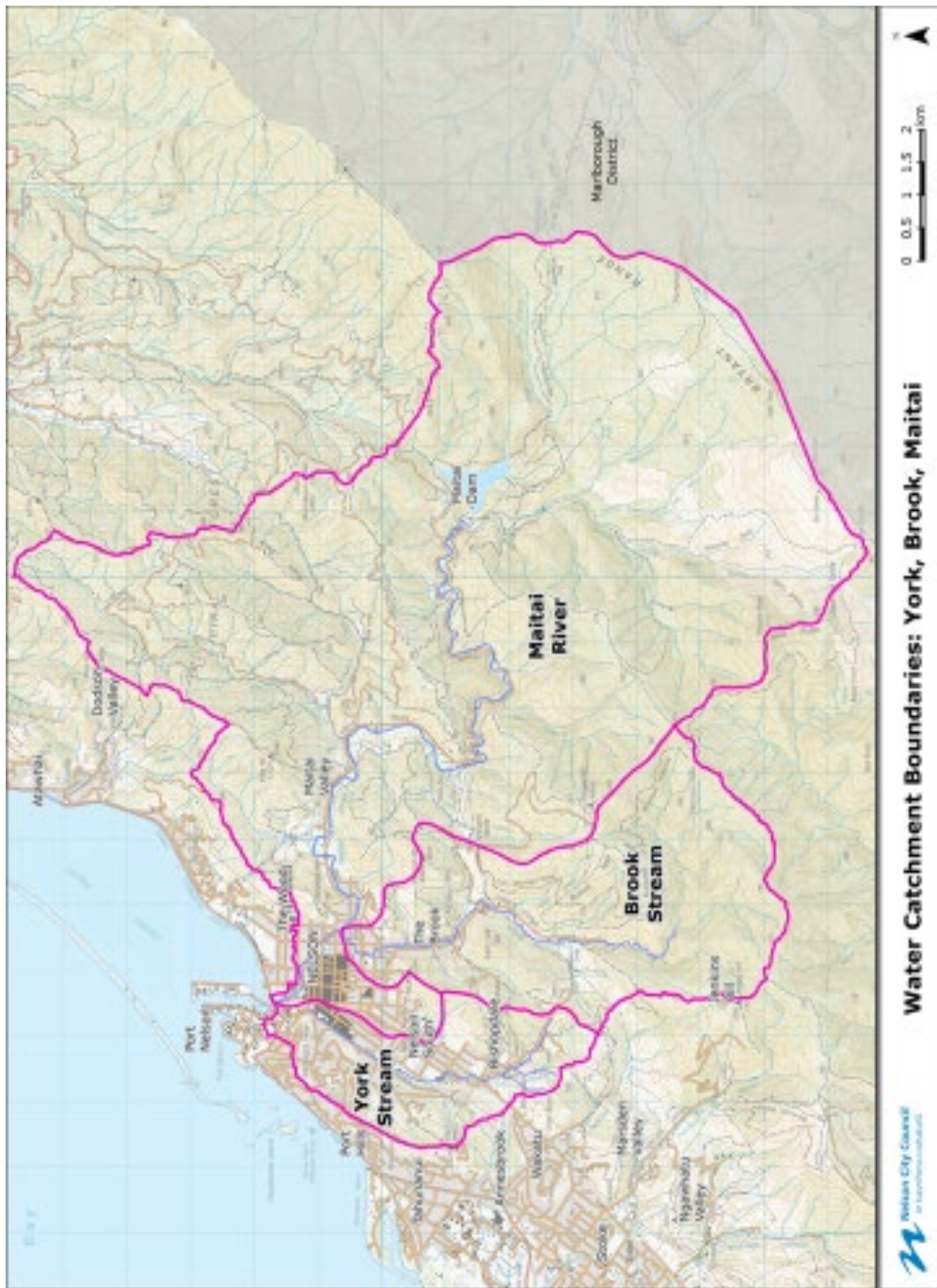
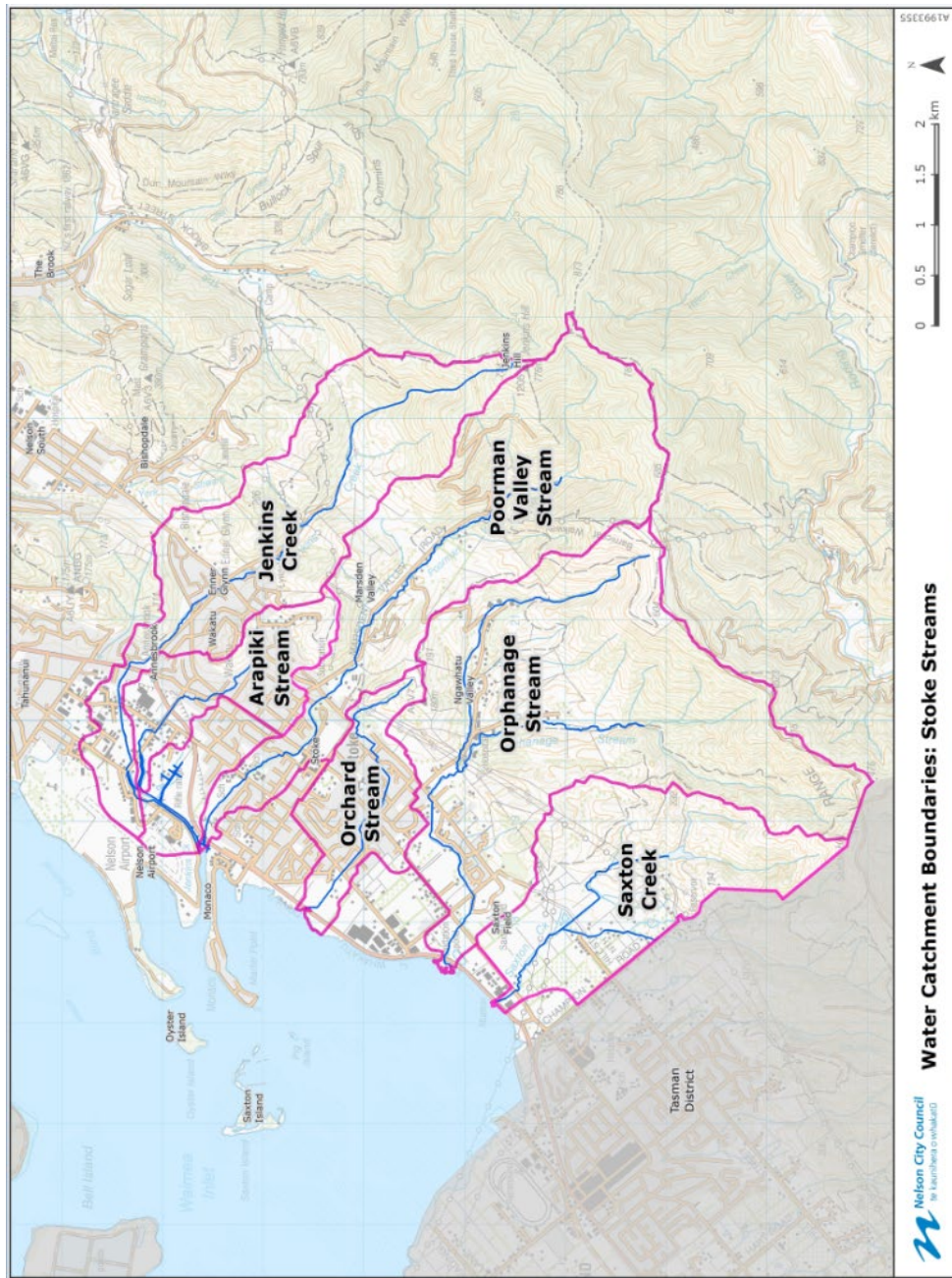


Figure ES-3: Water Catchment Boundaries: Stoke Streams



iii Key issues

Council's priorities between 2018 and 2028 for the stormwater and flood protection activity will focus on the following areas:

- ***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 asset management plan can 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; 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, protection of fish spawning areas, protection of natural 'pool and riffle' stream bed form, natural meanders where possible.

- *Streams and rivers to be free of manufactured obstructions that impede fish passage.*
- *The completion of the inventory of urban and rural streams with Council's environmental team to better describe the current flood capacity and environmental features for all catchments.*
- *Additional effort to reduce stormwater flow into the wastewater system to reduce sewer overflows and reduce pumping costs*

- ***Compliance with the **National Policy Statement for Freshwater Management** and other Central Government freshwater reforms such as the Clean Water Package.***

Council, iwi and the wider community are developing environmental standards for streams and rivers in Nelson based on the requirements of the National Policy Statement. These standards are expected to be the basis of rules in the proposed Whakamahere Whakatū Nelson Plan and will set the scene for water quality improvements into the future. Although rules are yet to be finalised, activities that impact fresh water (stormwater-through maintenance activities, transport- through material deposited on roads and parks and reserves-through activities that may

lead to discharges to water) will need to take note of any changes to rules from the date of notification of the proposed plan.

- *Development of **resilient infrastructure** to address climate change predictions and the capacity of urban rivers and streams to handle extreme weather events.*

Detailed computer models have been developed for eleven of the urban streams in the city. The flood plans from these models show that significant areas of the city are likely to be impacted by the larger storm events. 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 models will be used to identify the reliable existing channel capacity of the streams and help support the Whakamahere Whakatū Nelson Plan hazards section and guide future development rules in areas subject to flooding.

Natural Hazard Security of the network in light of the recent Canterbury and Kaikoura Earthquakes and various storm events.

Further work is proposed in this asset management plan to build on the hazard vulnerability studies carried out by Treasury in 2017 in response to the recent Canterbury and Kaikoura Earthquakes and multiple flood events across the country.

On 1 & 20 February 2018 the remnants of two tropical cyclones hit the Nelson Tasman region. Both caused extensive damage.

On 1 February the storm surge from ex-tropical cyclone Fehi added an extra 60cm to the expected tide level and seawater damaged buildings on Rocks Road and backflowed through sumps in low lying areas. Significant surface flooding occurred particularly at the Wakatu Industrial Estate, Hathaway Terrace and Wakatu carpark.

Ex-tropical cyclone Gita mostly affected the Motueka/Takaka Hill area on 20 February.

Natural hazard resilience will include 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. The work will link with similar projects in the wastewater and water supply activities.

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

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 the asset management plan is to complete the Maitai River flood response options and identify implications for the central business district and the Wood from the Maitai River, Brook stream and York stream flood flows.

- *The completion of work in progress 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 stage 1 immediately downstream from Champion Road complete and stage 3 through Saxton Field nearing completion. Stage 2 linking stages 1 & 3 is due to commence construction in 2017/18. Detailed design of stage 4 from Main Road Stoke to the sea is also planned for 2017/18 with construction to follow 2018/19-2020/21. York Stream works are programmed from the intake in Bishopdale Reserve through to Kawai Street in 2017/18 with some additional works on Bishopdale reserve in 2020/2021-2022/2023. Future funding has been included for improvements to adjacent streets and the channel from Kawai Street to the intake structure in Victory school. Upgrading Little-Go Stream from Franklin Street to the Girls College playing field in Waimea Road is nearing completion. The next stage involves finalising options in 2017/18 for detention on the playing field/ completion of piping to Rutherford Street or some combination of both. Budget is proposed for 2018/19 for construction.

- *Ensuring sufficient **stormwater disposal options** are available to allow for the on-going growth of the city using a risk based approach.*

Stormwater disposal options range from low impact disposal to land, 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. It is very important to ensure the appropriate response is matched to demand, geography and the geology of the different areas to minimise nuisance issues arising from stormwater flowing across property boundaries and destabilising hillsides. Any upgrading of the public network will be undertaken to support growth areas (co-ordinated with other utility upgrades in the same area) and to reduce risk of slips and nuisance issues. The proposed revision of the Land Development Manual, currently being prepared with Tasman District Council, will set out the construction details for the above disposal options.

- *Continue with developing **stormwater and flood protection strategies** for the city.*

These will identify areas with inadequate stormwater and flood protection services, both built eg pipes, flumes and concrete channels and natural eg smaller hillside gullies, overland flow paths, streams and rivers. Complete Tahunanui hillside and Modellers Pond studies. This work links with the disposal options above. 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. A more strategic approach is required to identify stormwater and flood requirements across the city and develop appropriate responses.

- **Secondary flow paths**

Secondary flow paths carry overland stormwater flow when rivers, streams and pipes are full. Currently Council's Land Development Manual provides guidance for developers of new subdivisions on the best means of providing for these flows. Generally roads are the preferred flow paths in the city. There will also be a large number of flow paths on private property that will carry stormwater from storm events that need to be identified and landowners made aware of the importance of keeping them clear (City wide). A budget for identifying these is proposed for 2018/19-2019/20.

- **Inventory of Urban Streams and Rivers.**

In 2015 Council began the development of computer models of the major streams and rivers in the city. This work was largely completed in 2016/17 and supported the community consultation for the hazards section of the proposed Whakamahere Whakatū Nelson Plan. The next stage of the work is to complete a capacity assessment of all the urban sections of streams and rivers that can then be used for a risk based approach to flood management. Refer the flood maps below.

- **Inventory of Rural Rivers.**

Council currently does not take stormwater rates for any property north of the Gentle Annie Saddle or from other properties greater than 15 Ha in area. As a consequence no routine maintenance works are carried out by this activity in these areas. An inventory of these rural rivers is proposed for four years from 2025 to provide Council with a better understanding of how the rivers might respond to changing land use and what the flooding risk might be for downstream urban areas.

- **Flood Management**

Flood management is a priority for the city for the next ten years. After decades of development on the flood plains adjacent the urban river channels the city has a considerable investment in these areas.

In order to help us understand the present and future risks to these areas Council has commissioned computer flood models to better identify the areas at greatest risk.

The following figures show some of the outputs from the Council's computer flood models for the major urban streams and rivers. The plans are colour coded to show depth of flooding for a Q100 event that coincides with an average high tide and expected sea level rise of 1m at 2100.

It is proposed to have a deeper conversation with the community about a risk based approach to flood protection that recognises the likely changing weather patterns and flood risk over the life of this plan and the trade-offs around flood protection and affordability that need to be balanced.

Figure ES-4: Q100 Flood Modelling 1m sea level rise Year 2100: Wakapuaka

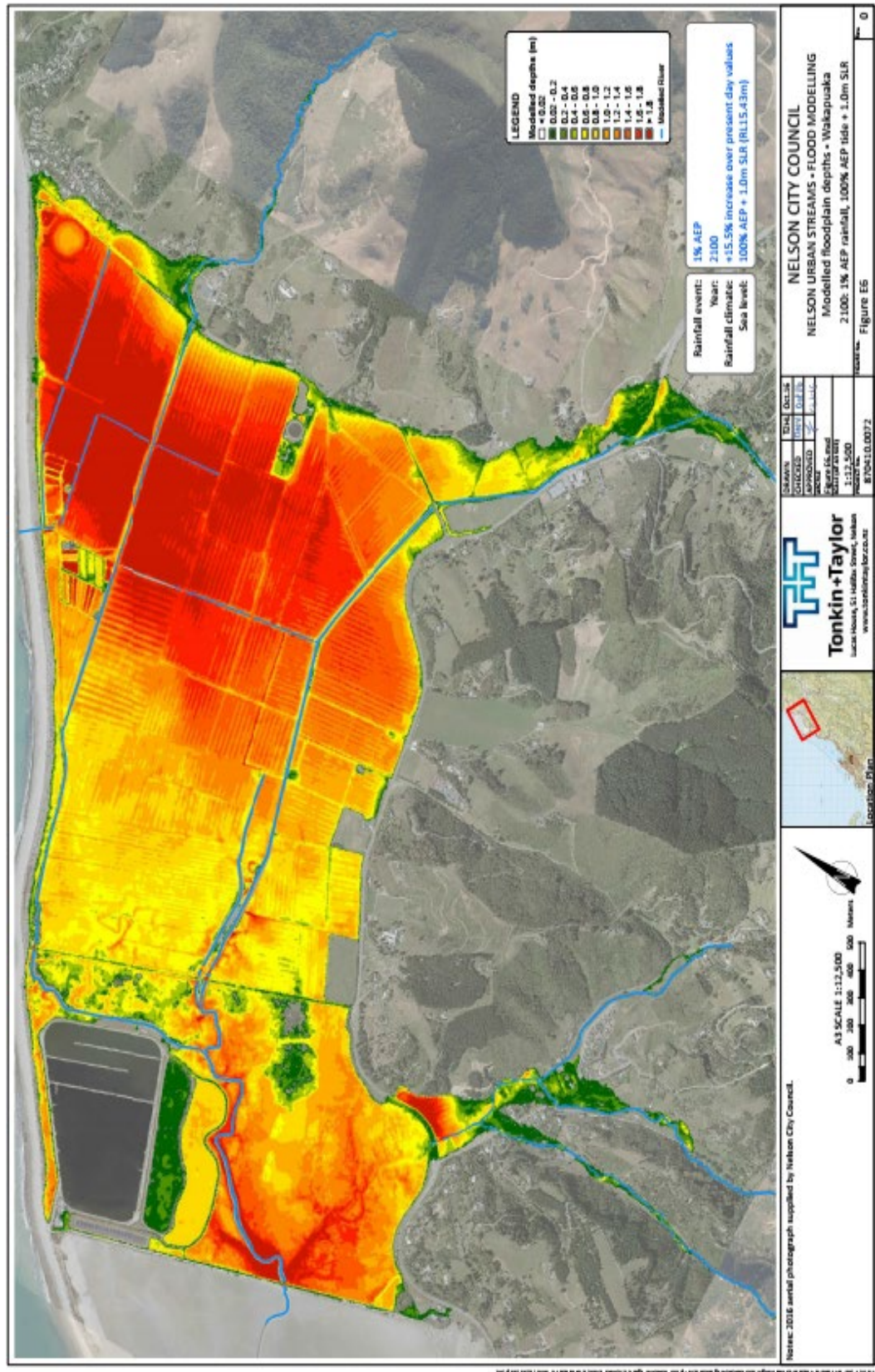


Figure ES-6: Q100 Flood Modelling 1m sea level rise Year 2100: Maitai River, Brook and York Streams

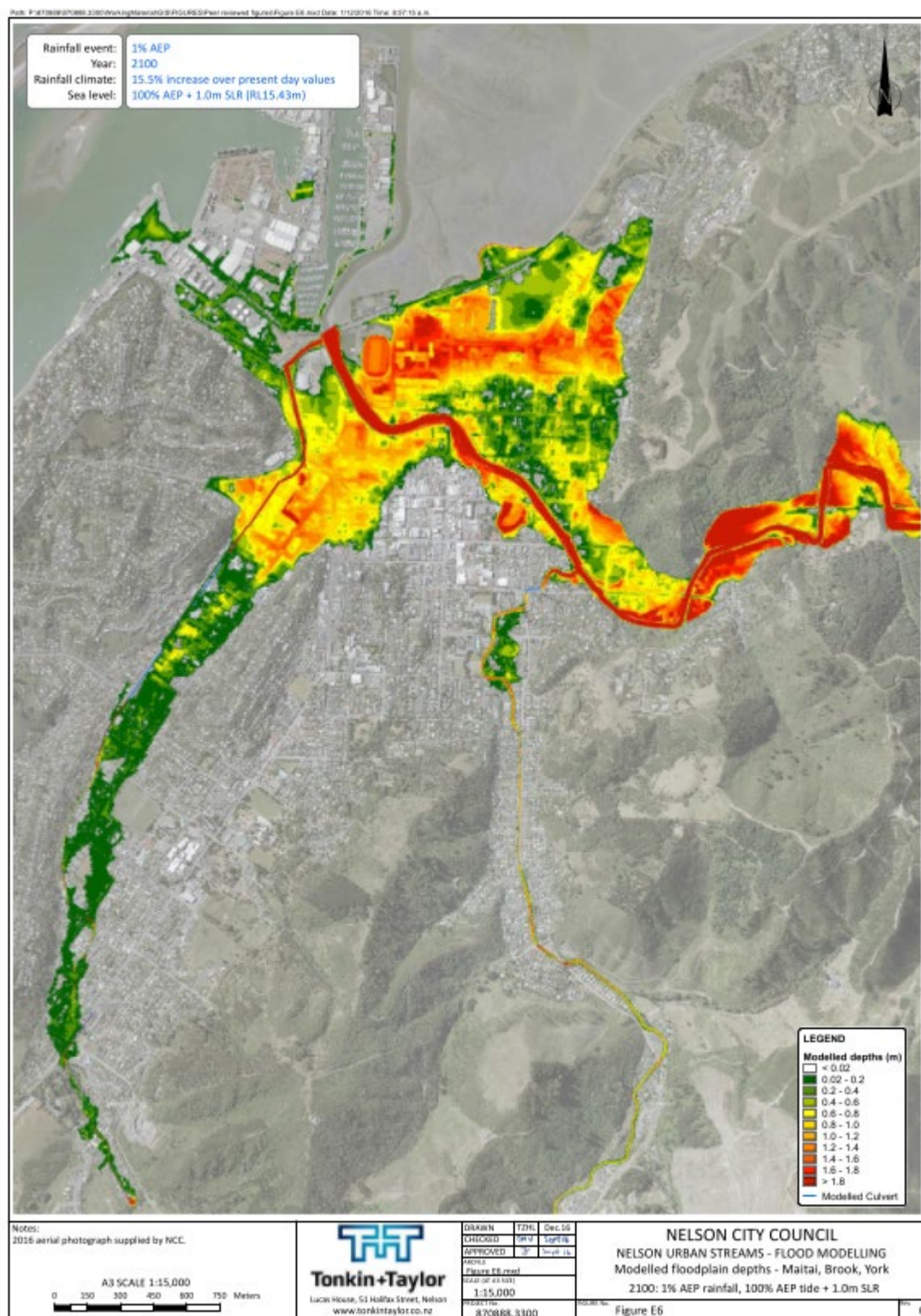


Figure ES-7: Q100 Flood Modelling 1m sea level rise Year 2100: Jenkins-Arapiki-Poorman Streams

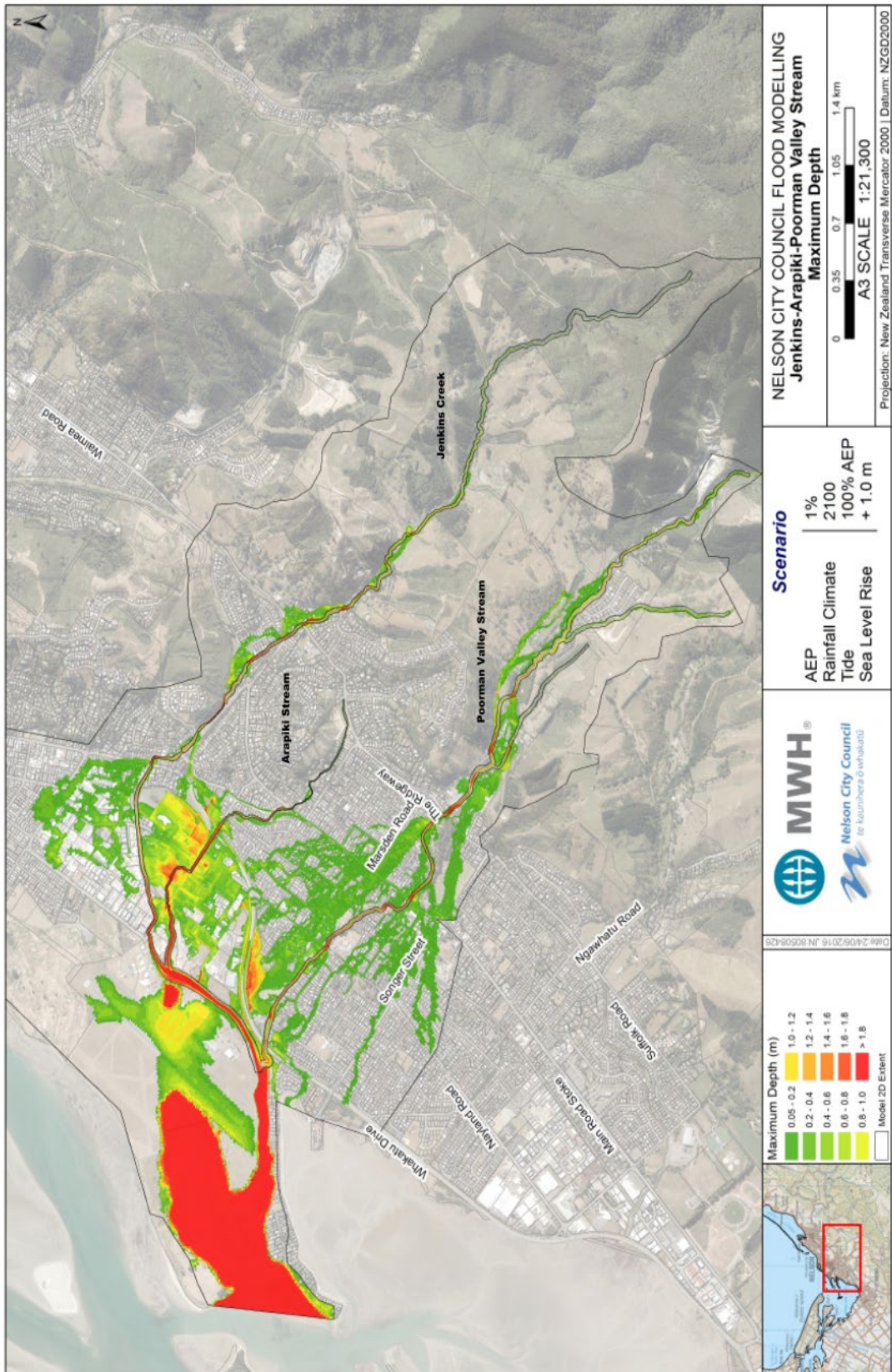
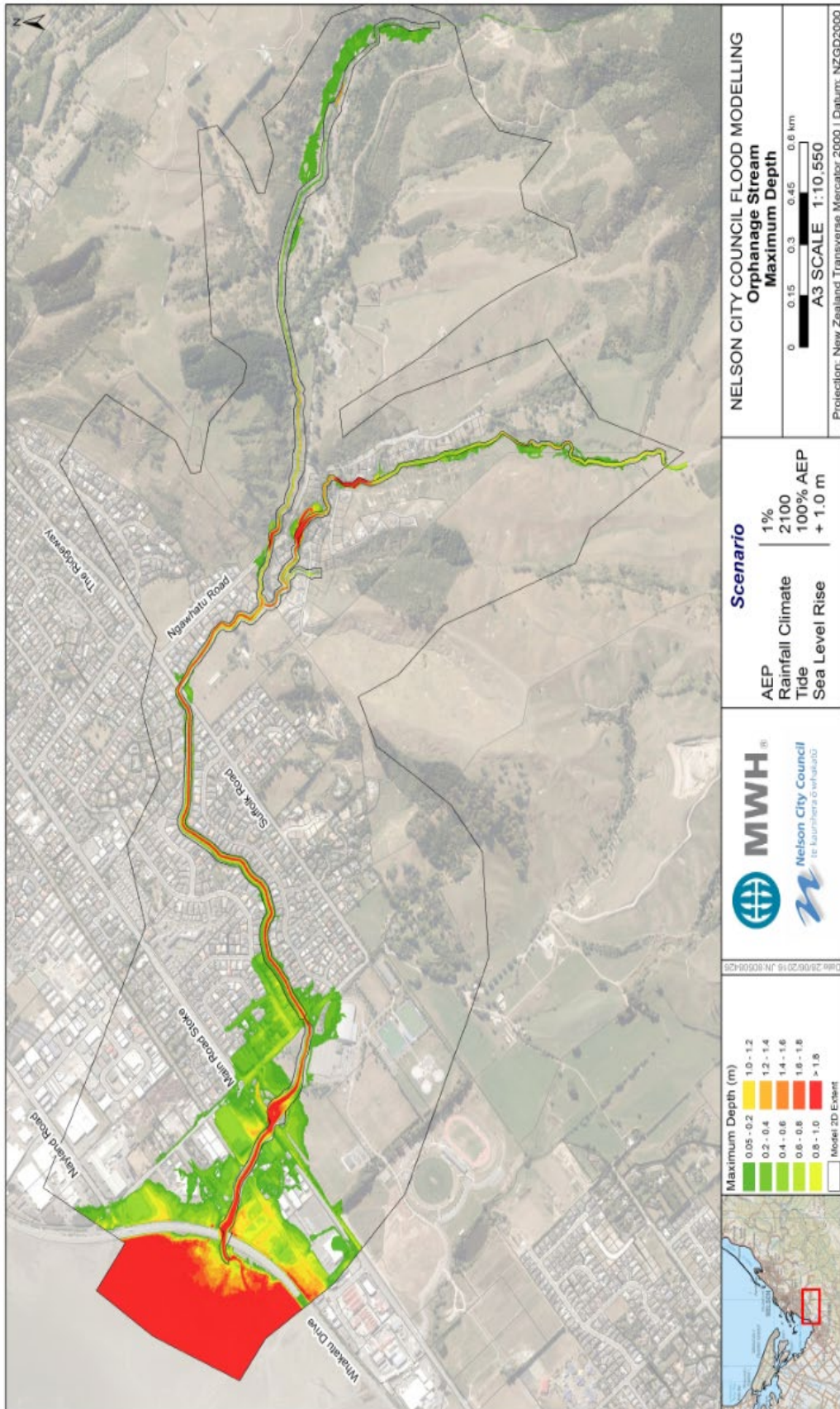


Figure ES-8: Q100 Flood Modelling 1m sea level rise Year 2100: Orchard Stream



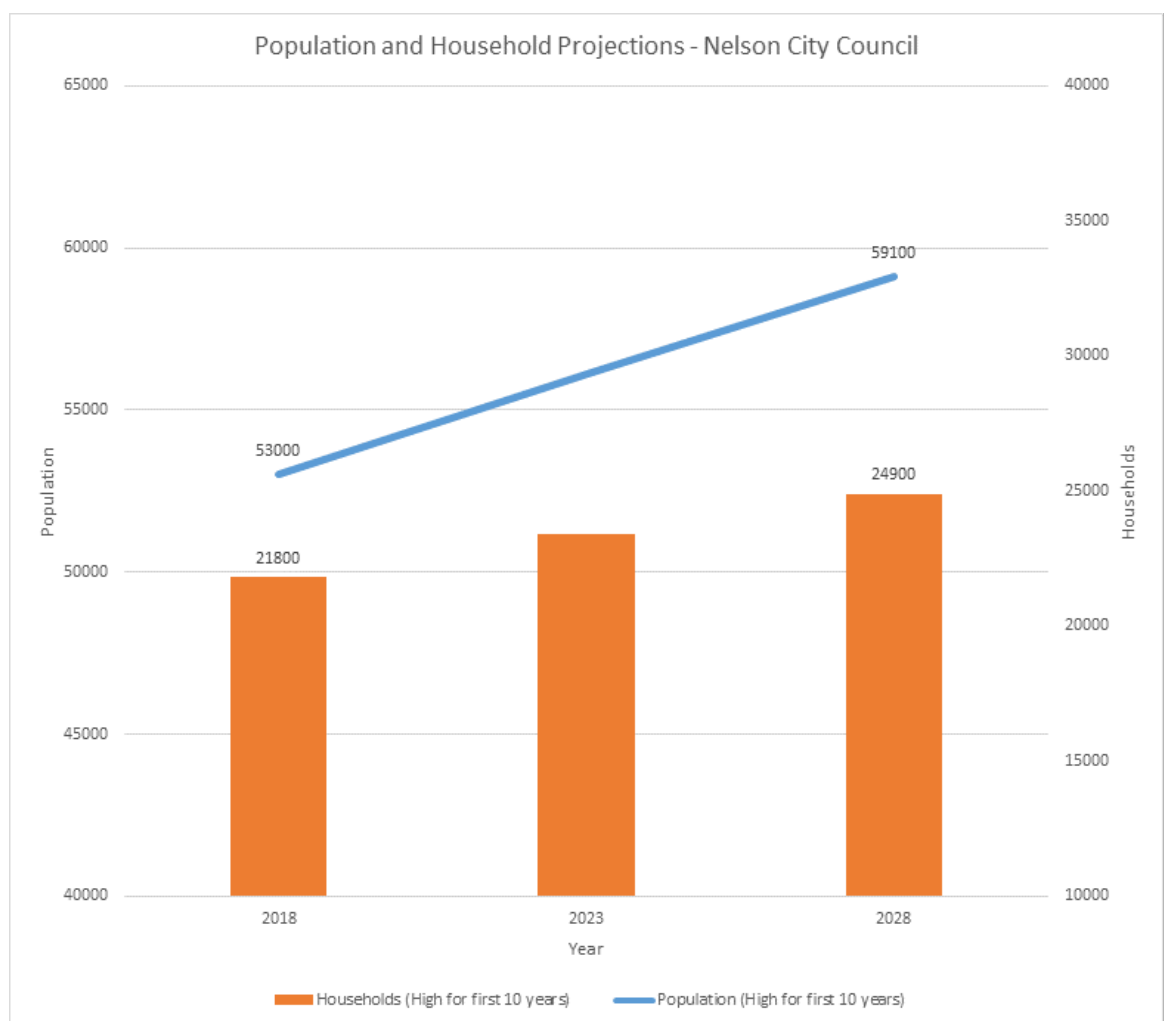
Figure ES-9: Q100 Flood Modelling 1m sea level rise Year 2100: Orphanage Stream



- National Policy Statement Urban Development Capacity**

The National Policy Statement for Urban Development Capacity (NPS-UDC) requires local authorities to 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 feasible, zoned and serviced while long-term capacity must be feasible, with servicing planned but does not need to be zoned yet. The following graph is based on statistics New Zealand growth projections for the city out to 2028. An increase of approximately 12% in population over this time is expected.

Figure ES-10: Population and household projections (high), 2018-2028, Nelson



As shown above the recent modelling of the flood capacity of most urban streams has identified that large parts of the city will be adversely impacted by extreme rain events. 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 techniques for stormwater disposal.

iv Levels of service

Table ES-3: Levels of Service table 2018 – 2028

					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* 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* 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	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 Asset Management Plan* 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				

					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)	
Our communities are healthy, safe, inclusive and resilient		Develop risk based Maitai flood response options 5	New Measure	Flood analysis and property impacts identified	Response options identified	Community engagement on response options	Implementation of response option	
		Develop city wide flood protections strategies 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	
	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* 2	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* 2	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

* 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.

<p>Measurement procedures:</p> <ol style="list-style-type: none"> 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
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Also important 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.

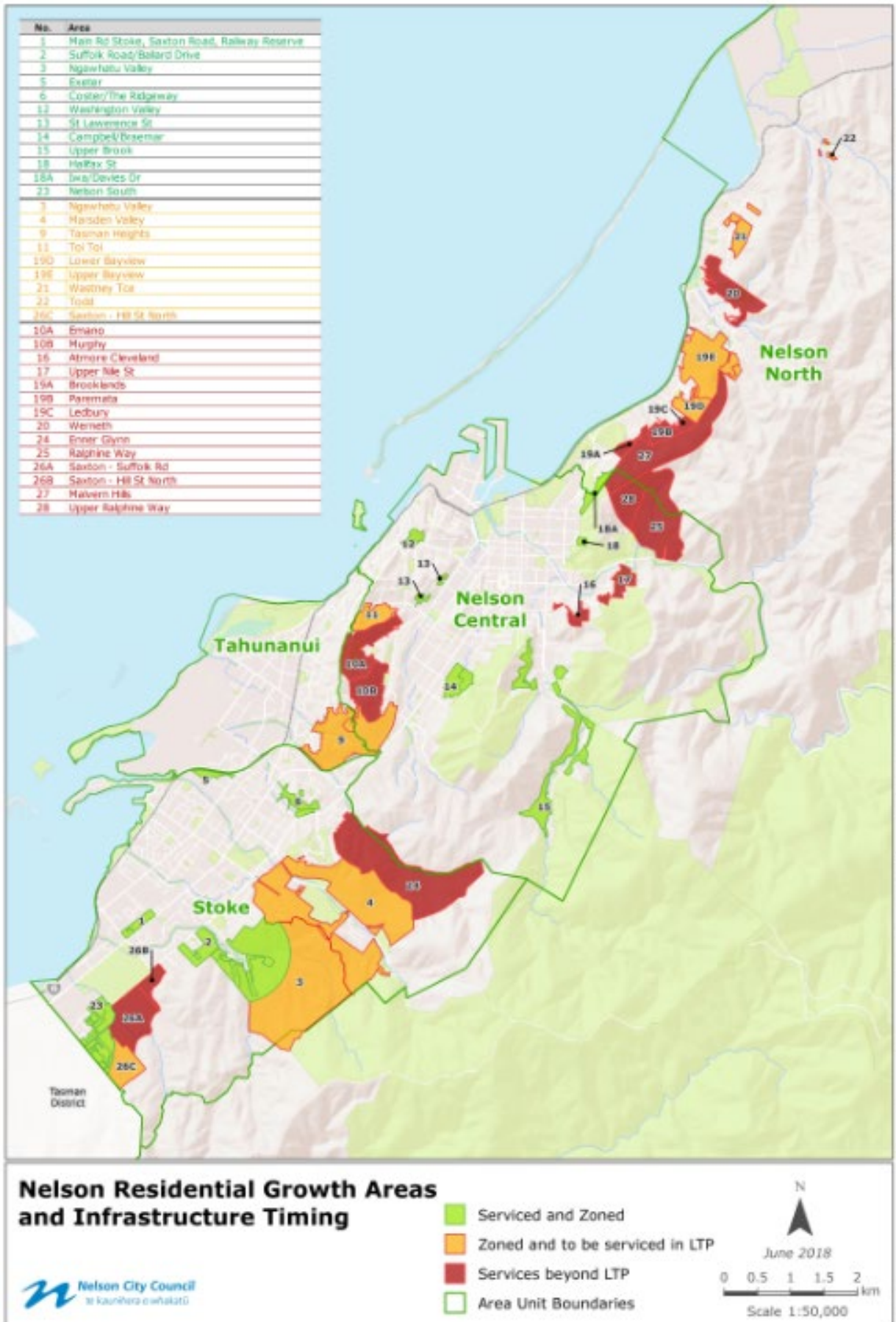
v Future demand

Table ES-4: Future demand

Stormwater and Flood Protection Demand Drivers	Changes to the Activity
<p>Significant population growth and residential expansion into greenfield areas</p>	<p>Development of new areas on the periphery of the city and increased density in some existing developed areas leading to increased runoff rates as impermeable areas increase. See map below. Need to identify appropriate disposal techniques where public drains lack capacity. Growth projects are identified in the financial tables.</p>
<p>Climate Change</p>	<p>In recent years, there has been an increase in the incidence of extreme weather events around the world. 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 with the need for either increased network capacity or a greater acceptance by the community of the adverse impacts of extreme events. Design standards in the LDM 2010 recognise the need to meet expected increased rainfall intensities out to 2100.</p>
<p>Legislative National Policy Statements:</p> <ul style="list-style-type: none"> • Freshwater Management and • Urban Development Capacity 	<ul style="list-style-type: none"> • Freshwater Management is a cornerstone central government initiative to improve the quality of freshwater bodies in New Zealand. This is expected to impact on 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 develops the freshwater sections of the proposed Whakamahere Whakatū Nelson Plan through 2017/18. • Urban Development Capacity 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.
<p>Organisational Policies Environmental Sustainability</p>	<p>Development of sustainability strategies that include reduction of infiltration (into the wastewater system).</p>

Infrastructure Planning Process for Growth Projects

Figure ES-11: Infrastructure planning process for growth projects



vi Lifecycle management plan

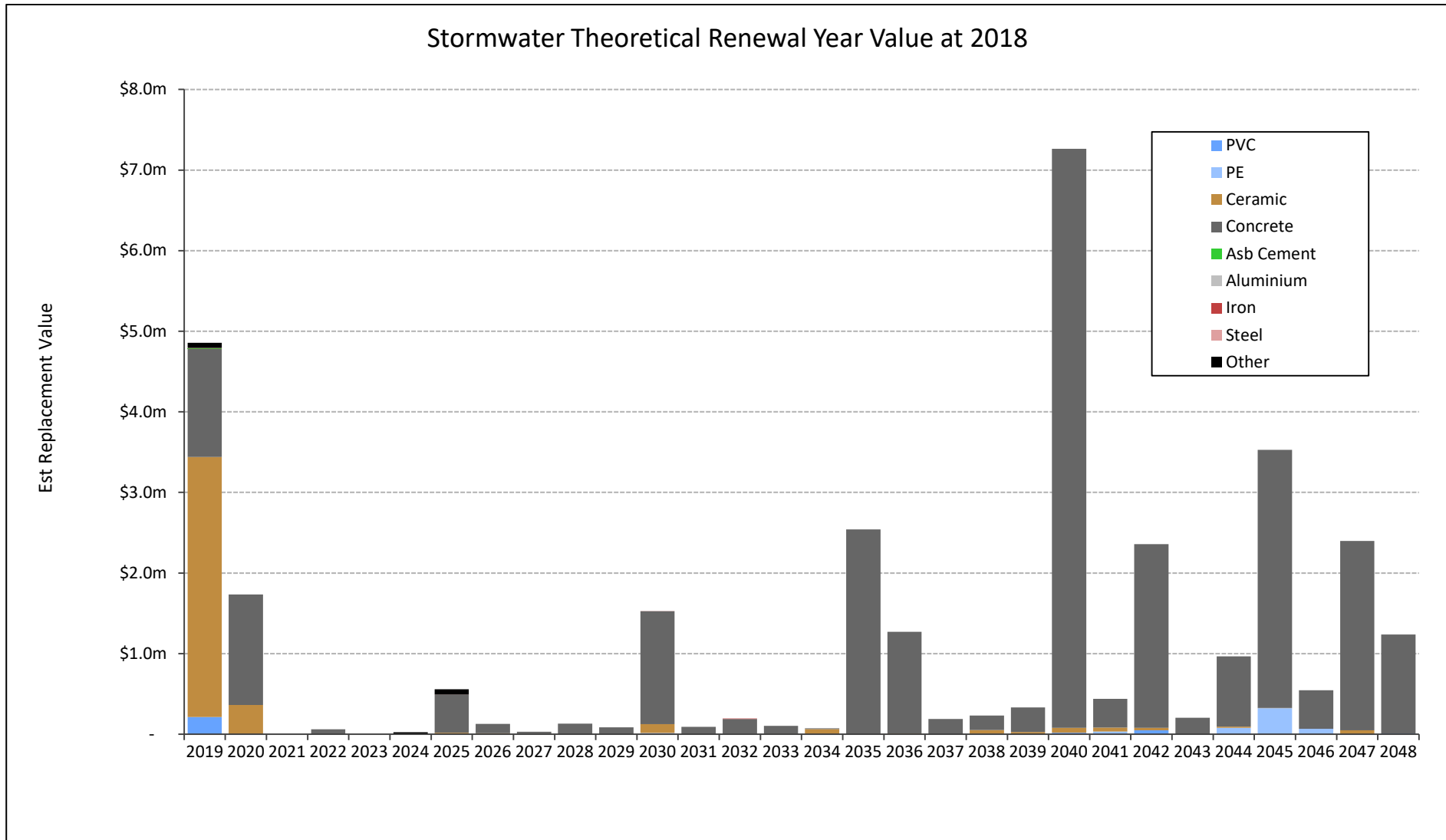
Assets have a lifecycle as they move through from the initial concept to the final disposal. Depending on the type of asset, its lifecycle may vary from 10 years to over 100 years.

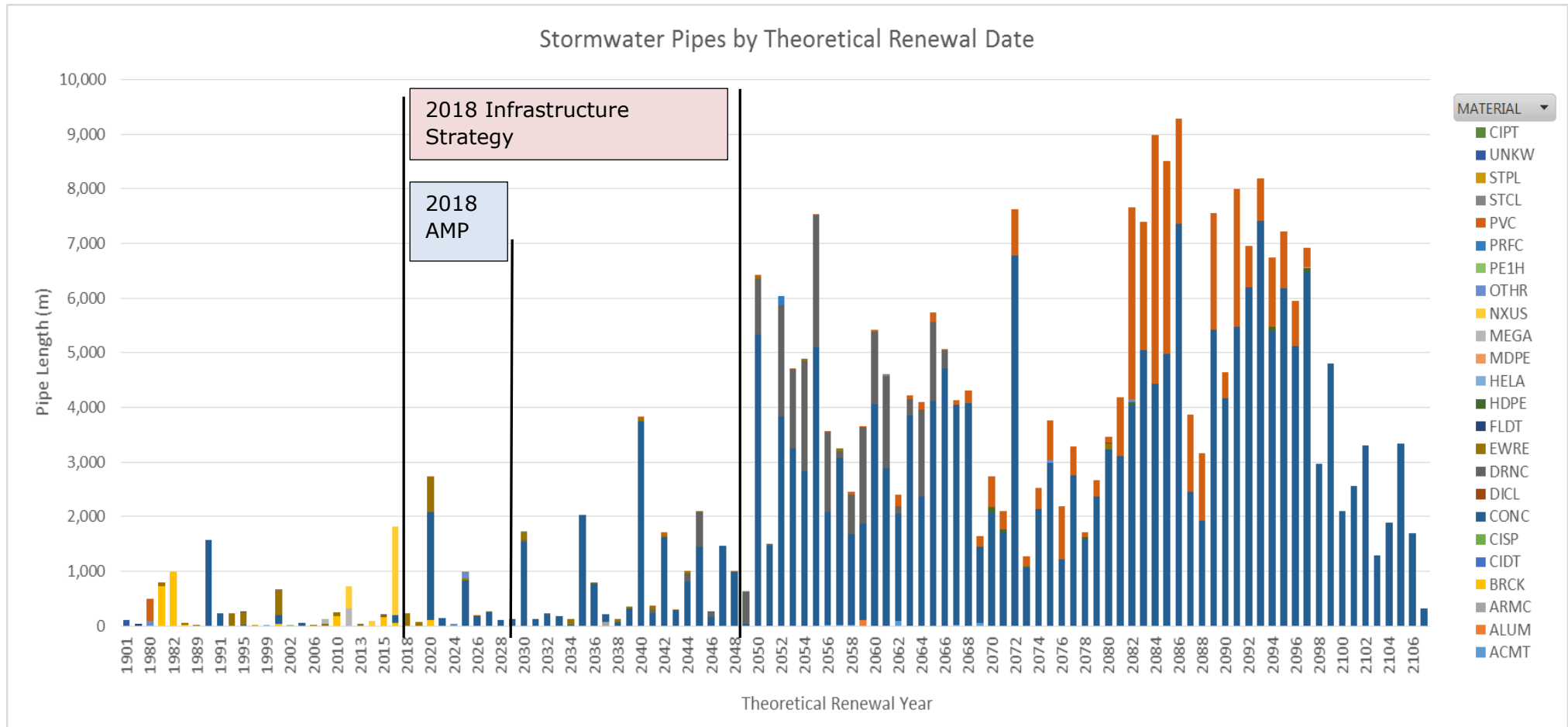
Table ES-5: Pipe Asset Lives from new

Material	Life
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

The following figure shows the theoretical renewal year of the pipe assets based on renewal by age. As stormwater pipes are generally performing better than those in the wastewater and water networks we are proposing to review the theoretical asset lives over the first three years of this plan.

Figure ES-12: Theoretical Renewal Year / Material Distribution





vii 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 taking
- 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 31000:2009.

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

The following consequences are considered:

- Safety
- Health
- 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 specific objectives that guide the Stormwater and Flood Protection risk analysis are taken from the Stormwater and Flood Protection levels of service:

- 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 the Flood Protection Asset management Plan

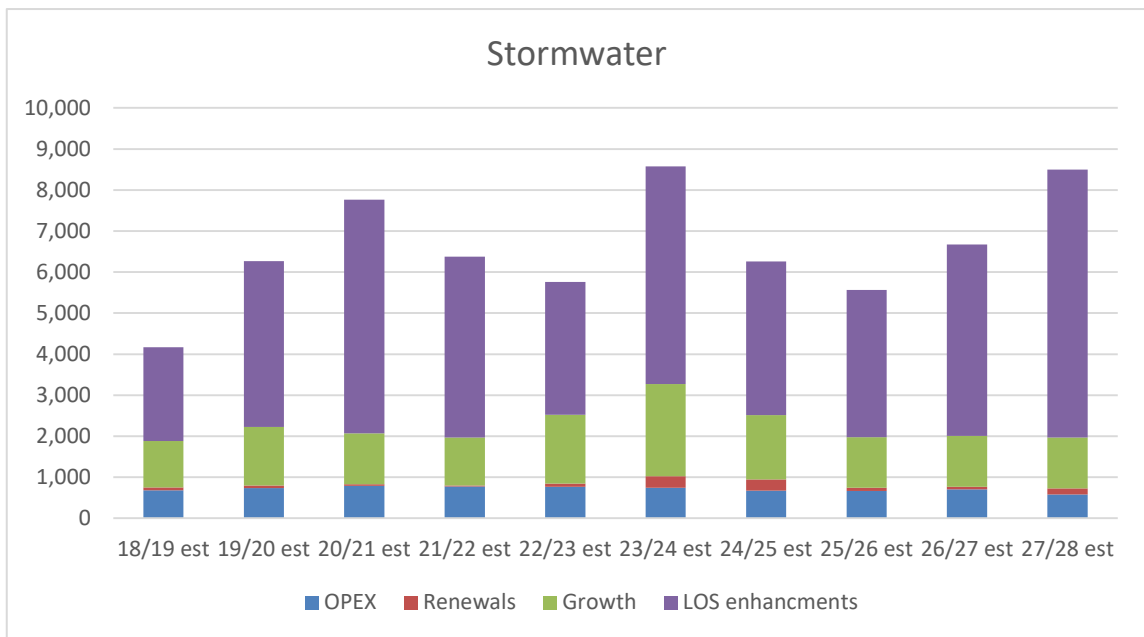
As noted in the priority section, uncertainty around possible future LOS changes (eg Freshwater NPS) and the risk-based decision framework feature in this area.

viii Financial summary

Stormwater Expenditure

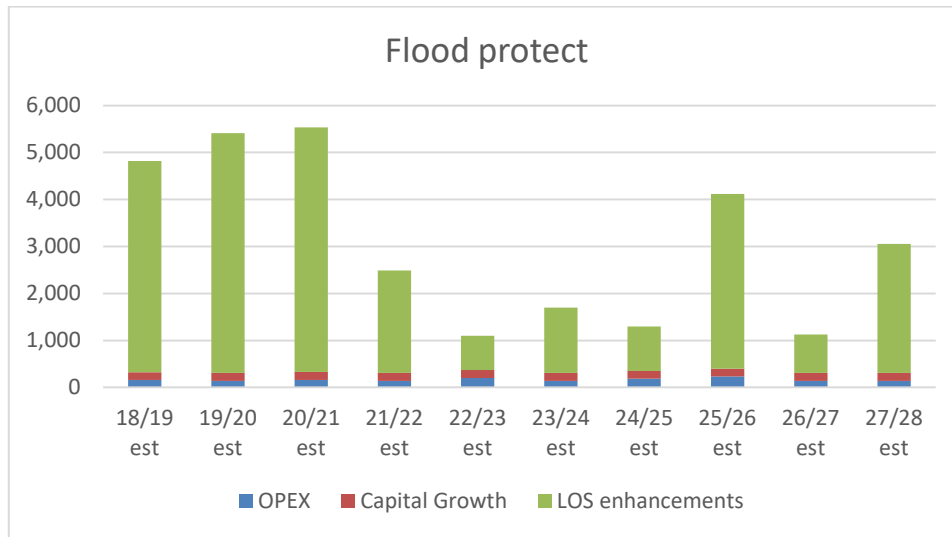
The following graphs chart the proposed expenditure for the next ten years.

Figure ES-13: Stormwater proposed expenditure to 2027/28



Expenditure for the stormwater activity is relatively constant over the term of the plan. The slight spike in years 2023/24 and 2027/28 relates to three larger construction projects (Main Road Stoke, Halifax Street and Rutherford St) coinciding in the same years. As both of these projects are best constructed with road upgrades the final timing of them may change over the next ten years.

Figure ES-14: Flood Protection proposed expenditure to 2027/28



Expenditure on the flood protection activity reduces after 2020/21 when the construction of the Saxton Creek upgrade is expected to be largely complete. Options for future flood response projects will be developed using a risk based approach over the next three years.

Table ES-6: Stormwater & Flood Protection Expenditure Years 1-10 of the 2018/28 Long Term Plan (\$000)

Account	2018/19 LTP Final Uninflated	2019/20 LTP Final Uninflated	2020/21 LTP Final Uninflated	2021/22 LTP Final Uninflated	2022/23 LTP Final Uninflated	2023/24 LTP Final Uninflated	2024/25 LTP Final Uninflated	2025/26 LTP Final Uninflated	2026/27 LTP Final Uninflated	2027/28 LTP Final Uninflated
6510 Stormwater	4,171.8	6,264.8	7,767.1	6,374.3	5,760.5	8,578.2	6,261.6	5,563.3	6,675.9	8,497.5
Expenses	682.9	736.3	788.8	774.6	767.5	746.4	675.1	666.5	703.6	580.5
Base Expenditure	277.1	269.1	277.1	259.1	267.1	259.1	267.1	259.1	267.1	259.1
Unprogrammed Expenses	220.0	220.0	220.0	240.0	240.0	240.0	240.0	240.0	240.0	240.0
Programmed Expenses	185.8	247.3	291.7	275.6	260.3	247.4	167.9	167.5	196.5	81.5
Capital Expenditure	3,488.8	5,528.5	6,978.3	5,599.6	4,993.1	7,831.8	5,586.5	4,896.8	5,972.4	7,917.0
Renewals	70.7	65.0	45.0	25.0	75.0	275.0	275.0	76.2	66.2	150.0
Capital Growth	1,129.0	1,423.1	1,237.1	1,171.9	1,679.9	2,247.1	1,561.4	1,237.1	1,237.1	1,237.1
651076102838. Marybank / Tresillian Ave	0.0	54.1	108.1	10.5	540.5	1,000.0	0.0	0.0	0.0	0.0
651076102863. Network Capacity Confirmation for Growth Areas	0.0	0.0	0.0	0.0	0.0	108.1	108.1	108.1	108.1	108.1
651076102961. York Terrace	0.0	0.0	0.0	32.4	10.4	10.0	324.3	0.0	0.0	0.0
65107691. Vested Assets	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0
651076912826. Hill Street North stormwater	0.0	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Increased LOS	2,289.2	4,040.4	5,696.2	4,402.7	3,238.2	5,309.7	3,750.1	3,583.5	4,669.0	6,529.9
651079101057. Capital: Poynters Cres	0.0	0.0	30.0	10.2	21.6	300.0	0.0	0.0	0.0	0.0
651079101071. Capital: Shelbourne St s/w upgrade	0.0	0.0	54.1	162.2	0.0	0.0	0.0	0.0	0.0	0.0
651079101173. Capital: Freshwater Improvement Programme	0.0	0.0	50.0	50.0	50.0	25.0	25.0	100.0	100.0	100.0
651079102051. Capital: Rangiora Tce	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.1	0.0	0.0
651079102054. Montcalm/Arrow/Wash Vly/Hastings	37.9	1,081.3	1,081.0	756.7	0.0	0.0	0.0	0.0	0.0	0.0
651079102055. Capital: Viewmount/Ridgeway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	17.0	10.2
651079102059. Capital: Arapiki Road	0.0	0.0	40.1	10.2	250.3	0.0	0.0	0.0	0.0	0.0
651079102061. Capital: Main Rd Stoke (Hays cnr - Louis)	0.0	0.0	40.0	10.0	10.0	550.0	0.0	0.0	0.0	0.0
651079102062. Capital: Main Rd Stoke (Louisson - Marsd)	0.0	0.0	40.0	10.0	10.7	752.7	0.0	0.0	0.0	0.0
651079102068. Capital: Railway Reserve/ Newall/Bledisloe	0.0	0.0	0.0	0.0	0.0	0.0	54.1	24.1	24.1	540.5
651079102074. Capital: Milton: Grove-Cambria	0.0	0.0	27.0	10.0	246.0	0.0	0.0	0.0	0.0	0.0
651079102075. Capital: Halifax St: Tas-Miltn	0.0	0.0	0.0	0.0	0.0	0.0	25.7	25.7	10.7	900.0
651079102079. Capital: Mount St / Konini St	10.0	10.0	540.5	10.0	10.0	540.5	0.0	0.0	0.0	0.0
651079102095. Airlie St	50.0	0.0	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102097. Tipahi/Eckington	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	270.3	324.3

651079102127. Brougham St	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.4	10.3	10.3
651079102624. LOS: Nile Street East	807.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102814. Anglia/Scotia	0.0	0.0	0.0	0.0	20.1	10.2	10.2	162.2	0.0	0.0
651079102816. Black	0.0	0.0	0.0	10.0	25.0	200.0	0.0	0.0	0.0	0.0
651079102817. Brooklands	55.0	0.0	166.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102818. Cawthron Crescent	30.0	10.4	21.6	225.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102819. Cherry/Baigent/Ridgeway	0.0	0.0	0.0	40.0	20.1	20.4	540.5	0.0	0.0	0.0
651079102820. Collingwood Street	0.0	0.0	0.0	0.0	0.0	0.0	36.5	54.1	21.6	250.0
651079102821. Dodson Valley	0.0	48.6	21.6	120.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102822. Examiner	20.0	54.0	10.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102824. Golf/ Parkers	0.0	0.0	37.8	10.0	10.0	432.4	0.0	0.0	0.0	0.0
651079102825. Hardy (Tasman-Alton)	0.0	0.0	0.0	0.0	0.0	48.6	21.6	10.0	500.0	0.0
651079102827. Isel Place	0.0	0.0	0.0	54.1	21.6	10.2	162.2	0.0	0.0	0.0
651079102828. Jellicoe/Bledisloe/Kaka/Kea/Freyberg/Maple	0.0	0.0	0.0	0.0	0.0	0.0	54.1	20.0	10.5	520.5
651079102829. Karaka	0.0	0.0	0.0	0.0	0.0	0.0	52.7	21.6	10.5	270.3
651079102831. Kauri/Matai/Titoki/Ranui	0.0	0.0	0.0	0.0	0.0	0.0	52.7	21.6	10.5	262.2
651079102832. Kipling	0.0	0.0	0.0	0.0	0.0	0.0	48.6	10.0	10.0	200.0
651079102833. Kowhai	0.0	0.0	0.0	30.0	10.1	250.0	0.0	0.0	0.0	0.0
651079102834. Mahoe/Orsman/Matipo	0.0	0.0	0.0	54.1	54.1	20.0	432.4	0.0	0.0	0.0
651079102835. Manson Ave	0.0	54.1	10.0	10.0	270.3	0.0	0.0	0.0	0.0	0.0
651079102836. Manuka	0.0	0.0	0.0	0.0	0.0	0.0	48.6	20.0	10.0	500.0
651079102837. Martin	0.0	0.0	0.0	0.0	0.0	54.1	20.1	10.6	270.3	0.0
651079102840. Nayland Road / Galway	206.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102842. Ngaio/Maitland	0.0	0.0	0.0	20.3	10.6	450.0	0.0	0.0	0.0	0.0
651079102843. Paru Paru	0.0	0.0	10.8	10.8	10.8	250.0	0.0	0.0	0.0	0.0
651079102844. Pateke	0.0	0.0	0.0	10.8	10.8	108.1	0.0	0.0	0.0	0.0
651079102847. Riverside	0.0	0.0	32.4	10.8	10.8	250.0	0.0	0.0	0.0	0.0
651079102848. Rotoiti	0.0	30.0	10.0	110.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102849. Russell Street Reserve	27.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102850. Little Go Stream upgrade Rutherford St	290.0	1,500.0	1,000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102851. Rutherford Stage 2 - Box Culvert	0.0	62.2	50.0	150.0	0.0	70.3	108.1	108.1	1,081.0	1,081.0
651079102853. Stafford Ave	0.0	0.0	0.0	0.0	0.0	0.0	32.4	21.6	10.6	162.2
651079102855. Tahunanui Hills Stormwater- Moana Avenue to Rocks Road	100.0	90.7	540.5	540.7	540.7	400.0	0.0	0.0	0.0	0.0
651079102858. Totara/Hutcheson	0.0	10.8	10.8	200.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102859. Trafalgar Square (Betts Carpark)	0.0	0.0	0.0	75.7	58.1	58.1	810.8	0.0	0.0	0.0

651079102860. Tui Glen	0.0	0.0	35.0	146.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102861. Vanguard Street Stormwater	316.0	0.0	0.0	0.0	54.1	70.3	200.3	0.0	0.0	0.0
651079102862. Natural Hazards Risk Remediation	0.0	0.0	108.1	108.1	108.1	0.0	0.0	0.0	0.0	0.0
651079102874. Beach Road	0.0	35.0	10.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102875. Ariesdale/Thompson Tce	0.0	0.0	0.0	30.0	250.0	0.0	0.0	0.0	0.0	0.0
651079102954. Coleridge Place - Secondary flow path	0.0	0.0	0.0	0.0	0.0	20.5	10.5	84.1	0.0	0.0
651079102955. Harford Court - secondary flow path	0.0	0.0	0.0	0.0	21.6	11.6	86.5	0.0	0.0	0.0
651079102956. Marsden Valley Cemetery diversion	0.0	0.0	0.0	0.0	0.0	21.6	10.8	189.2	0.0	0.0
651079102957. Orakei/Tamaki/Rangiora Intersection	0.0	0.0	32.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102959. Renwick / Wellington Street / Waimea Road	0.0	0.0	54.1	52.7	310.0	0.0	0.0	0.0	0.0	0.0
651079102960. Seaton/Allisdair	0.0	54.1	20.1	10.5	216.2	0.0	0.0	0.0	0.0	0.0
651079102971. Beatson Road	0.0	0.0	0.0	0.0	54.1	54.1	20.3	324.3	0.0	0.0
651079103089. Strawbridge Sq Stormwater improvements	0.0	0.0	0.0	10.0	10.0	60.0	0.0	0.0	0.0	0.0
651079103218. Emano Reserve Stormwater	10.0	10.0	10.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111059. Private Drains/Sub	0.0	0.0	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0
651079111060. Pvt/Public Drains	58.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1
651079111069. Tosswill to Tahuna Stormwater Upgrade	100.0	30.0	20.0	450.0	250.0	0.0	0.0	0.0	0.0	0.0
651079111070. Otterson Street to Pascoe Street Stormwater	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	10.0	250.0
651079111106. Athol Street Storm water	0.0	30.0	0.0	30.0	25.0	10.0	500.0	0.0	0.0	0.0
651079111109. Ashdonleigh Grove Storm water	0.0	0.0	20.0	10.0	50.0	0.0	0.0	0.0	0.0	0.0
651079111110. Nile St East Storm water	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111111. Annesbrook Drive Storm Water	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111114. Marsden Road storm water	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111121. Railway Reserve (Bishopdale - St Vincent) stormwater improve	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111196. Piping Ditches	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0
651079112473. Wastney Terrace stormwater (pvt drain prgm)	0.0	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112589. Stansell Pvt/ Pub Drains	55.0	5.0	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112815. Bisley Avenue	50.0	0.0	0.0	10.0	5.0	50.0	0.0	0.0	0.0	0.0
651079112830. Kauri Street	10.3	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112846. Public/Private Drains & Open Chanel Upgrade Progra	0.0	0.0	0.0	0.0	54.1	54.1	54.1	540.5	540.5	540.5
651079113143. Haven Rd open channel upgrade	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	25.0	350.0
651079113145. Nikau Rd open channel upgrade	0.0	0.0	0.0	0.0	0.0	0.0	20.0	10.0	10.0	150.0
651079122090. St Vincent/Hastings St Culvert	10.0	10.0	10.0	10.0	30.0	100.0	152.0	1,500.0	1,500.0	0.0

65107997. LoS: investigation, options, testing, engagement	-18.1	-75.8	-114.0	-109.1	-87.6	-50.9	-81.5	-14.8	0.0	0.0
6520 Flood Protection	4,817.1	5,408.1	5,532.9	2,486.3	1,101.2	1,700.1	1,293.6	4,117.8	1,129.2	3,055.4
Expenses	157.2	140.9	161.1	140.9	201.7	140.9	183.3	233.2	140.9	140.9
Base Expenditure	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9
Unprogrammed Expenses	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Programmed Expenses	16.3	0.0	20.2	0.0	60.8	0.0	42.4	92.2	0.0	0.0
Capital Expenditure	4,659.8	5,267.1	5,371.8	2,345.3	899.5	1,559.2	1,110.3	3,884.6	988.3	2,914.5
Capital Growth	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0
65207691. Vested Assets	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0
Capital Increased LOS	4,493.8	5,101.1	5,205.8	2,179.3	733.5	1,393.2	944.3	3,718.6	822.3	2,748.5
652079101100. Capital: York Stream Channel Upgrade	0.0	0.0	50.0	20.0	350.0	50.0	50.0	1,500.0	0.0	0.0
652079101178. Maitai flood management	100.0	50.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0
652079102080. Capital: Arapiki Stream	0.0	0.0	0.0	0.0	0.0	0.0	54.1	54.1	54.1	270.3
652079102087. Main Rd Stoke/Poormans St/Culvert op. Fire Station	20.0	20.0	10.0	250.0	0.0	0.0	0.0	50.0	250.0	0.0
652079111088. Capital: Todds Valley Stream upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079111182. Maire Stream: Stage 1	150.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079111387. Brook Stream fish passage	80.0	50.0	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112073. Oldham Creek stormwater upgrade	0.0	0.0	0.0	0.0	0.0	0.0	80.0	50.0	10.0	820.0
652079112625. Review of Jenkins & Arapiki (airport)	0.0	0.0	116.3	54.1	54.0	540.5	0.0	0.0	0.0	0.0
652079112689. Saxton Creek upgrade	2,795.6	360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112721. Wakapuaka Flats Stormwater Network Upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	250.0
652079112867. Orchard Stream	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079112868. Jenkins Stream stormwater upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079112963. Brook Stream Outlet low flow	50.0	0.0	0.0	314.1	0.0	0.0	0.0	0.0	0.0	0.0
652079112965. Emano Street Channel	0.0	0.0	0.0	0.0	162.2	54.1	54.1	1,000.0	0.0	0.0
652079112966. Murphy Street	0.0	0.0	0.0	0.0	0.0	0.0	100.0	50.0	50.0	1,000.0
652079112967. Orphanage Stream Upgrade - Stage 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.1	50.0	50.0
652079112968. Orphanage Stream / Sunningdale	132.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112969. Poormans Stream	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	50.0	50.0
652079122866. Whakatu Drive (Storage World)	604.4	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079122964. Saxton Creek, Main Rd Stoke Culvert to Sea	150.0	3,023.0	3,783.5	1,125.0	0.0	0.0	0.0	0.0	0.0	0.0
652079123289. Orphanage Stream - bunding and Suffolk Road Culvert	140.0	840.0	640.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

652079902052. Brook Stream Catchment Improvements	0.0	0.0	108.1	108.1	20.0	540.5	540.5	540.5	0.0	0.0
652079902103. Inventory of Urban Streams	238.0	100.0	100.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
652079902104. Inventory of Rural Streams	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1	.2	.2
652079902657. Flood Mitigation	0.0	158.1	158.1	158.1	108.1	108.1	108.1	108.1	108.1	108.1
652079902962. Secondary Flow Paths	50.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65207997. LoS: investigation, options, testing, engagement	-16.3	0.0	-20.2	0.0	-60.8	0.0	-42.4	-92.2	0.0	0.0

ix Asset management practices**Information systems**

All asset information is stored on Arcinfo (a computer based geographical information system) and Infor Asset Management System.

The Council has a number of information systems (Infor, InTouch, Network Model, and closed circuit television archive) that are not integrated. The ongoing integration of these systems will assist in the optimisation of operations, renewals and the ongoing development of the stormwater activity.

Accounting and Financial Systems

The Nelson City Council uses integrated computer software supplied by MagiQ

Geographical Information System

Data captured is required to be accurate to within a tolerance of +/- 0.3m. In inaccessible areas, it is not considered economic to search for buried fittings and the best estimated position has been entered with the accuracy limitation flagged. Procedures are in place to update new data into the Geographical information system on a monthly basis via Nelson City Council engineering staff.

Data on assets associated with renewal and upgrade capital are now updated into the asset register by Nelson City Council Engineering and Finance staff. This ensures a high level of reliability.

Closed Circuit Television

Closed Circuit Television condition inspections are carried out by an external contractor as required, with subsequent condition assessment used to determine whether to repair or replace stormwater mains. The Infor system is used to assist in the selection of pipes to be checked.

The Closed Circuit Television inspection records are inputted into the Infor system via Cleanflow.

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.

x Monitoring and improvement programme

The Nelson City Council Stormwater Asset Management 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 Nelson City Council policy changes that may impact on the levels of service.

The Asset Management Plan will be improved throughout its life cycle as further information about the stormwater system assets are collected in terms of condition, performance and service delivery. Nelson City Council is committed to advanced data

collection and management systems that will allow for a greater appreciation of the performance and condition of the Nelson City Council assets.

Nelson City Council will report variations in the adopted annual plan budgets against the original asset 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 Nelson City 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 Asset 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. \$/m/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.

In 2014 Nelson City Council participated in a Local Government New Zealand benchmarking exercise for water based utilities.

The effectiveness of the Asset Management 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 on a monthly basis
- The ongoing updating of the asset register of the pipe assets when repairs are carried out and the attributes are compared with the asset register attributes
- The development of modelling for the reticulation on a catchment by catchment basis

Table ES-7: Improvement Programme

Improvement Programme
Expand sustainable practice throughout the stormwater and flood protection activity
Improve linkage to Environmental Activity & Transport Asset Management Plans including creating a chart to show the links
Review Levels of Service (especially in relation to sustainability & infiltration)
Improve accuracy of data through review and modification of collection, storage, and auditing
Include a more detailed strategy for critical assets such as open channels and streams and rivers
Expand focus on inter-relationship of network components and development of improved strategies for maintenance, renewals, and upgrades
Ongoing refinement of lifecycle decision making and financial forecasts
Develop Risk Plans
Investigate better reporting options regarding blockages to pipe network so that service requests identify whether a roading or stormwater issue
Improve reporting on response times. The median time reported is currently based on 50% of requests
Complete computer modelling for streams and rivers
Investigate reporting processes and procedures from Infor and maintenance contractors to ensure that the appropriate levels of service and asset management reporting is available
Review condition assessments
Review life expectancy

1. Introduction

1.1. Background

1.1.1. Purpose of the plan

The purpose of this Stormwater and flood protection Asset Management Plan is to support the goal of the stormwater activity by ensuring 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 the Asset Management Plan further supports the purpose by:

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

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 uncontrolled stormwater discharges.

The contribution of stormwater 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 Asset Management planning is to:

Deliver the required 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 (2018-2028) for stormwater collection and 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 asset management plan and in order to avoid un-necessary duplication this plan focusses on the first ten years of the thirty year strategy timeframe.

Proposed Whakamahere Whakatū Nelson Plan

By their nature stormwater or flood protection activities often take place close to or within streams and rivers. The proposed Whakamahere Whakatū Nelson Plan is currently being developed by the Nelson City Council as the replacement for the Nelson Resource Management Plan. While the impact of the plan on the operation of the stormwater network will become clearer as the proposed plan rules are developed it is expected that there will be an increased emphasis on water quality as the proposed plan responds to the National Policy Statement for Fresh Water Management. Any future stormwater and flood protection activities will need to meet the requirements of the proposed Whakamahere Whakatū Nelson Plan when it becomes operative, with cost implications identified in future asset management plans as they become obvious. The proposed plan will also include Council's response to the requirements of the NZ Coastal Policy Statement and the National Policy Statement Urban Development Capacity.

Current Nelson Resource Management Plan

The Nelson Resource Management Plan (NRMP) is the operative plan established under the Resource Management Act 1991. The NRMP 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 was also granted. This consent will expire on the date the proposed Whakamahere Whakatū Nelson Plan becomes operative.

Environmental Activity & Transport Asset 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 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 the catchment.

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 undertaken 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 eg Natural gravel management in beds where practicable, protection of natural river banks, river bank shade through vegetation, protection of fish spawning areas, protection of natural 'pool and riffle' stream bed form, natural meanders where possible.
- Streams and rivers to be free of manufactured obstructions that impede fish passage.
- Improved quality of water discharged to streams and rivers.

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. The respective Asset and 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.

Among the activities that improve water quality are the various riparian planting initiatives under this asset management plan and the environment activity plan, freshwater and sediment contaminant monitoring, controls on storage and use of hazardous materials under the current and proposed resource management plans and the establishment of re-forestation areas under the reserves asset management plan.

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.

Ngā Taonga Tuku Iho Ki Whakatū Management Plan: It is a collective initiative involving five of the six local iwi (Ngati Rarua, Ngati Kuia, Ngati Toa Rangitira, Ngati Te Atiawa, Ngati Koata and Ngati Tama) that gives a big picture approach to the management of nga taonga tuku iho (the treasured resources).

Long Term Plan 2018-28

This asset management plan supports Council in the development of the Long Term Plan 2018-28 by providing the substantiation for budget forecasts put forward in the Draft Long Term Plan for stormwater collection and disposal and flood protection. As the AMP presents the recommendations of the authors for the future operations, maintenance and capital works necessary to meet the levels of service of the utility 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 Plan

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.

Future Development Strategy

In response to the National Policy Statement on Urban Development Capacity Nelson City and Tasman District Council (TDC) are both developing strategies for accommodating projected growth in population and households, as well as the attendant business and other demands this growth will bring. The impact on stormwater volume and quality and flood protection for these future growth areas is one of the key focus areas for this asset management plan.

Land Development Manual

The Land Development Manual 2010 is the document that sets out Council's engineering requirements for developments under the Nelson Resource Management Plan and is the basis of Council's requirements as a network utility operator under the Building Act 2004. A review of the Land Development Manual 2010 is currently underway. The proposed new manual is being developed jointly with Tasman District Council and community stakeholders. As a document that is referenced in the proposed Whakamahere Whakatū Nelson Plan it will be subject to a public notification and submission process.

A major component of the LDM is the revised stormwater and flood protection section. A stronger emphasis on water quality through on-site detention, temperature moderation and ground discharge are being considered.

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. During high rainfall events the rivers and streams transport large volumes of water and sediment with levels of energy that are capable of causing significant damage to property adjoining these areas and within the flood path.

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 12 detention systems. 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 detailed in Figure 1-1 below and discussed in detail in Section 5 – Lifecycle Management.

The inventory of public stormwater services assets owned by Nelson City Council and managed by the Infrastructure division as at June 2016 is shown in Table 1-1

Table 1-1: Summary of Stormwater Activity Assets

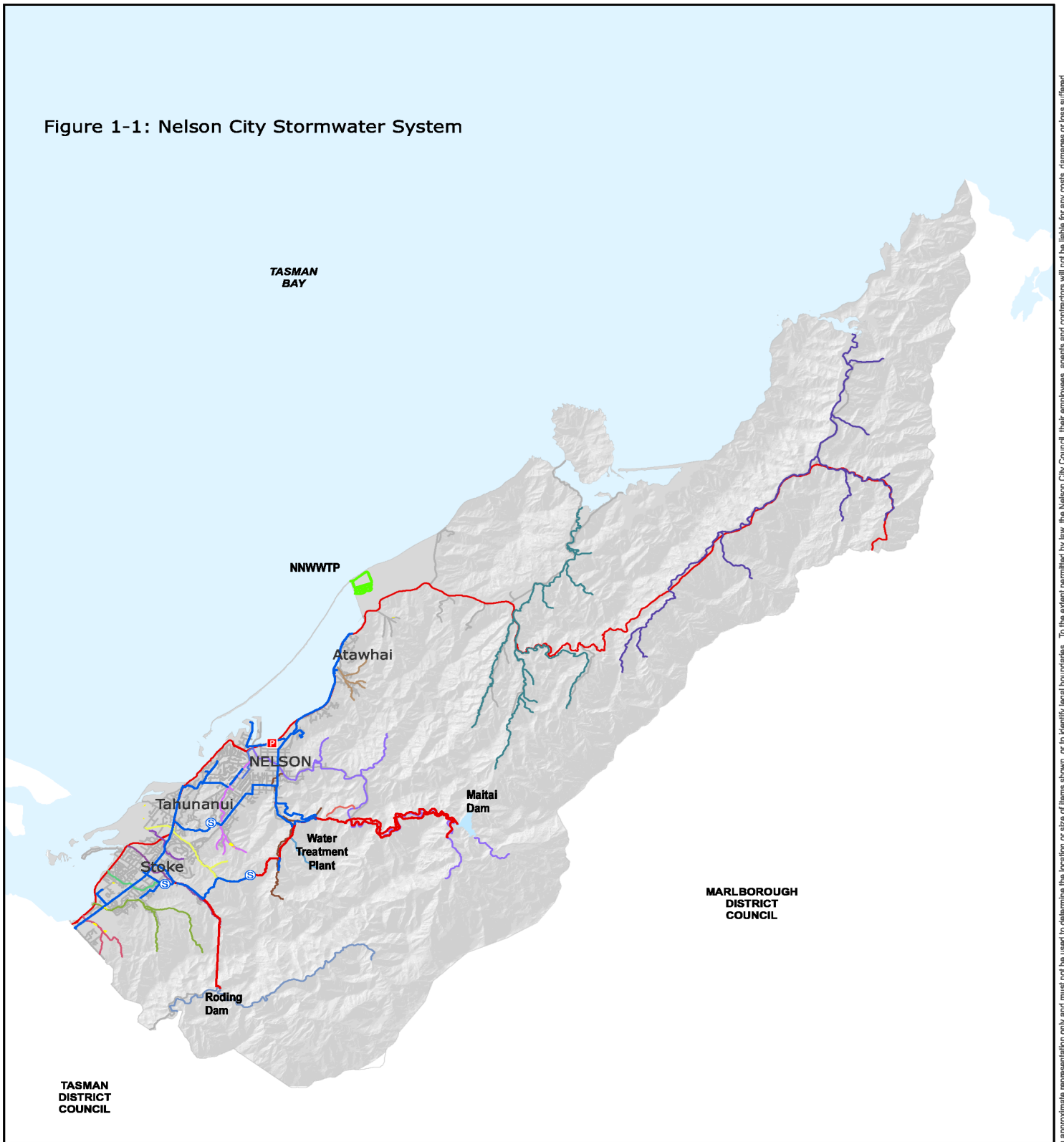
Asset Category	Quantity		
	km	m ²	units
Stormwater			
Pipes Up To 600mm	161.1		
Pipes > 600mm	41.0		
Culverts	6.2		
Rocks Rd Culvert	0.3		
Intakes			110
Manholes			4,563
Outfalls (includes 79 with wing walls)			420
Sumps			606
Pump Stations			2
Tide Gates			24
Detention Dams ²			14
Flood Protection			
Streams/Rivers	31.5		
Bank Protection		59,693	
Channels	1.3		

² Detention dams at Todd Valley x 1, Motueka Street x 1, York Valley x 3, Tasman Heights x 2, Bledisloe Reserve x 1, Ngawhatu Valley Road x2, The Ridgeway at Panorama Drive roundabout x 1, Saxton Stream x 1(new), Saxton Field x 1(new), Springlea at Frenchay Drive

Table 1-2: Rivers and Streams

River	Overall River Length (m)
Orphanage Creek	2,320
Orchard Creek	2,910
Poormans Stream	3,060
Arapiki Stream	2,300
Jenkins	2,980
York	4,590
Brook Stream	2,950
Maitai River	4,600
Todd Valley	1,915
Oldham Creek	1,840
Saxton Creek	2,100
Total	31,565

Figure 1-1: Nelson City Stormwater System

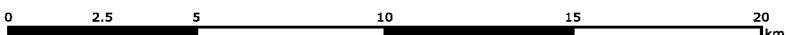


**RIVERS AND STREAMS
KEY INFRASTRUCTURE -
UTILITIES**

- | | | |
|------------------|-----------------|----------------------------------|
| Arapiki Stream | Poomans Stream | Trunk Watermain |
| Glen Creek | Roding River | Maitai & Roding Dams Supply Line |
| Groom Creek | Saltwater Creek | Neale Park Sewer Pumpstation |
| Jenkins Creek | Saxton Creek | Fresh Water Storage Tanks |
| Maitai River | The Brook | NN Treatment Plant |
| Oldham Creek | Wakapuaka River | Detention Dam |
| Orchard Stream | Whangamoa River | |
| Orphanage Stream | York Stream | |



Scale
1:200,000



The map is an approximate representation only and must not be used to determine the location or size of items shown, or to identify legal boundaries. To the extent permitted by law, the Nelson City Council, their employees, agents and contractors will not be liable for any costs, damages or loss suffered as a result of the data or plan, and no warranty of any kind is given as to the accuracy or completeness of the information represented by the GIS data. While reasonable use is permitted and encouraged, all data is copyright reserved by Nelson City Council. Cadastral information derived from the Land Information New Zealand. CROWN COPYRIGHT RESERVED. MO. Original map size A4. File Ref: A1170286

1.1.4. Key partners and stakeholders in the plan

The plan recognises the following external and internal key partners and stakeholders:

Table 1-3: Key Partners and Stake Holders

Key Partners and Stakeholders	Main Interests
Key Partners	
Tangata Whenua comprising of regional iwi	Environment, cultural heritage
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
Nelson City Council (unitary authority)	Environment
Tasman District Council	Cross boundary watercourses.
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

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 a separate operations and asset management team. Capital projects are managed by specialist project managers in a separate service delivery team.

The day to day operations and maintenance of the network are carried out by an external contractor managed by the team leader – utilities.

Asset management functions are undertaken by separate asset engineers.

1.2. Goals and objectives of asset ownership

1.2.1. 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 expanded by amalgamation of adjoining areas since. Tahuna Board joined the City in 1950, Stoke was transferred from Waimea County Council in 1958, Atawhai in 1968. Whangamoia Riding and the South Nelson area from Saxton Road to Champion Road were further additions in 1989.

The role of Council

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 infiltration of stormwater into the wastewater system, and protects the natural environment.

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.

The Health Act 1956:

Places an obligation on Council to improve, promote and protect public health within the District. The provision of Stormwater services helps to promote and improve public health.

Soil Conservation and Rivers Control Act 1941:

Council has the authority of a catchment board within its territorial boundaries and has the following function: *'It shall be a function of every Catchment Board to minimise and prevent damage within its district by floods and erosion.'*

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

Vision

Nelson is the Smart Little City

Mission statement

We leverage our resources to 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 2018-2028 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 four have direct links with the stormwater and flood protection activity and are discussed in more detail in the Levels of Service section.

1.2.3. Plan framework and key elements

The framework of the Stormwater and Flood Protection Asset Management Plan 2018-28 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)

1.3. AM 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 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 AM Maturity Index. The Nelson City Council Asset Management Policy sets the level of maturity per activity. Refer to the Plan Improvement and Monitoring – Status of AM Practices section of this plan for details about this activity’s current maturity status and target levels of maturity.

2. Levels of service

Asset 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, timelines, 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.

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.

Performance measures that are included in the Long Term Plan are reported on annually, through the Annual Report.

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.	Reliability Capacity

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

Water and Sanitary Services Assessments

The aim of the Water and Sanitary Services Assessments is to enable the Council to gain an overview of the Water and Sanitary Services within its district to help plan and prioritise for any improved level of service and to consider its obligations as a Unitary Authority. Council completed this assessment in 2005. No significant change to the delivery of services has occurred in the intervening period and there are no plans to review the document in the next three years.

Residents' Survey

The purpose of the Residents' Survey is to get statistically representative resident feedback on Council performance which is used to report on performance measures and identify areas for improvement.

Nelson City Council has been conducting annual surveys of residents since the late 1990s, covering a range of topics. Where possible, questions are repeated to enable comparisons over time. Council's current approach to annual residents' surveys is to run a long (20-minute) survey every three years, timed for the year before the Long Term Plan (LTP), for example, 2017. This allows a wider range of topics to be covered to inform LTP decision-making. In the intervening years, such as in 2016, shorter surveys (up to 10 minutes) are undertaken. These focus on collecting data to report on LTP performance measures and to inform Asset and Activity Management Plans.

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.

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.

Flooding is anticipated in the city in heavy rain events where the rainfall intensity is greater than the network can cope with, where sumps are blocked or no stormwater network is available. Council designs the pipes and small open channels in the stormwater network for storms of approximately a 15 year return period due to cost. Flooding from events greater than this is expected. Council has a regular sump clearing and maintenance programme but seasonal events such as the autumn leaf fall can lead to local blockage of sumps in streets. Residents keeping an eye on these areas is much appreciated. Council also has a programme to extend the stormwater network throughout the city and improve the existing network, particularly on hillside areas where slips can develop. Different options for the disposal of stormwater are also being looked at by both Nelson City Council and Tasman District Council. An increasing emphasis on detention of stormwater or discharge back into the ground in appropriate areas is being considered.

Council is in the process of developing a programme to provide a targeted response to flooding following a risk based approach. Upgrading streams and rivers is one part of the response and careful design of new buildings and the location of future growth areas are the others. Council is currently upgrading the flood response measures to Saxton Creek, Orphanage Stream, York Stream and Little-Go stream. A comprehensive flood modelling exercise is also underway covering the thirteen larger streams and rivers in the city. Council endeavours to help property owners with flooding issues but this will always be limited by the multiple demands on contractors during a storm event. As with all natural hazards residents are encouraged to prepare as best they can for these before they happen.

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

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. Council’s community outcomes are set out in the Long Term Plan 2018 – 2028.

Table 2-2: Link between Community Outcomes and the Stormwater and Flood Protection Activity

Community Outcome	How this Council activity contributes to the 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 modified environments 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 and to protect ecosystem health as a NPS-FM mandatory attribute.
Our urban and rural environments are people-friendly, well planned and sustainably managed	Homes, facilities and people are protected from the adverse effects of rainfall events by a well-managed stormwater and flood protection network. Sufficient and appropriate stormwater infrastructure is provided to ensure residential and business growth projections are achieved.
Our infrastructure is efficient, cost effective and meets current and future needs	A good quality, sustainable and affordable stormwater and flood protection network meets the needs of our current and future community.
Our region is supported by an innovative and sustainable economy	Impact on businesses and economic activity are minimised by understanding and managing the stormwater and flood protection network to protect people and property.

The District and the community outcomes have been developed to provide a link between community issues and the current stormwater goal.

GOAL OF THE STORMWATER AND FLOOD PROTECTION ACTIVITY
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 uncontrolled stormwater discharges.

The Wastewater Asset Management Plan will also be reviewed in conjunction with the Stormwater and Flood Protection Asset 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 ground water infiltration into the wastewater network and providing property owners with an alternative to discharging stormwater directly to the wastewater network).

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:

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

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-

(b) to meet the current and future needs of communities for good-quality local infrastructure, local public services, and performance of regulatory functions in a way that is most cost-effective for households and businesses.

(2) In this Act, 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

Sec 11A sets out core services that Council must consider in performing role:

In performing its role, a local authority must have particular regard to the contribution that the following core services make to its communities:

- (a) network infrastructure:
- (b) public transport services:
- (c) solid waste collection and disposal:
- (d) the avoidance or mitigation of natural hazards:
- (e) libraries, museums, reserves, recreational facilities, and other community infrastructure.

14 Principles relating to local authorities

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 interests 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.

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.

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.

Resource Consents Stormwater:

Council seeks resource consents where required for all discrete operational activities and capital work projects. In addition two 'global' consents have been granted for 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 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.

Resource Consents Held for Stormwater and Flood Protection

The resource consents associated with the stormwater and flood protection activity for Nelson City Council are detailed in Table 2-3 below.

Table 2-3: Stormwater and Flood Protection Resource Consents

Consent Number	Consent Type	Consent Expiry Date	Consent Allowance
RM 075499	Discharge of stormwater to fresh water	19 February 2044	<p>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:</p> <ul style="list-style-type: none"> (a) Significant adverse effects on aquatic life; (b) Adverse effects on human health; and (c) The maximum number of <i>E coli</i> shall not be increased by more than 550 <i>E.coli</i>/100 ml of ambient levels (as measured at a sampling point immediately upstream of the discharge point).
RM175025	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/ Nelson Plan become fully operative.	<p>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.</p> <p>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”.</p> <p>Gravel may only be extracted up to 30 metres upstream or downstream of any structure, any removal of gravel beyond 30 metres from any structure shall require the prior approval of the Council’s Monitoring Officer.</p> <p>The placement of rock protection 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. This distance shall be approved by the Council’s Monitoring Officer in consultation with the Consent Holder.</p> <p>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. All exposed ground shall be planted within 3 months of the adjacent works being completed or, if undertaken immediately prior to summer, as soon as the</p>

Consent Number	Consent Type	Consent Expiry Date	Consent Allowance
			next planting season commences. Preference shall be given to the planting of appropriate native riparian species. The Consent Holder shall as far as practicable retain the existing riparian vegetation in the vicinity of the work.
RM 985327	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.	24 August 2033	
RM 115033	Formalise the existing Wood stormwater outfall structure	1 April 2046	
RM 015445	Stormwater discharge into Maitai River Construction of outlet on the Maitai River bank (adjacent to the corner of Collingwood Street and Ajax Avenue)	19 February 2037	<p>After reasonable mixing (see note below), the discharge from the outfall shall comply with the following minimum standards: water</p> <ol style="list-style-type: none"> i. The natural temperature of the shall: <ul style="list-style-type: none"> • Not be changed by more than 2°C; • Shall not exceed 25°C; ii. The concentration of dissolved oxygen shall exceed the higher of 6mg/l or 80% saturation; iii. There shall be no significant adverse effects on the aquatic life arising from the discharge of contaminant into water, a pH change, the deposition of matter on the foreshore or seabed, or any other cause; iv. There shall be no production of any conspicuous oil or grease, films, scums or foams or floatable or suspended material; v. There shall be no conspicuous change in the natural colour or visual clarity of the receiving water; and vi. There shall be no emission of objectionable odour within the receiving water. <p>Note: The mixing zone is defined by points located at 50m downstream from the point where the discharge meets the river and shall include a zone of 50m either side of the discharge outfall over the river base. Beyond this defined "mixing zone", the above standards shall be strictly complied with.</p>
RM 155171	Water permit to temporarily divert water associated with the construction of gravel traps (and the associated removal of gravel) in the beds of Poorman Valley Stream and Orphanage Stream.	11 December 2050	
RM 155373	Land use consent to extract gravel from the bed of Poorman Valley Stream within, and upstream of, the Main Road Stoke culvert.	2 February 2021	
RM 155428	To disturb the bed of Little Go Stream and extract gravel in association with the removal of accumulated gravel	20 January 2051	

Consent Number	Consent Type	Consent Expiry Date	Consent Allowance
	from the gravel trap and clearance of debris from the intake structure within the Stream.		
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.
RM 005433	Upgrade of the Hardy Street East/Tory Street stormwater system with the result being an increased discharge to the Maitai River at an existing discharge point.	1 March 2036	
RM 035215	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. The coastal permit refers to that part of the works that takes place in the coastal marine area and the land use consent refers to the works on land, namely, the laying of either pipes or a culvert underneath the Rocks Road car park. This consent does not include beach renourishment which has been declined.	3 December 2038	
RM 145269V1	To extend the timeframe for reinstatement of fish passage. 187 Champion Road, Nelson.	No expiry date in consent	

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."

National Policy Statement for Freshwater Management 2014

The NPS-FM sets out how Council's will manage water quality and quantity. The NPS-FM requires them to safeguard:

- The life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, of fresh water; and
- The health of people and communities, at least as affected by secondary contact with fresh water;

And to ensure the overall quality of freshwater is maintained or improved while:

- Protecting the significant values of outstanding freshwater bodies;
- Protecting the significant values of wetlands; and
- Improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.

With respect to water quantity the NPS-FM also requires safeguarding of life-supporting capacity, ecosystem processes and indigenous species and ecosystems; while also **avoiding further over-allocation and phasing out existing over-allocation**, improving and maximising the efficient use and allocation of water, and protecting the significant values of wetlands and outstanding freshwater bodies.

New Zealand Coastal Policy Statement

The New Zealand Coastal Policy Statement (NZCPS) 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 and take steps to avoid adverse effects of stormwater discharge to water on a catchment basis. This includes reducing contaminant and sediment loadings in stormwater at source through contaminant treatment and by controls on land use activities, and promoting design options that reduce flows to stormwater reticulation systems at source.

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 Urban Development Capacity

Land use, development and development infrastructure are integrated with each other in a manner that ensures urban environments have sufficient opportunities to meet demand.

The National Policy Statement for Urban Development Capacity (NPS-UDC) requires local authorities to 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 feasible, zoned and serviced while long-term capacity must be feasible, with servicing planned but does not need to be zoned yet.

Local authorities with a medium or high growth urban area also need to provide an additional margin of feasible development capacity over and above projected demand of at least: 20% in the short and medium term; and 15% in the long term.

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.

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 2-4 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 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 2-4: 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	Nil	Minor	Mod	Compliance with MFE and resource consent requirements.
Pest weeds.	Static	Static	√		Mod	Nil	Minor	Mod	Compliance with the Tasman-Nelson Pest Management Strategy.
Environmental									

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	
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	Modelling of catchments to identify reticulation (drains and pipes) that are at capacity and may constrain future development or be at risk of flooding. Upgrade streams and rivers to appropriate capacity on a risk based approach. Plan for floodable areas in city development planning.
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 asset 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. Community engagement, education and regulatory response where appropriate.
Growth is constrained by lack of stormwater infrastructure	Static	Static	√		Minor	Mod	Minor	Minor	NPS-UDC work for Nelson urban area guides to prioritise roll out to ensure demand is met.

Table 2-5: Outlines the levels of service for 2015-25

					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 for the built and natural environment from stormwater discharges	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* 1	No contraventions were identified by regulatory section 2014/15 2015/16 & 2016/17	100% compliance	Maintain	Maintain	Maintain
			Stormwater network extended throughout the city 2	87.5% of projects completed 2015/16	Complete 80% of capital expenditure programme	Maintain	Maintain	Maintain
	Our urban and rural environments are people-friendly, well planned and sustainably managed	Reliability ^An operational stormwater network	Number of blockages per 100km of pipes on an annual basis 3	52 blockages per 100km of pipes 2016/17 53 blockages per 100km of pipes 2015/16 18 blockages per 100km of pipes 2014/15	Less than 25 blockages per 100km of pipes on an annual basis	Maintain	Maintain	Maintain
	Our region is supported by an	Response	The number of complaints received about the performance	10 complaints per 1000 connections 2016/17	No more than 25 complaints	Maintain	Maintain	Maintain

					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)
	innovative and sustainable economy	^Minimise justifiable complaints	of the stormwater system, expressed per 1000 properties connected to the stormwater system* 3	17 complaints per 1000 connections 2015/16	per 1000 connections per year			
Flood Protection	<p>Our unique natural environment is healthy and protected</p> <p>Our urban and rural environments are people-friendly, well planned and sustainably managed</p>	<p>Quality</p> <p>^Protection for the urban built and natural environment from floods through upgrading, maintaining, repairing and renewing assets to standards in the Flood Protection Asset Management Plan</p>	<p>The major flood protection and control works that are maintained, repaired and renewed to the key standards defined in the Stormwater and Flood Protection Asset Management Plan*</p> <p>4</p>	<p>No loss of current service potential evident in any urban streams 2015/16 and 2016/17</p>	<p>Network maintained to its current service potential. Damage from any flood event identified, prioritised and a repair programme agreed with the community. High priority works undertaken as soon as practicable. Network components are renewed to continue to provide their original</p>	Maintain	Maintain	Maintain

					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)	
				design service potential.*				
		Damage to urban property from Maitai River flooding is minimised 3	No reported damage to urban property as a result of flooding 2015/16	Urban section of Maitai River is inspected and maintained annually	Maintain	Maintain	Maintain	
	Reliability	a) The number of flooding events that occur. b) For each flooding event, the number of habitable floors affected. (Expressed per 1000 properties connected to stormwater system)* 3	No flooding events with reported habitable floor damage 2016/17 One flooding event No habitable floor damage 2015/16	No damage from flood events up to Q2 level to more than 10 per 1000 properties per year.	Maintain	Maintain	Maintain	
		The median response time to attend a flooding event, measured from the time that notification is received to the time that service personnel reach the site* 3	Median response time of 25 minutes 2016/17 Median response time of 48 minutes 2015/16 Median response time of less than 30 minutes 2014/15	Median response time is less than 180 minutes*.	Maintain	Maintain	Maintain	

					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)	
Our unique natural environment is healthy and protected	Environmental Sustainability ^Integration of ecological and flood protection requirements in urban sections of streams and rivers	Fish passage in streams is maximised and ecological impact of structures is minimised 4	Fish Passage improvements were designed in 2016/17 Design options for improving fish passage were identified for the Brook St channel 2015/16 A number of projects established to improve freshwater quality in the Maitai river were completed 2014/15	Undertake design of preferred option to improve fish passage to the Brook Street channel	Begin review of fish passage to remainder Brook Street channel	Fish passage in streams is maximised and ecological impact of structures is minimised		
		Channel maintenance works carried out in accordance with resource consents 1	100% compliance with resource consent conditions 2015/16 and 2016/17	100% compliance with resource consent conditions	Maintain	Maintain	Maintain	

^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
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* 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. If the blockage is within the private section of the system and the landowner still wants the repair carried out then the Council’s Maintenance Contractor will carry out the work and invoice the landowner directly.

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 2-6 sets out the response times for system failures that are detailed in the maintenance contract with Nelmac.

Table 2-6: 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. Desired level of service

Some changes to the levels of service have been identified through the review process. Levels of service that were previously met with ease have been ‘tightened’ to provide a more challenging environment for Council and drive incremental improvements and those where levels of service were overly optimistic have been adjusted to reflect realistic targets.

Table 2-7 Outlines the proposed levels of service for 2018-28.

Table 2-7: Levels of Service table 2018 – 2028

					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* 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* 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		No loss of current service potential in any urban streams 2016/17 and 2015/16	Network maintained to current service potential			
			The major flood protection and control works that are maintained, repaired and renewed to the key standards defined in the Stormwater and Flood Protection Asset Management Plan* 3,4	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 5	New Measure	Flood analysis and property impacts identified	Response options identified	Community engagement on	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)
							response options	
			Develop city wide flood protections strategies 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* 2	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* 2	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

* 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.

<p>Measurement procedures:</p> <ol style="list-style-type: none"> 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
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3. Future demand

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

3.1. Demand drivers

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

Table 3-1: Stormwater Demand Drivers

Stormwater Demand Drivers	Changes to Stormwater Activity
Significant population growth and residential expansion into greenfield areas	Development of new development areas on the periphery of the city and increased density in some existing developed areas leading to increased runoff rates as impermeable areas increase.
Changes in Customer Expectations	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
Community Expectation	Enhancing the natural environment of streams and rivers and installation of reticulation to existing streets
Climatic Changes	In recent years, there has been an increase in the incidence of extreme weather events around the world. The general trend for Nelson is of winters being wetter and the other seasons being drier. More frequent heavy rainfall events have been predicted
Legislative National Policy Statements: <ul style="list-style-type: none"> • Freshwater Management • Urban Development Capacity 	<ul style="list-style-type: none"> • Freshwater Management is a cornerstone central government initiative to improve the quality of freshwater bodies in New Zealand. This is expected to impact on 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 develops the freshwater sections of the proposed Whakamahere Whakatū Nelson Plan through 2017/18. • Urban Development Capacity 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 infiltration (into the wastewater system).

3.2. Demand forecasts

Nelson Population and Household Projections: 2018-2028

Nelson’s population projections for the next 10 years are calculated using the Statistics NZ high series projections.

Projections are not predictions and should be used as an indication of the overall trend, rather than as exact forecasts.

Figure 3-1: Population and household projections (high), 2018-2028, Nelson

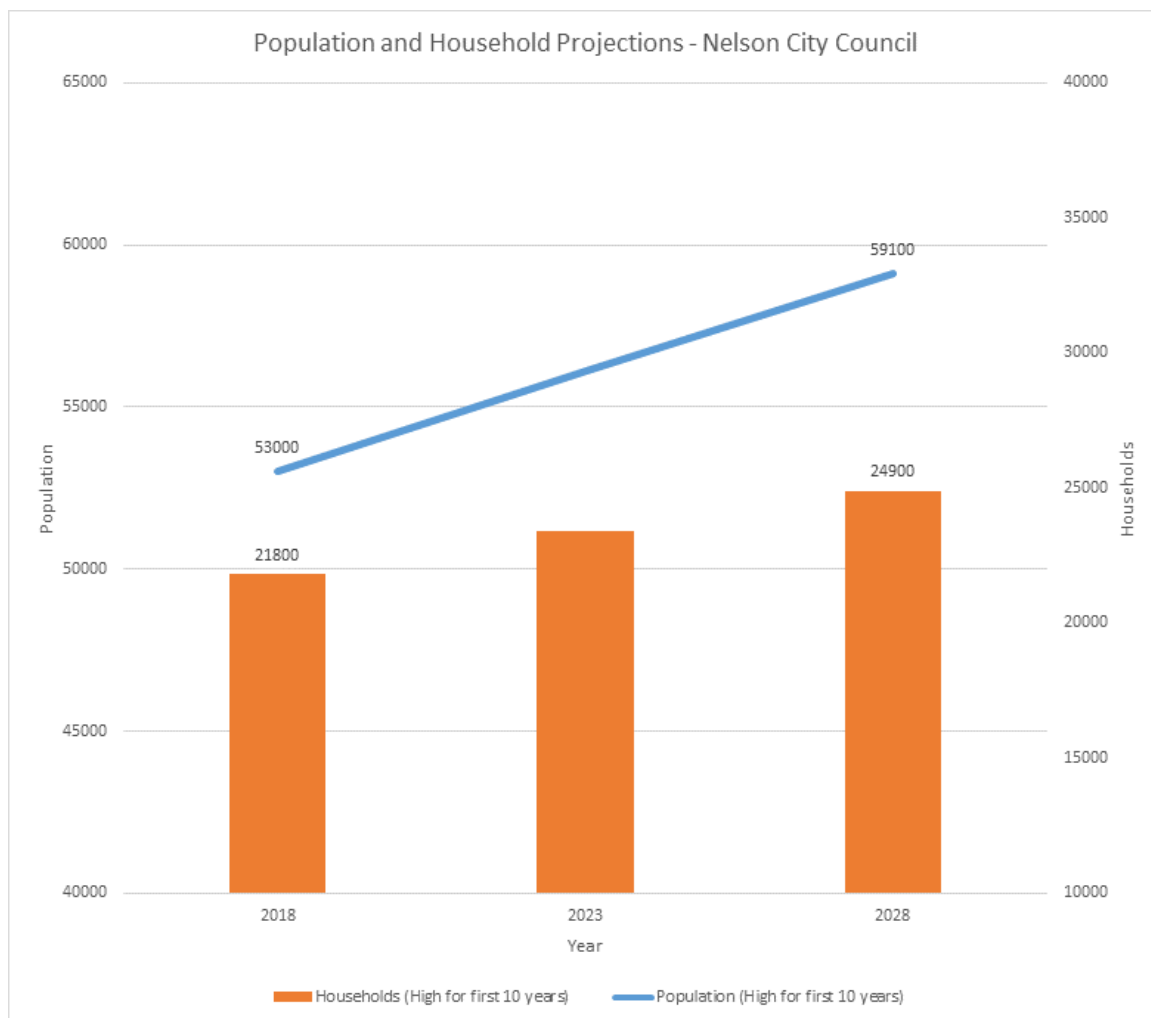
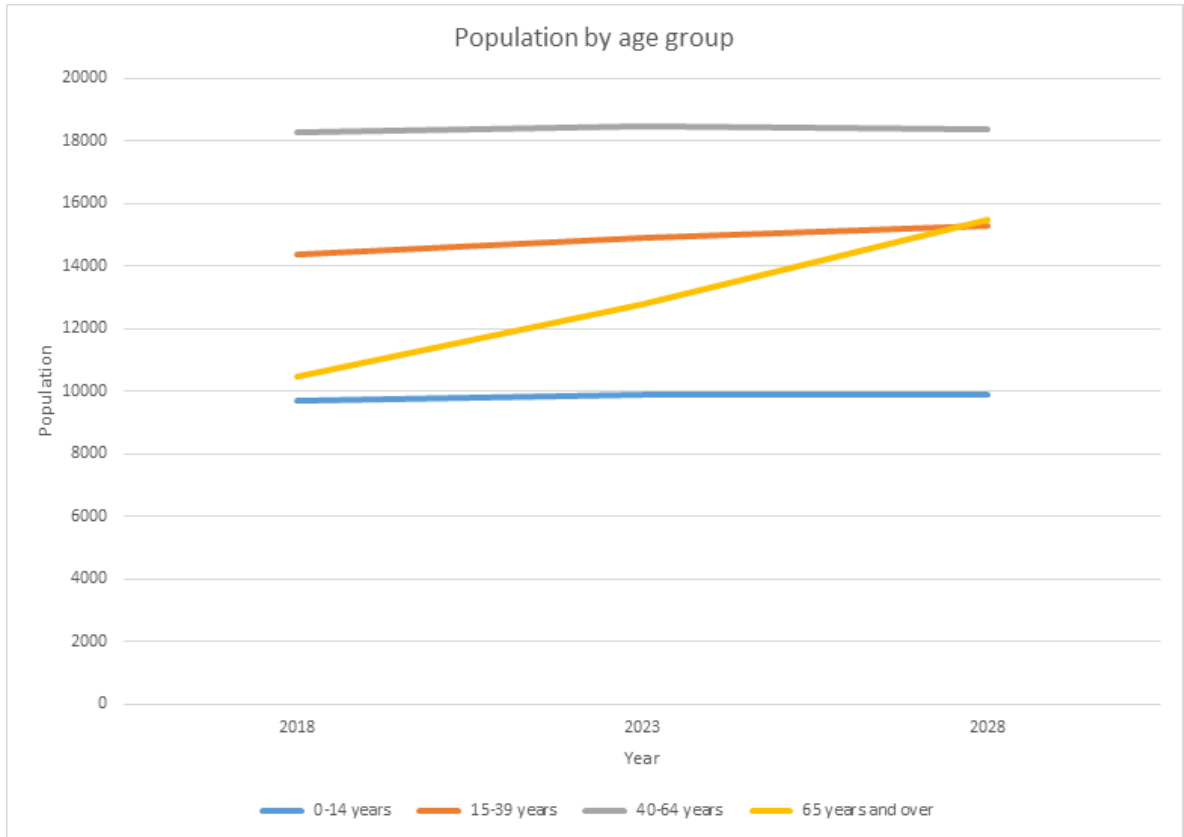


Figure 3-1 shows that, under the high growth scenario, population is projected to increase by 6,100 residents between 2018 and 2028 and the number of households in Nelson will increase by 3,100 households between 2018 and 2028.

One of the key issues facing Nelson is the aging of its population. An aging in the population has a significant impact on what sort of services Council will be required to provide and the ability of future residents to fund rate.

Figure 3-2 shows the projected trends for each age group from 2018-2028.

Figure 3-2: Population Age Trends



Projected demand for National Policy Statement – Urban Development Capacity

The National Policy Statement for Urban Development Capacity (NPS-UDC) requires local authorities to ensure there is sufficient development capacity to meet demand plus an additional margin (Nelson a medium/high growth urban area):

- in the short term (within 3 years) + minimum 20%
- medium term (3-10 years) + minimum 20%
- long term (10-30 years) + minimum 15%

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 Appendix J.

3.3. Demand impacts on assets

Demand for stormwater reticulation is driven by growth in the city and the absence of appropriate alternative disposal options in large parts of the city.

A significant constraint for Nelson is that most of our greenfield residential growth areas are at top of catchment where downstream capacity of streams and the piped network is restricted.

One challenge for central Nelson’s stormwater system is low-lying areas of reclaimed land in the central city. In some parts of town, particularly around Vanguard Street, seawater flows back up the system during very high tides and causes low level flooding. An investigation is currently underway reviewing the York Stream culvert and secondary flow paths in the Vanguard Street / St Vincent Street area as part of the wider Central Business District area impacted by the Maitai River, Brook Stream and York Stream.

A further constraint for alternative ground based disposal options 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 the 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	<p>Protect property from flood damage and the environment from illegal discharges 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.</p> <p>Nelson Resource Management Plan controls storage and use of hazardous materials and discharges from commercial and industrial sites.</p> <p>Flood protection measures include the use of regulations to set minimum floor levels for buildings and standards to ensure adequate secondary flow paths and detention areas.</p> <p>The use of the District Plan to control the areas in which development can occur and the associated density that is permitted.</p> <p>Integrating growth planning with infrastructure provision via the Urban Development Strategy</p> <p>Restrictions on buildings in high flood risk areas by ensuring buildings are sited clear of areas that are at risk of flooding and inundation</p>
Education	Continuation of non-regulatory community engagement programmes (2.1.2 above) to encourage community to reduce contaminants to freshwater

Strategy	Objective / Description
Alternative disposal strategies	<p>Minimising the Effect of Increased Urban Runoff through low impact design for Q₂ rainfall events.</p> <p>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.</p> <p>Nelson City Council also has a need for drainage controls that reduce the quantity of stormwater entering wastewater drainage systems.</p> <p>The implementation of the Nelson Resource Management Plan requires at-risk sites, such as some industrial sites and service stations, to have oil and grit trap provisions.</p> <p>Private detention tanks and community rainwater harvesting and stormwater reduction education.</p>

3.5. Asset programmes to meet demand

Council is concentrating on providing services to areas that are zoned for development (Residential, Rural Zone High Density Small Holdings, Suburban Commercial, Industrial) but are covered by the Services Overlay because one or more servicing constraints have been identified as needing to be addressed prior to the development of that property/area. The projects to facilitate future growth identified in this Asset Management Plan therefore only consist of works required to eliminate servicing constraints on sites zoned for development or as part of the Housing Accord and Special Housing Areas Act 2013 and these have been prioritised in accordance with Council’s strategic planning process. A Map of the areas identified for growth is attached in Appendix J.

Future Urban Development Strategy: Nelson City and Tasman District Council (TDC) are both developing strategies for accommodating projected growth in population and households, as well as the attendant business and other demands this growth will bring and matching it with infrastructure provision as required by NPS-UDC.

Reticulation Capacity

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 asset management plan sets out the areas of the city where stormwater projects are proposed. In addition a number of wider strategies are identified to review the existing network and assess the most appropriate stormwater disposal option(s) for the area.

Progress on reticulation works is very dependent on also having reliable capacity in the rivers and streams that receive the stormwater flows. Council has historically committed to a programme of works for urban rivers and streams for a primary capacity of Q₅₀, 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 design standard and the proposal to adopt Q₁₀₀ as the standard in the joint Nelson City Council/Tasman District Council Land Development Manual unless a specific risk based assessment would suggest an alternative is more appropriate. Due to the proximity of existing properties, structures and land of high natural and recreational value, work on the margins of these rivers and streams is not straightforward. Specific proposals for the Maitai River urban and rural areas are to be developed in the near future as part of a risk based approach.

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 a cost effective service is delivered to the community.

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:

	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. Maintenance relates to preventative maintenance 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 timescale.
	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:

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	Where the cost to maintain or operate an asset is greater than the economic return.
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:

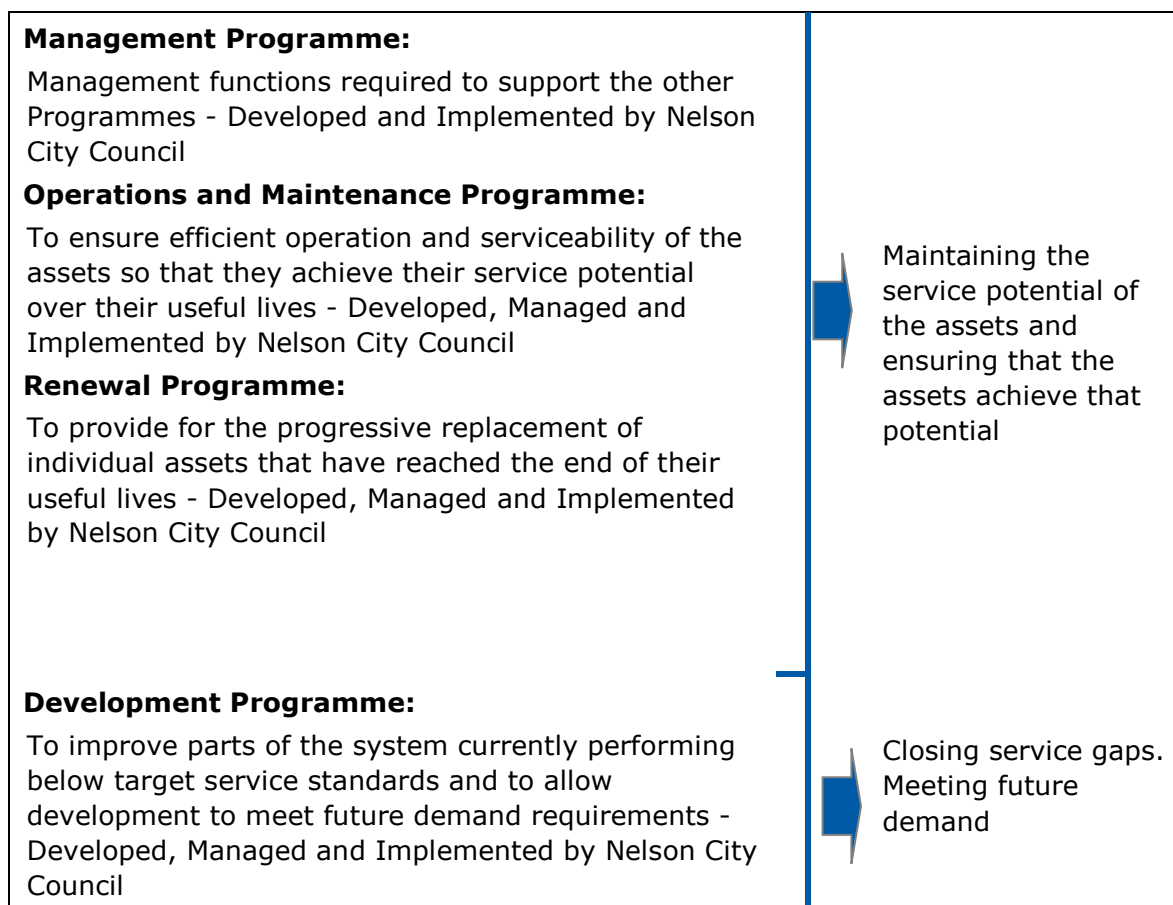


Table 4-1: Management Strategies

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.
Strategic Alignment	This Asset Management Plan will support the achievement of relevant Community Outcomes for Nelson City Council. Community Outcomes for Nelson City Council are 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 this Asset Management Plan.
Service Levels	A clear statement of the stormwater services provided and standards to be achieved that directly link to, and support the stated community outcomes, are shown within this Asset Management Plan.
Sustainable Management	Ensures all planning for the management, operation, maintenance, renewal and development of the stormwater activity is compatible with sustainable management principles.

Strategy	Objective/ Description
	<p>Nelson City Council will pursue ways of limiting the use of natural resources including energy, valued landscapes (and other natural heritage) and adverse effects on waterways. This will involve auditing the systems and materials used, and developing ways to incorporate sustainable operation and development principles into Nelson City Council activities.</p>
Data Management and Utilisation	
<p>Network modelling</p>	<p>Investigate the development of computer-based hydraulic models of the reticulation network and complete the computer flood models of streams and rivers. Computer models of the network enable Nelson City Council to:</p> <ul style="list-style-type: none"> Determine accurately the existing capacity of the system Identify inadequate sections of the system Operate the system in the most efficient and sustainable manner Determine the impact of further development on the system Identify system upgrading requirements Compare options for upgrading the stormwater and flood protection/management network
<p>Data Collection</p>	<p>Data collection programmes (condition, performance, asset registers) closely aligned with business needs will be operated in accordance with documented quality processes</p> <p>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:</p> <ul style="list-style-type: none"> Asset attribute information Asset performance data Asset condition data.
<p>Geographical Information System Data</p>	<p>Geographical information system data will be the subject of defined quality assurance processes.</p> <p>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 storage.</p>
Business Processes	
<p>Asset Management Plan Updates</p>	<p>This Asset Management 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.</p> <p>The scope of the review will be influenced by changes in Community Outcomes for Nelson City Council, service standards, improved knowledge of assets and corporate strategy/ policy and process.</p>
<p>Risk Management</p>	<p>Risk Management is an essential part of Asset Management. Stormwater activity risks will be managed by implementing the Risk Register for the Stormwater activity and the implementation of risk controls to maintain risk exposure at agreed levels.</p> <p>Risk controls will include maintaining appropriate insurance cover, emergency response planning, condition monitoring of critical assets, preventative maintenance, use of Supervisory Control and Data Acquisition, and operations manuals, review of standards and physical works programmes.</p>

Strategy	Objective/ Description
Infrastructure Asset valuation	<p>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 international financial activity and align with the Long Term Plan requirements.</p> <p>Asset valuations are the basis for several key asset management processes including asset renewal modelling and financial risk assessments. Valuations of the stormwater system will be carried out based on data from the Asset Management System to ensure audit ability and alignment with other processes.</p>
Monitoring	
Level of Service Standards	Continue with the monitoring procedures to ensure stormwater 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	<p>The performance of the stormwater assets are monitored as an input to asset renewal and asset development programmes. The Monitoring includes:</p> <ul style="list-style-type: none"> 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	<p>Expenditure programmes for the stormwater activity indicates Council funding and budgets with a 10 year projection.</p> <p>Use the Asset Management Plans to provide sufficient detail to demonstrate the decision making process for those 10 year projections.</p>
Financial management	<p>Manage the stormwater activity budget in accordance with statutes and corporate policy. This involves:</p> <ul style="list-style-type: none"> Economic appraisal of all capital expenditure Annual review of Asset Management Plan financial programmes Recording of significant deferred maintenance and asset renewals Continuous monitoring of expenditure against budget.
Sustainable Funding	<p>Ensure the stormwater activity is managed in a financially sustainable manner over the long term.</p> <p>The financial requirements for the provision of the stormwater activity, sustainable and to acceptable standards over the long term will be identified and provided for in the budgets. These financial requirements include:</p> <ul style="list-style-type: none"> 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.

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

Areas where stormwater rates are taken:

- Maintain and renew current and future public drains
- Upgrade the existing network 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
- 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

Areas where stormwater rates are taken:

- Maintain the current flood channel capacity and repair bank erosion where public assets or private buildings are threatened.
- 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
- 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 Nelson City Council Stormwater System.

Table 4-2: Stormwater Assets

Asset Category	Quantity		
	km	m ²	units
Stormwater			
Pipes Up To 600mm	161.1		
Pipes > 600mm	41.0		
Culverts	6.2		
Rocks Rd Culvert	0.3		
Intakes			110
Manholes			4,563
Outfalls (includes 79 with wing walls)			420
Sumps			606
Pump Stations			2
Tide Gates			24
Detention Dams ³			14
Flood Protection			
Streams/Rivers	31.5		
Bank Protection		59,693	
Channels	1.3		

³ Detention dams at Todd Valley x 1, Motueka Street x 1, York Valley x 3, Tasman Heights x 2, Bledisloe Reserve x 1, Ngawhatu Valley Road x2, The Ridgeway at Panorama Drive roundabout x 1, Saxton Stream x 1(new), Saxton Field x 1(new), Springlea at Frenchay Drive

Table 4-3: Rivers and Streams

River	Overall River Length (m)
Orphanage Creek	2,320
Orchard Creek	2,910
Poormans Stream	3,060
Arapiki Stream	2,300
Jenkins	2,980
York	4,590
Brook Stream	2,950
Maitai River	4,600
Todd Valley	1,915
Oldham Creek	1,840
Saxton Creek	2,100
Total	31,565

Table 4-4: Stormwater Mains, Channels, Culverts and Bank Protection Lengths by Material as at November 2017

Asset Catagory	km
Asbestos Cement	.77
Aluminium	.11
ArmourCoil	.38
ASPH	.13
Brick	2.19
Ductile Cast Iron	.007
Pit Cast Iron	.006
Spun Cast Iron	.15
Concrete (InsituFORM lined)	.07
Concrete	379.45
CRST	.03
Drainage Coil	58.79
Earthenware	6.88
Field Tiles	.2
GABN	.73
Galvanised	.07
GRAV	.03
High-density polyethylene pipe	.59
Helcoil Aluminium	.17
Medium Density PE	.02
MEGA	1
NAPP Not applicable?	5.15
NXUS	3.75
OTHER	.02
OTHR	1.48
PE 100 Material	.01

Pole Construction	.05
Perforated Concrete	.36
PVC	97.02
ROCK	20.89
SOIL	96.14
Steel Concrete Lined	.4
Steel Pitch Lined	.02
TIMB	3.01
UNKW	.51
Grand Total	680.6

Sumps in legal roads are roading assets. Sump leads are also roading assets until they meet a stormwater asset. Culverts and bridges crossing legal roads which have open channels on either side are roading assets. All other culverts are stormwater assets.

Stormwater Runoff

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

- A **primary stormwater system** is designed to minimise nuisance flooding by collecting and discharging stormwater, resulting from moderate rainfall into streams and other watercourses. The primary stormwater system comprises pipes, culverts, open drains, channels, rivers and streams. A **secondary stormwater system** generally comprises overland flowpaths through private property and along roadways designed to convey excess floodwater with a minimum of damage when the primary stormwater system is overloaded. The provision of secondary flowpaths recognises that it is impractical to provide a primary system that can cope with extreme rainfall events.
- A variety of **traps** in the stormwater system designed to reduce the quantities of debris and gravel that are discharged to water bodies.

Reticulation

Increases in the expected rainfall intensities out to 2100 means that a large percentage of the existing stormwater network will not be able to meet the expected storm flows in the future. It is not economically viable to upgrade all these systems over the next 10 years. A project prioritisation process ranks projects based on meeting the requirements for growth areas as a priority.

The purpose of the reticulation system is to minimise nuisance flooding by collecting and discharging stormwater, resulting from moderate rainfall, into streams and other watercourses and prevent damage to or loss of property or amenity. The reticulation system is made up of the following major components:

- Pipes
- Culverts
- Manholes
- Sumps

Install Reticulation System to meet Q₁₅ Rainfall

The design of the reticulation system for a 1 in 15 year flood event, with the provision of suitable secondary flowpaths to carry flood flows in the event of a less probable storm is in the Nelson City Council Land Development Manual 2010.

The Nelson City Council Land Development Manual 2010 states that reticulation systems are designed to a Q₁₅ standard and specified rivers and streams generally to a Q₅₀ standard. This standard requires the reticulation Q₁₅ hydraulic grade to be above the river or stream Q₅₀ level at its outfall where possible.

Where this is not possible, consideration shall be given to the Q₁₅ hydraulic grade line for the reticulation outfall to be lowered to the river or stream Q₁₅ level. Consideration is given to the difference in time of concentrations between the reticulation catchment and the river or stream catchment as this difference will provide an indication of the likelihood of combined peak flows occurring at the outfall.

In flatter areas of the city this design criteria has proved impracticable. In these situations, consideration for the Q₁₅ hydraulic grade line of the reticulation outfall to be

lowered to the river and stream Q₅ level is possible. This can lead to submerged outfalls and the greater probability of surface flooding.

As part of the development of a proposed combined Nelson City Council and Tasman District Council Land Development Manual there is likely to be a range of reticulation design capacities up to Q₁₅ to reflect issues in the Tasman District reticulation. A stronger emphasis on secondary flow paths is also a feature of the document.

Stormwater Pipes

The Nelson City Council has stormwater pipe assets ranging from new to over 100 years old. The distribution of pipe length verses installation year can be seen in Figure 4-1.

The capital works programme for the next 10 year period is based on the following:

- Continuation of the stormwater upgrade strategy
- Upgrade of stormwater network to service future development areas
- Identification of appropriate stormwater disposal mechanisms throughout the city

Figure 4-1: Year of Installation / Material Distribution

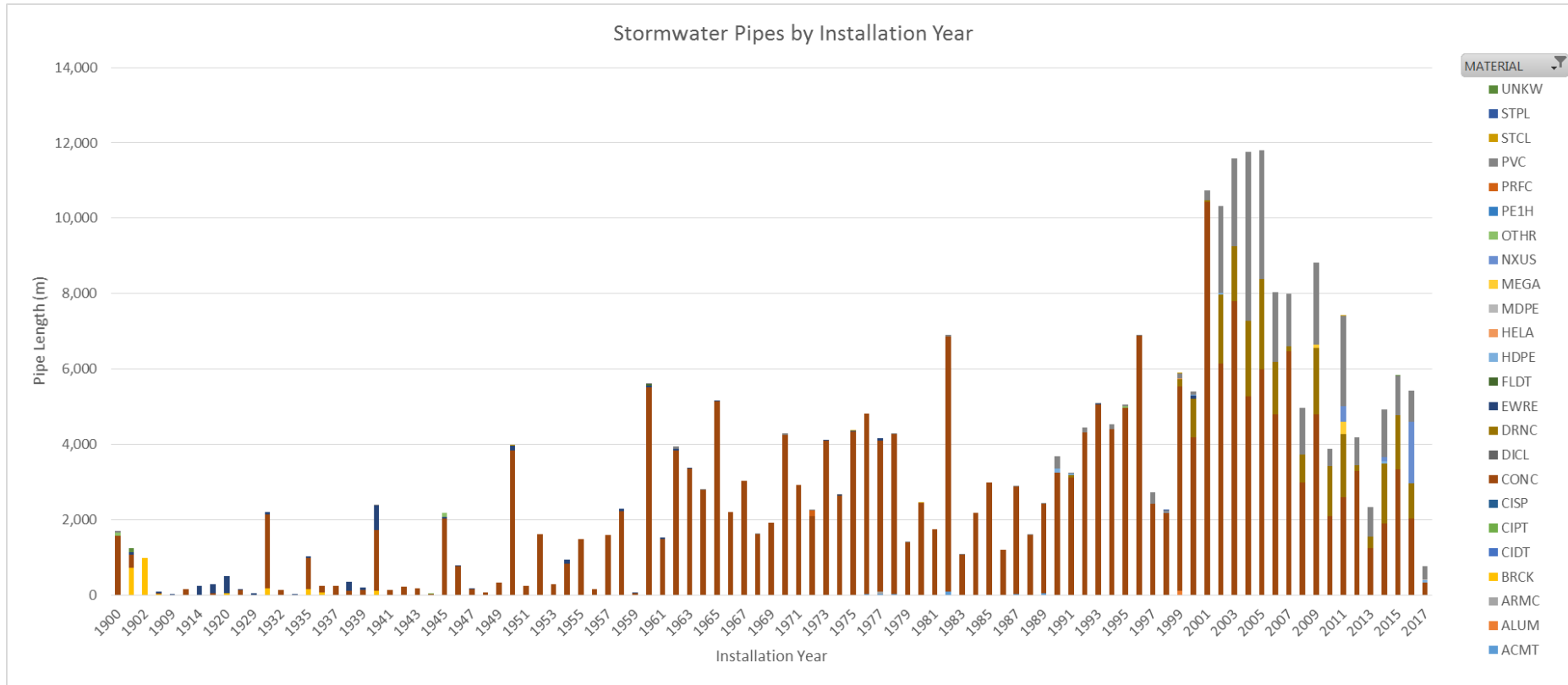
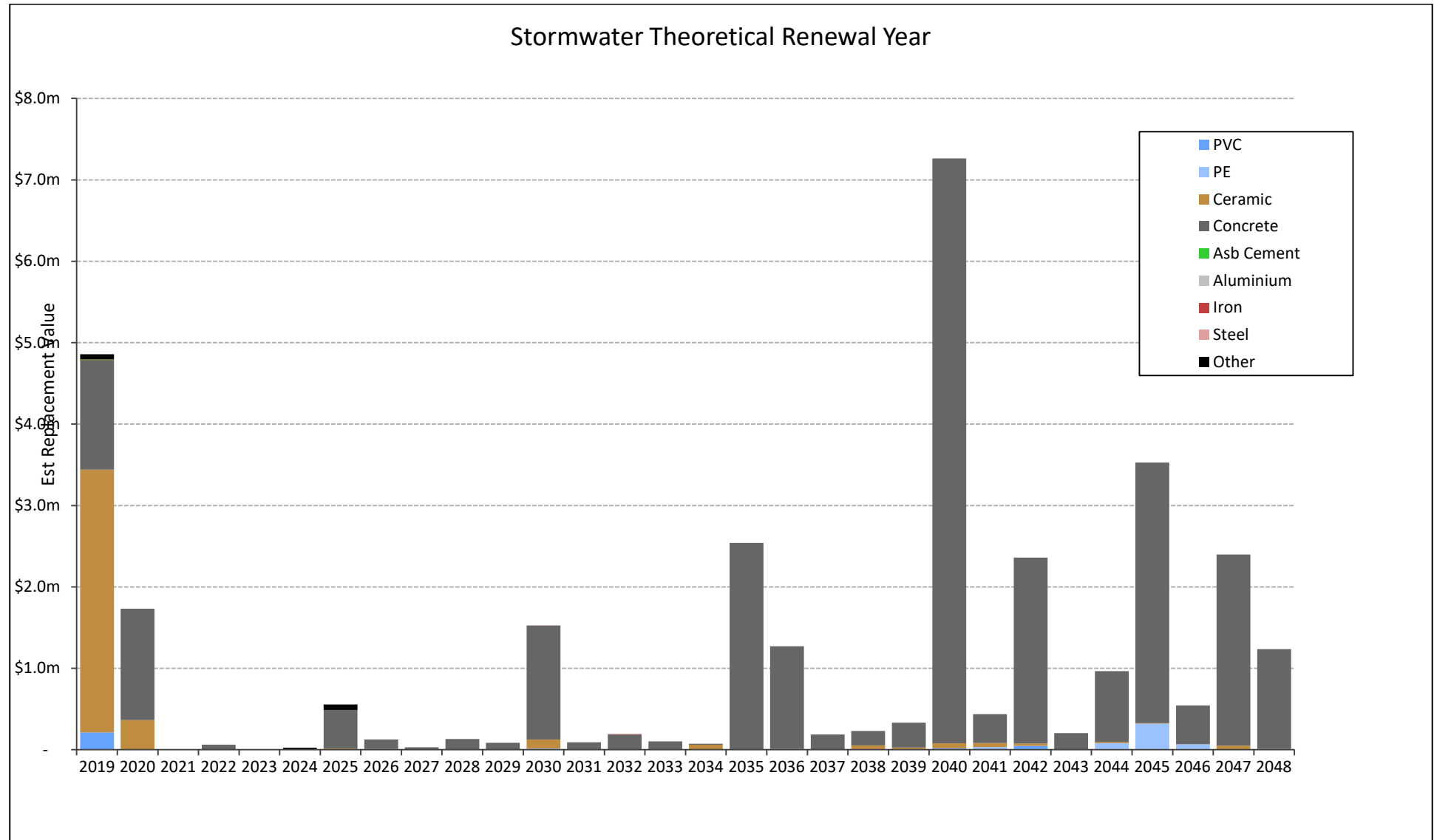


Figure 4-2: Theoretical Renewal Year / Material Distribution



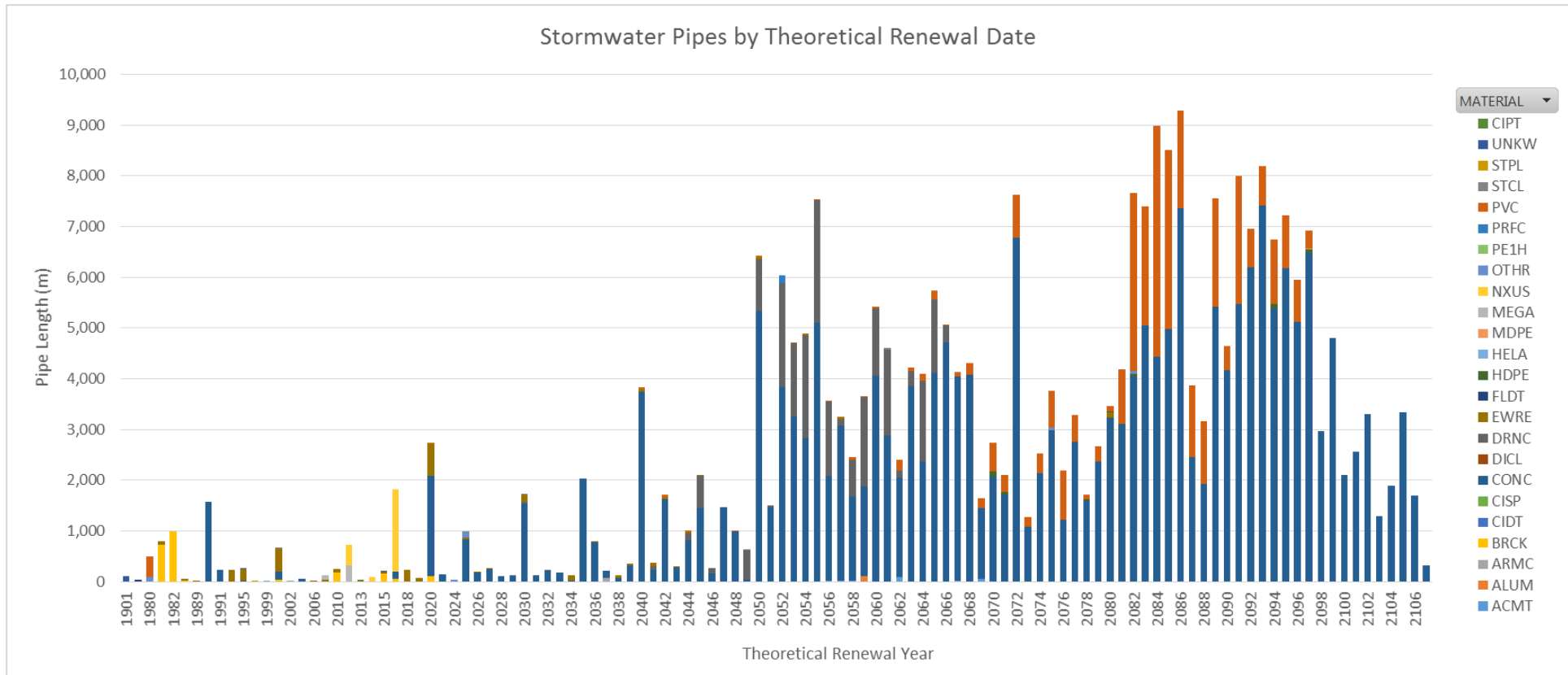


Table 4-5: Working Life of Stormwater Assets (Years)

Material	Life
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 renewals of its assets has been used to vary these base lives.

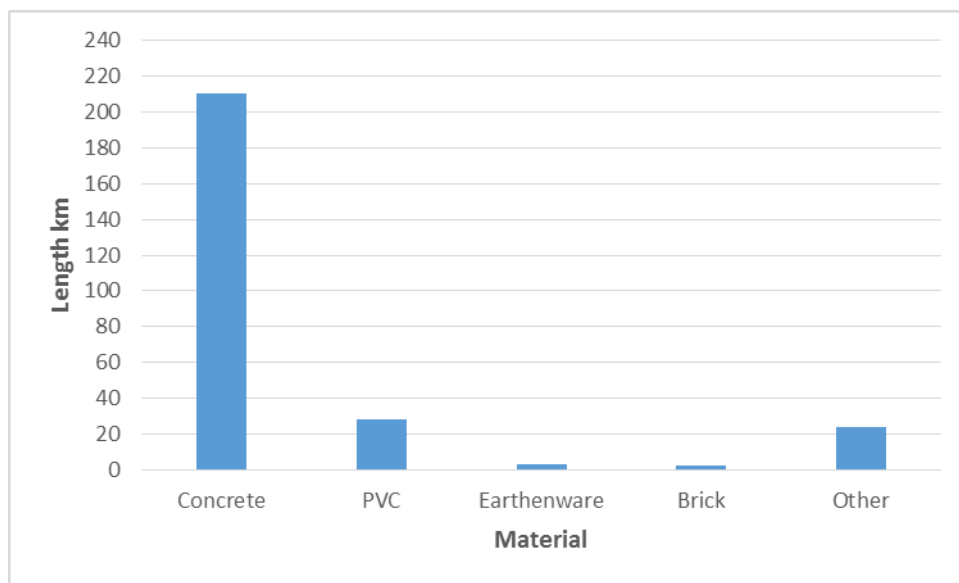
Inspections of a number of stormwater pipes in the network have shown them to be in generally good order. Where good quality materials were used and professional installation techniques followed only minimal levels of wear and loss of service were observed. Most pipes are therefore expected to exceed their estimated service life. However some pockets of poor quality pipe material and installation details have also been found. Further investigation will be carried out over the first three years of this plan to try and identify weak areas of the network and a renewal strategy will be developed to prioritise their replacement.

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

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

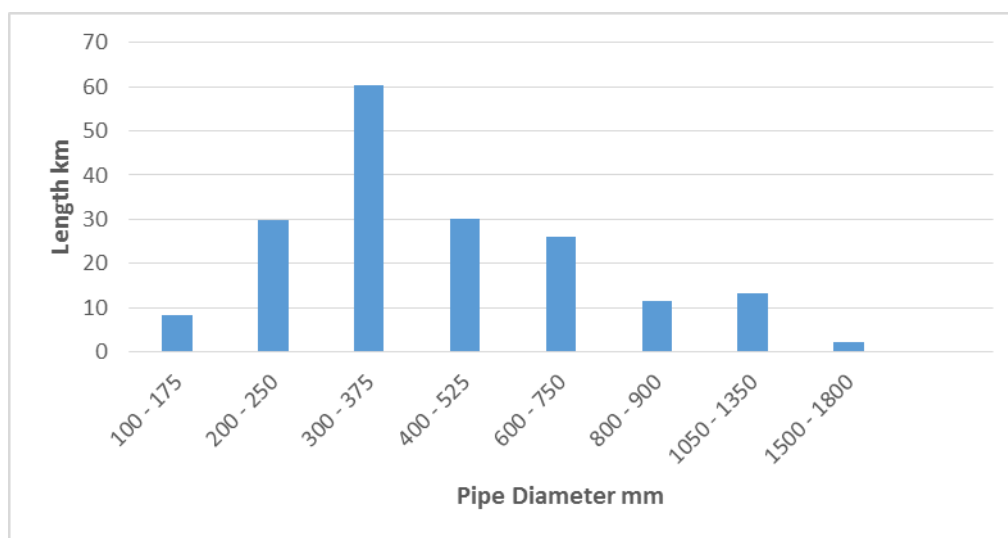
Concrete has been the predominant pipe material used and this can be seen in Figure 4-3.

Figure 4-3: Summary of Pipe Materials



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

Figure 4-4: Summary of Pipe Length Vs Diameter



Culverts

The Council has 6km of culverts of which 0.6km are of brick construction with an install date of approximately 1907. These are located generally in the central city area and in Ngatiawa Street. These culverts are of variable quality, some with bricks dropping out due to loss of mortar jointing and root infiltration 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. This is being monitored for effectiveness prior to a wider application.

The large concrete box culverts in Haven Road/St Vincent Street were inspected by Aurecon in 2010/11 and in 2011/12 temporary propping has been installed and a programme is being developed to identify repair or replacement options.

Manholes

There are approximately 4,600 manholes in the Nelson City Council stormwater network ranging from 1050 diameter to deep trap man holes for grit removal.

Stormwater Outlets

Nelson City Council has approximately 420 stormwater outlets to rivers, streams or salt water, the size and numbers per catchment are shown in Table 4.6 below. Note there are 79 outfalls with wing walls.

Table 4-6: Council Stormwater Outfalls by Pipe Diameter

Creek	Diameter Range mm				Grand Total
	0-299	300-699	700-1299	1300+	
Arapiki	4	13	4	1	22
Brook	25	30	7	1	63
Jenkins	13	16	8	-	37
Maitai	20	26	4	2	52
Oldham	13	13	2	-	28
Orchard	6	13	6	1	26
Orphanage	27	16	4	-	47
Poormans	11	10	1	-	22
Salt Water	11	6	1	3	21
York	42	31		3	76
below York	13	10	1	2	26
Total	185	184	38	13	420

Detention Dams

Fourteen detention dams are located in the Bishopdale and Stoke areas, and are earth/ concrete detention basins with controlled outlets. These detention dams are located at:

- Bishopdale Avenue below No.70
- Clifford Avenue above the Cul-de-sac
- The Ridgeway at Panorama Drive roundabout
- Bledisloe Reserve
- Ngawhatu x 2 (Playing field on Suffolk Rd and above Bridgewater Lane)
- York Valley above Westley Place
- Todd Valley
- Motueka Street
- Tasman Heights x2
- Saxton Creek
- Saxton Field (Orphanage Stream)

- Springlea at Frenchay Drive

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

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 are larger pump stations (Centennial \$890k and Wood \$2.05M) installed due to excessive flooding in Tahuna and the Wood areas respectively, especially coinciding with storm events during high tide. These two pump stations operate as follows:

- Centennial Road pump station operates on average 6x / year. If there are low flows, it will be operated bimonthly as a minimum.
- The Wood pump station averages 2x/year

Proposed changes to the Tahunanui modeller's pond (functions as the outlet to the centennial pump station) would mean the pump station would operate on high tides to pump salt water into the modeller's pond as a weed suppressant measure. This is likely to result in greater operating and maintenance costs.

Pump Station System and Power Failures

All pump stations are monitored by a Supervisory Control and Data Acquisition/telemetry system. In the event of a system or power failure the system notifies on-call operators to take the necessary action. Back up 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

These are open channels that carry some stormwater from public spaces such as roads, parks and reserves and discharge it to channels that flow through private property. 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.

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 further refine 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:

- Orphanage Creek - Through existing urban and industrial development, as of 2003
- Orchard Creek - Songer Street. intake to outfall
- Poormans Valley Stream - Marsden Cemetery to outfall
- Arapiki Stream - Ridgeways detention dam to outfall
- Jenkins Creek - Newman Drive to outfall
- York Stream - York Valley detention structure to outfall
- Maitai River - Jeckells Bridge to outfall
- The Brook - 320 Brook Street to outfall
- Oldham Creek - Through urban sections where stormwater rates are applied
- Todd Valley - Through urban sections where stormwater rates are applied
- Saxton Creek - Through urban sections where stormwater rates are applied

River and Stream Flood Capacity Management



Maitai River, Brook Stream, York Stream Flood Capacity and 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, computer models of these water courses have been constructed. These models will be 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 is 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.

The primary issue being considered is whether or not it is possible to contain flood flows within the "banks" of a modified river cross section and if this is possible, at what cost to the current walkways and reserves that have been developed in these areas.

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.

Sections of the Maitai River adjacent Clouston's Bridge and Riverside Drive are expected to be the focus for initial detailed investigation.

Brook Stream

The Brook Stream is a mix of natural and concrete lined channels, in an increasingly urbanised environment, from the intersection point with the Maitai River to the headwaters above the Brook Motor Camp. There is very limited flow information available for the stream, which has an impact for the Maitai flood protection investigation, as well as initiatives for the Brook stream itself, such as the improvement of the concrete channel section for fish passage. In 2013 Council, through its hydrology contract with Tasman District Council, installed flow monitoring equipment within the concrete channel section. A computer model of the concrete section of the channel has been completed in 2016 that will allow Council to look at options for creating a more natural channel environment and evaluating flood capacity into the future. A trial of a range of materials that may be suitable for the

improvement of fish passage within the concrete sections began in 2016. 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 begun construction of a large 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 Q₁₀₀ (1% probability of occurrence in any year) flow event.

The area from Victory School to the sea is fully enclosed in a box culvert. Flows in excess of the various open channel/culvert capacities must flow overland through the lower Bishopdale/Vanguard Street/St Vincent Street areas to Saltwater Creek.

Currently Council is reviewing the capacity of the main culvert networks in Vanguard Street and St Vincent Street. This work will link with the computer model of the stream that will enable a more accurate assessment of overland flow issues in the area.

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. This previously relied on voluntary public co-operation. A process to identify and establish responsibilities for the maintenance and upgrading of these is required. Some preliminary work has been undertaken by Council's GIS team. This asset management plan includes a project budget line to complete a comprehensive identification of these across the city.

As many of the secondary flow paths will be on private property this process is expected to require extensive site verification and consultation with the property owners affected.

4.1.2. Asset capacity/performance

Managing Stream Floods

The Nelson City Council Land Development Manual 2010 currently requires streams and rivers to have a primary channel design for a 1 in 50 year flood event with a minimum 400mm freeboard and a system capacity to cater for a 1 in 100 year flood event. The Land Development Manual is currently being reviewed with the intention of developing a joint manual with Tasman District Council.

Computer models of the following streams and rivers have been developed in 2016/17 to guide the development of a risk based response to flooding:

- Whangamoia River
- Wakapuaka River
- Hillwood Stream
- Todd Stream
- Oldham Creek
- Maitai River

- Brook Stream
- York Stream
- Jenkins Stream
- Arapiki Stream
- Poormans Stream
- Orchard Stream
- Orphanage Stream

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 for 2017/18-2018/19 for the urban streams 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.

4.1.3. 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 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 for assets with long economic lives will in the future be based on consequence of failure (criticality), remaining life and asset performance (failure modes).

A re-evaluation of the strategy for condition profiling is required to ensure that condition profiling is conducted using a risk based methodology that is at an appropriate industry standard and will comply with Audit requirements.

Current Position on Condition Assessment

Presently the 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 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 4-7 below details an estimate of the condition of the reticulation.

Table 4-7: Condition of Components Estimates (% of total of each component)

	Very Good %	Good %	Moderate %	Poor %	Very Poor %	Total
Reticulation	10	40	30	10	10	202.1km
Intakes	10	40	20	20	10	110
Sumps	20	30	15	15	20	606
Culverts	10	20	40	10	20	6.5 km
Channels	5	30	20	20	25	1.3km
Manholes	20	20	20	20	20	4,563
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 has generally a high confidence in the processes for the attributes data, condition and performance of assets within the stormwater activity as indicated in Table 4.8 below. Where the confidence rating requires to be increased additional resources will be required to resolve this issue.

Table 4-8: 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
Depth						
Material						
Install Date						

Attribute	All Data Estimated	Significant Data Estimated	50% Estimated	Minor Inaccuracies	Accurate	Comment
Location						and field books for information on pipe alignment, material and age and entered this information into the Geographical information system.
Pipe Length						
Pump Stations- all components						
Condition						
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.
Performance						
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.

4.1.4. Asset valuations

The replacement costs of the stormwater and flood protection assets are \$202.8m at June 2016 as detailed in Table 4-8 below. The majority of the replacement costs 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 NCC, which is completed by reviewing all assets and valuing them based on recent costs for similar work within Nelson City Council. This work is peer reviewed by OPUS International 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 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 4-9: Stormwater Asset Valuation – June 2016

Asset Category	June 2016					
	Quantity			RV	DRV	Depr
	km	units	m2	(\$)	(\$)	(\$)
Mains Up To 600mm	161.1			78,577,115	53,247,025	881,768
Mains > 600mm	41.0			54,107,640	34,189,570	599,020
Channels	1.3			273,571	146,922	3,287
Culverts	6.2			16,623,457	11,874,525	185,212
Rocks Rd Culvert	0.3			3,100,197	2,741,632	34,447
Intakes		110		654,114	465,757	8,065
Manholes		4,563		22,358,930	16,539,757	247,955
Outfalls		79		437,281	274,219	7,156
Sumps		606		1,400,207	998,261	15,489
Pump Stations		2		3,471,998	2,019,534	105,870
Tide Gates		24		179,019	89,175	5,143
TOTAL				181,183,529	122,586,375	2,093,411
Flood Protection Asset Valuation						
Asset Category	June 2016					
	Quantity			RV	DRV	Depr
	km	units	m2	(\$)	(\$)	(\$)
Bank Protection			59,693	19,953,182	13,589,824	287,203
Detention Dams		9 ¹		1,702,111	1,512,483	9,400
TOTAL				21,655,294	15,102,307	296,603

Detention dams at Todd Valley x 1, Motueka Street x 1, York Valley x 3, Tasman Heights x 1, Bledisloe Reserve x 1, Ngawhatu Valley Road x1, The Ridgeway at Panorama Drive roundabout x 1. New dams at Saxton Stream x 1, Saxton Field x 1, Ngawhatu at Bridgewater Lane, Tasman Heights, Frenchay Drive will be added to the 2018 valuation.

The 2017 indexed valuation of the stormwater and flood protection assets are Stormwater \$126,585,000 and Flood Protection \$22,478,000.

4.1.5. Historical data

Expenditure trends for the past four years are shown in the following graphs. The increase in flood protection expenditure reflects the response to the 2011 and 2013 flood events.

Figure 4-5: Summary of Stormwater Expenditure Past 4 Years

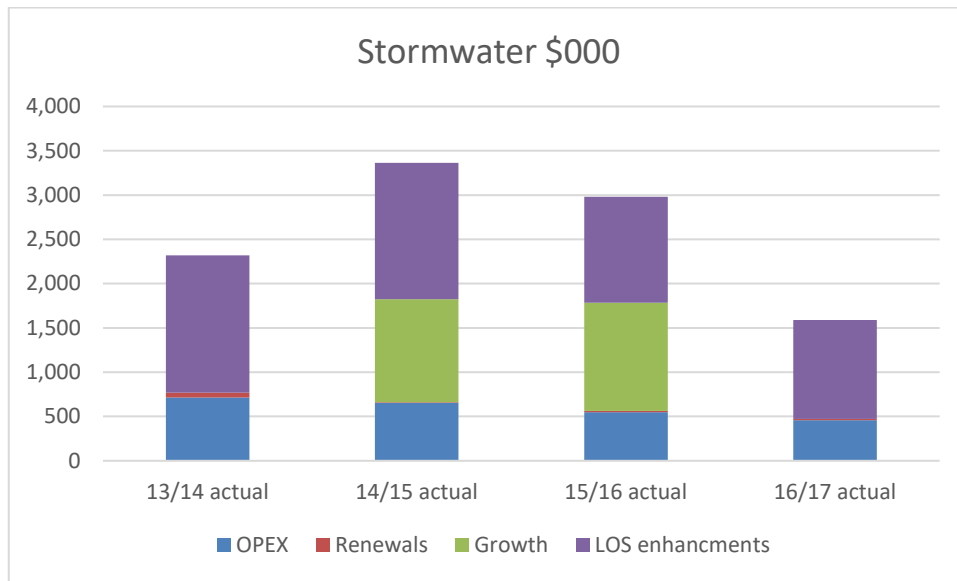
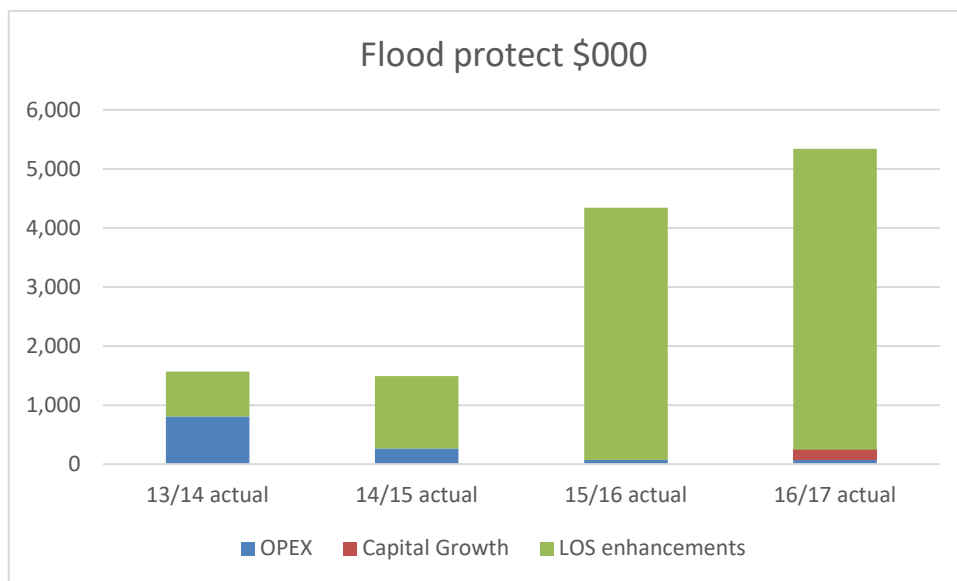


Figure 4-6: Summary of Flood Protection Expenditure Past 4 Years



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:



- Programmed - A base level of maintenance carried out to a predetermined schedule. Its objective is to maintain the service potential of the asset system. 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. Further work moving towards advanced asset management planning techniques for critical components is considered appropriate to apply programmed maintenance programmes to the widest area of components required to ensure the safe and efficient operation of the network. This approach would allow 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:

- Network Services internal utilities business unit for design and Supervision (Nelson City Council).
- NELMAC Limited for all reticulation operations and maintenance (CCTO).
- External contractors for specialist activities such as closed circuit television 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 Maintenance of Utility Services contract.

Level of Service Implications

For the stormwater network to deliver the levels of service it must be intact and functioning. Reactive maintenance must be carried out promptly. Programmed maintenance must be carried out to ensure that downtime is minimised by carrying out maintenance before it becomes reactive.

Demand Implications

With increasing demand there will be an increase in total variable costs particularly as 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.

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.

The following table sets out the operations and maintenance strategies:

Table 4-10: Operations and Maintenance Strategies

Strategy	Objective/ Description
Maintenance	
Preventative Maintenance	Preventative Maintenance will be carried out in terms of defined routine maintenance items and triggers for these activities to be carried out. 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. Individual river and stream maintenance programmes: Bridge, weir, culvert, bank and bed protection, using rock, timber, gabions etc Removal of trees, shrubs and grasses where necessary Cleaning of energy dissipaters, pipe outlets and fish access. Water quality – primary mechanism is Road sweeping:under transport asset 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 All liquid cleanings are disposed to the sewerage infrastructure as trade waste.
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.
Repairs	The detection and repair of faults causing failure will be undertaken as quickly as practically possible. The fault will be isolated and components repaired or replaced as appropriate and then if warranted the item will be tested to ensure that it meets the relevant operational standard.
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 to ensure alternative options are considered and optimum decisions made.
Operations	

Strategy	Objective/ Description
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

Table 4-11: Stormwater and Flood Protection Operations and Maintenance Financial Projections (\$000)

Account	2018/19 LTP Final Uninflated	2019/20 LTP Final Uninflated	2020/21 LTP Final Uninflated	2021/22 LTP Final Uninflated	2022/23 LTP Final Uninflated	2023/24 LTP Final Uninflated	2024/25 LTP Final Uninflated	2025/26 LTP Final Uninflated	2026/27 LTP Final Uninflated	2027/28 LTP Final Uninflated
6510 Stormwater										
Expenses	682.9	736.3	788.8	774.6	767.5	746.4	675.1	666.5	703.6	580.5
Base Expenditure	277.1	269.1	277.1	259.1	267.1	259.1	267.1	259.1	267.1	259.1
Unprogrammed Expenses	220.0	220.0	220.0	240.0	240.0	240.0	240.0	240.0	240.0	240.0
Programmed Expenses	185.8	247.3	291.7	275.6	260.3	247.4	167.9	167.5	196.5	81.5
6520 Flood Protection										
Expenses	157.2	140.9	161.1	140.9	201.7	140.9	183.3	233.2	140.9	140.9
Base Expenditure	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9
Unprogrammed Expenses	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Programmed Expenses	16.3	0.0	20.2	0.0	60.8	0.0	42.4	92.2	0.0	0.0

4.3. Renewal/Replacement plan

Capital Renewal /Replacement

Renewal is major work that does not increase the asset's design capacity but restores, rehabilitates, replaces or renews an existing component to its original capacity. This includes:

- Works that do not increase the 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. 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 is greater than 10% then the difference will be funded from capital.

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 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).

This renewal strategy deals with the reticulation portion of the network –intakes, pipes, valves and associated chambers and outfalls. Pumpstations, telemetry, flow meters and river works are considered separately.

Table 4-12: Renewal Strategies

Strategy	Objective/ Description
Identification of Renewal Needs	<p>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:</p> <p>Potential development in the city</p> <p>Other Council projects</p> <p>e.g. the condition of stormwater pipelines will be inspected prior to major road works to identify the risk of the road being damaged by pipeline failure or the need for pipeline replacement in the short/medium term. Pipelines in poor condition will be programmed for replacement prior to or in conjunction with the road works.</p> <p>Issues identified with asset by location and or materials through condition reports, maintenance records (asset failure and expenditure history), wastewater infiltration studies, request for service (RFS) records, and observations of public, staff and contractors.</p> <ol style="list-style-type: none"> 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 where excavation to renew the stormwater asset would be undesirable within the next ten years.
Project options	<p>Decision Criteria (see Appendices) are weighed. 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.</p>
Prioritisation of Renewal Projects	<p>Decisions on renewal works consider the short and long-term effects on the operating and structural integrity of the system</p>
Design	<p>Renewal works constructed each year are generally designed in advance to maintain level of service.</p> <p>Renewal works are designed and undertaken in accordance with Nelson City Council Land Development Manual that stress the use of long life materials</p> <p>Low impact urban design is used where appropriate.</p> <p>Investment is made in new technologies to rehabilitate existing reticulation where appropriate, rather than excavate and replace.</p> <p>The design of watercourses allows for flood flows, enhanced natural characteristics and the wider community recreational use of the area;</p> <p>Developing multi-use detention dams and structures as an alternative to upgrading the stormwater network is increasingly the most affordable flood response technique.</p>
Deferred Renewals	<p>The quantity and impact of deferred renewals (if any) is tracked</p>

Strategy	Objective/ Description
	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. As Council currently funds asset renewals from depreciation deferred renewals are not expected.

4.3.2. Summary of future costs

Table 4-13: Stormwater and Flood Protection Renewals Financial Projections (\$000)

Account	2018/19 LTP Final Uninflated	2019/20 LTP Final Uninflated	2020/21 LTP Final Uninflated	2021/22 LTP Final Uninflated	2022/23 LTP Final Uninflated	2023/24 LTP Final Uninflated	2024/25 LTP Final Uninflated	2025/26 LTP Final Uninflated	2026/27 LTP Final Uninflated	2027/28 LTP Final Uninflated
6510 Stormwater										
Capital Expenditure										
Renewals	70.7	65.0	45.0	25.0	75.0	275.0	275.0	76.2	66.2	150.0

Deferred Renewals

This plan indicates no deferred renewals.

Infrastructure strategy

The thirty year infrastructure strategy sets out the longer term renewal forecast for the water supply activity. 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 reduce both cost and community disruption.

4.4. Creation/Acquisition/Augmentation plan

Creation/Acquisition/Augmentation works create a new asset that previously did not exist, or upgrade or 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 eg 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.

4.4.1. Selection criteria

Level of Service Implication on Capital

The capital works for stormwater network construction are to address problems with appropriate stormwater disposal options in the city to the levels of service required.

Demand Implications on Capital

The capital works proposed will address the need for more detention and mains to meet growth requirements. Failure to meet growth requirements will then impact on Levels of Service.

Risk Implications on Capital

The capital works proposed address the need for decreasing the risk to the city from inadequate response to flooding.

Lifecycle Implications on Capital

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 water supply projects over \$0.5million value.

Selection Strategy

Table 4-14: Selection Strategy

Criteria	Objective / Description
Identification of Upgrade Needs	Asset upgrade needs are identified from analysis of: <ul style="list-style-type: none"> • Demand forecasts • System performance monitoring • Network modelling of system capacity requirements • Risk assessments (Risk Management Plan), and • Customer service requests. A provisional forward capital works programme is maintained and updated at least annually.

Criteria	Objective / Description
Upgrade Project Categorisation	<p>Upgrade Projects will be separated into projects to close service gaps and projects required to accommodate growth.</p> <p>Upgrade projects to close service gaps are generally funded entirely by Nelson City Council.</p> <p>Upgrade projects to accommodate growth may be partly or wholly funded through Development Contributions.</p>
Prioritisation of Upgrade Projects	<p>Upgrade projects are justified and prioritised using a risk based process.</p> <p>Decisions on upgrade works consider the short and long-term effects on the operating and structural integrity of the stormwater system.</p> <p>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.</p> <p>Decisions on priorities for new works and renewal of assets for the stormwater network are based on the following:</p> <ul style="list-style-type: none"> • Known problem areas with flooding or inundation issues • New growth areas • Primary flow conduits – rivers and streams • Secondary flow paths • Criticality of proposed works • Multiple network project (e.g. incorporating road work, sewer, water assets)
Project Approval	<p>A long-term upgrade programme is prepared from projects meeting the assessment criteria, and all projects are approved through the Annual Plan process.</p> <p>The actual timing of asset upgrade works will reflect the community's ability to meet the cost, as determined through the Annual Plan process.</p> <p>Scheduled projects meeting assessment criteria not funded are listed on the forward works programme for the following year.</p>

4.4.2. Capital investment strategies

The table below sets out the strategies used for developing capital works programmes for the stormwater 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 4-15: Creation/Acquisition/Augmentation Strategies

Strategy	Objective / Description
Project Design	<p>All asset upgrade works will be designed and constructed in accordance with Nelson City Council Engineering Standards/Land Development Manual that stress the use of long life materials, and system design loading.</p> <p>In determining capital or asset upgrade work requirements the short and long term effects on the operating and structural integrity of the system are considered, together with the demands of any forecast increase in loading upon the system.</p> <p>The system will be designed to minimise supply disruptions as far as practically possible by building in an appropriate level of redundancy.</p>

Strategy	Objective / Description
	<p>The standardisation of designs and specifications will be considered in the interest of facilitating replacement and operational simplicity.</p> <p>All feasible options, including non-asset demand management options and the use of second-hand plant, are considered.</p> <p>Low impact urban design is used where appropriate.</p> <p>The design of watercourses allows for flood flows, enhanced natural characteristics and the wider community recreational use of the area;</p> <p>Various components of the stormwater goal are considered when developing the final detailed design:</p> <ul style="list-style-type: none"> • Economics of various options • Efficiency of meeting the network need • Cultural values relating to storm water disposal to freshwater and marine environments • Ecological values of freshwater and marine eco-systems • Recreational values of shared rivers and streams • Enhancing natural structures of streams and rivers where possible
Future Development	<p>Identifies sufficient, feasible development capacity in short, medium and long term and the location, timing and sequencing if infrastructure to support it.</p>
Gifted Assets	<p>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.</p> <p>Such assets will be accepted into public ownership when satisfactorily completed in accordance with approvals given.</p> <p>Council will not contribute to the cost of such work unless there are exceptional service standard or equity issues.</p>

4.4.3. Summary of future costs

Table 4-16: Stormwater and Flood Protection Creation/Acquisition/Augmentation Financial Projections (\$000)

Account	2018/19 LTP Final Uninflated	2019/20 LTP Final Uninflated	2020/21 LTP Final Uninflated	2021/22 LTP Final Uninflated	2022/23 LTP Final Uninflated	2023/24 LTP Final Uninflated	2024/25 LTP Final Uninflated	2025/26 LTP Final Uninflated	2026/27 LTP Final Uninflated	2027/28 LTP Final Uninflated
6510 Stormwater										
Capital Expenditure										
Capital Growth	1,129.0	1,423.1	1,237.1	1,171.9	1,679.9	2,247.1	1,561.4	1,237.1	1,237.1	1,237.1
651076102838. Marybank / Tresillian Ave	0.0	54.1	108.1	10.5	540.5	1,000.0	0.0	0.0	0.0	0.0
651076102863. Network Capacity Confirmation for Growth Areas	0.0	0.0	0.0	0.0	0.0	108.1	108.1	108.1	108.1	108.1
651076102961. York Terrace	0.0	0.0	0.0	32.4	10.4	10.0	324.3	0.0	0.0	0.0
65107691. Vested Assets	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0
651076912826. Hill Street North stormwater	0.0	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Increased LOS	2,289.2	4,040.4	5,696.2	4,402.7	3,238.2	5,309.7	3,750.1	3,583.5	4,669.0	6,529.9
651079101057. Capital: Poynters Cres	0.0	0.0	30.0	10.2	21.6	300.0	0.0	0.0	0.0	0.0
651079101071. Capital: Shelbourne St s/w upgrade	0.0	0.0	54.1	162.2	0.0	0.0	0.0	0.0	0.0	0.0
651079101173. Capital: Freshwater Improvement Programme	0.0	0.0	50.0	50.0	50.0	25.0	25.0	100.0	100.0	100.0
651079102051. Capital: Rangiora Tce	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.1	0.0	0.0
651079102054. Montcalm/Arrow/Wash Vly/Hastings	37.9	1,081.3	1,081.0	756.7	0.0	0.0	0.0	0.0	0.0	0.0
651079102055. Capital: Viewmount/Ridgeway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	17.0	10.2
651079102059. Capital: Arapiki Road	0.0	0.0	40.1	10.2	250.3	0.0	0.0	0.0	0.0	0.0
651079102061. Capital: Main Rd Stoke (Hays cnr - Louis	0.0	0.0	40.0	10.0	10.0	550.0	0.0	0.0	0.0	0.0
651079102062. Capital: Main Rd Stoke (Louisson - Marsd	0.0	0.0	40.0	10.0	10.7	752.7	0.0	0.0	0.0	0.0
651079102068. Capital: Railway Reserve/ Newall/Bledisloe	0.0	0.0	0.0	0.0	0.0	0.0	54.1	24.1	24.1	540.5
651079102074. Capital: Milton: Grove-Cambria	0.0	0.0	27.0	10.0	246.0	0.0	0.0	0.0	0.0	0.0
651079102075. Capital: Halifax St: Tas-Miltn	0.0	0.0	0.0	0.0	0.0	0.0	25.7	25.7	10.7	900.0
651079102079. Capital: Mount St / Konini St	10.0	10.0	540.5	10.0	10.0	540.5	0.0	0.0	0.0	0.0
651079102095. Airlie St	50.0	0.0	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102097. Tipahi/Eckington	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	270.3	324.3
651079102127. Brougham St	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.4	10.3	10.3
651079102624. LOS: Nile Street East	807.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102814. Anglia/Scotia	0.0	0.0	0.0	0.0	20.1	10.2	10.2	162.2	0.0	0.0
651079102816. Black	0.0	0.0	0.0	10.0	25.0	200.0	0.0	0.0	0.0	0.0

651079102817. Brooklands	55.0	0.0	166.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102818. Cawthron Crescent	30.0	10.4	21.6	225.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102819. Cherry/Baigent/Ridgeway	0.0	0.0	0.0	40.0	20.1	20.4	540.5	0.0	0.0	0.0
651079102820. Collingwood Street	0.0	0.0	0.0	0.0	0.0	0.0	36.5	54.1	21.6	250.0
651079102821. Dodson Valley	0.0	48.6	21.6	120.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102822. Examiner	20.0	54.0	10.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102824. Golf/ Parkers	0.0	0.0	37.8	10.0	10.0	432.4	0.0	0.0	0.0	0.0
651079102825. Hardy (Tasman-Alton)	0.0	0.0	0.0	0.0	0.0	48.6	21.6	10.0	500.0	0.0
651079102827. Isel Place	0.0	0.0	0.0	54.1	21.6	10.2	162.2	0.0	0.0	0.0
651079102828. Jellicoe/Bledisloe/Kaka/Kea/Freyberg/Maple	0.0	0.0	0.0	0.0	0.0	0.0	54.1	20.0	10.5	520.5
651079102829. Karaka	0.0	0.0	0.0	0.0	0.0	0.0	52.7	21.6	10.5	270.3
651079102831. Kauri/Matai/Titoki/Ranui	0.0	0.0	0.0	0.0	0.0	0.0	52.7	21.6	10.5	262.2
651079102832. Kipling	0.0	0.0	0.0	0.0	0.0	0.0	48.6	10.0	10.0	200.0
651079102833. Kowhai	0.0	0.0	0.0	30.0	10.1	250.0	0.0	0.0	0.0	0.0
651079102834. Mahoe/Orsman/Matipo	0.0	0.0	0.0	54.1	54.1	20.0	432.4	0.0	0.0	0.0
651079102835. Manson Ave	0.0	54.1	10.0	10.0	270.3	0.0	0.0	0.0	0.0	0.0
651079102836. Manuka	0.0	0.0	0.0	0.0	0.0	0.0	48.6	20.0	10.0	500.0
651079102837. Martin	0.0	0.0	0.0	0.0	0.0	54.1	20.1	10.6	270.3	0.0
651079102840. Nayland Road / Galway	206.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102842. Ngaio/Maitland	0.0	0.0	0.0	20.3	10.6	450.0	0.0	0.0	0.0	0.0
651079102843. Paru Paru	0.0	0.0	10.8	10.8	10.8	250.0	0.0	0.0	0.0	0.0
651079102844. Pateke	0.0	0.0	0.0	10.8	10.8	108.1	0.0	0.0	0.0	0.0
651079102847. Riverside	0.0	0.0	32.4	10.8	10.8	250.0	0.0	0.0	0.0	0.0
651079102848. Rotoiti	0.0	30.0	10.0	110.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102849. Russell Street Reserve	27.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102850. Little Go Stream upgrade Rutherford St	290.0	1,500.0	1,000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102851. Rutherford Stage 2 - Box Culvert	0.0	62.2	50.0	150.0	0.0	70.3	108.1	108.1	1,081.0	1,081.0
651079102853. Stafford Ave	0.0	0.0	0.0	0.0	0.0	0.0	32.4	21.6	10.6	162.2
651079102855. Tahunanui Hills Stormwater- Moana Avenue to Rocks Road	100.0	90.7	540.5	540.7	540.7	400.0	0.0	0.0	0.0	0.0
651079102858. Totara/Hutcheson	0.0	10.8	10.8	200.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102859. Trafalgar Square (Betts Carpark)	0.0	0.0	0.0	75.7	58.1	58.1	810.8	0.0	0.0	0.0
651079102860. Tui Glen	0.0	0.0	35.0	146.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102861. Vanguard Street Stormwater	316.0	0.0	0.0	0.0	54.1	70.3	200.3	0.0	0.0	0.0
651079102862. Natural Hazards Risk Remediation	0.0	0.0	108.1	108.1	108.1	0.0	0.0	0.0	0.0	0.0
651079102874. Beach Road	0.0	35.0	10.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0

651079102875. Ariesdale/Thompson Tce	0.0	0.0	0.0	30.0	250.0	0.0	0.0	0.0	0.0	0.0
651079102954. Coleridge Place - Secondary flow path	0.0	0.0	0.0	0.0	0.0	20.5	10.5	84.1	0.0	0.0
651079102955. Harford Court - secondary flow path	0.0	0.0	0.0	0.0	21.6	11.6	86.5	0.0	0.0	0.0
651079102956. Marsden Valley Cemetery diversion	0.0	0.0	0.0	0.0	0.0	21.6	10.8	189.2	0.0	0.0
651079102957. Orakei/Tamaki/Rangiora Intersection	0.0	0.0	32.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102959. Renwick / Wellington Street / Waimea Road	0.0	0.0	54.1	52.7	310.0	0.0	0.0	0.0	0.0	0.0
651079102960. Seaton/Allisdair	0.0	54.1	20.1	10.5	216.2	0.0	0.0	0.0	0.0	0.0
651079102971. Beatson Road	0.0	0.0	0.0	0.0	54.1	54.1	20.3	324.3	0.0	0.0
651079103089. Strawbridge Sq Stormwater improvements	0.0	0.0	0.0	10.0	10.0	60.0	0.0	0.0	0.0	0.0
651079103218. Emano Reserve Stormwater	10.0	10.0	10.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111059. Private Drains/Sub	0.0	0.0	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0
651079111060. Pvt/Public Drains	58.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1
651079111069. Tosswill to Tahuna Stormwater Upgrade	100.0	30.0	20.0	450.0	250.0	0.0	0.0	0.0	0.0	0.0
651079111070. Otterson Street to Pascoe Street Stormwater	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	10.0	250.0
651079111106. Athol Street Storm water	0.0	30.0	0.0	30.0	25.0	10.0	500.0	0.0	0.0	0.0
651079111109. Ashdonleigh Grove Storm water	0.0	0.0	20.0	10.0	50.0	0.0	0.0	0.0	0.0	0.0
651079111110. Nile St East Storm water	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111111. Annesbrook Drive Storm Water	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111114. Marsden Road storm water	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111121. Railway Reserve (Bishopdale - St Vincent) stormwater improve	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111196. Piping Ditches	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0
651079112473. Wastney Terrace stormwater (pvt drain prgm)	0.0	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112589. Stansell Pvt/ Pub Drains	55.0	5.0	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112815. Bisley Avenue	50.0	0.0	0.0	10.0	5.0	50.0	0.0	0.0	0.0	0.0
651079112830. Kauri Street	10.3	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112846. Public/Private Drains & Open Chanel Upgrade Progra	0.0	0.0	0.0	0.0	54.1	54.1	54.1	540.5	540.5	540.5
651079113143. Haven Rd open channel upgrade	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	25.0	350.0
651079113145. Nikau Rd open channel upgrade	0.0	0.0	0.0	0.0	0.0	0.0	20.0	10.0	10.0	150.0
651079122090. St Vincent/Hastings St Culvert	10.0	10.0	10.0	10.0	30.0	100.0	152.0	1,500.0	1,500.0	0.0
65107997. LoS: investigation, options, testing, engagement	-18.1	-75.8	-114.0	-109.1	-87.6	-50.9	-81.5	-14.8	0.0	0.0
6520 Flood Protection										
Capital Expenditure	4,659.8	5,267.1	5,371.8	2,345.3	899.5	1,559.2	1,110.3	3,884.6	988.3	2,914.5
Capital Growth	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0

65207691. Vested Assets	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0
Capital Increased LOS	4,493.8	5,101.1	5,205.8	2,179.3	733.5	1,393.2	944.3	3,718.6	822.3	2,748.5
652079101100. Capital: York Stream Channel Upgrade	0.0	0.0	50.0	20.0	350.0	50.0	50.0	1,500.0	0.0	0.0
652079101178. Maitai flood management	100.0	50.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0
652079102080. Capital: Arapiki Stream	0.0	0.0	0.0	0.0	0.0	0.0	54.1	54.1	54.1	270.3
652079102087. Main Rd Stoke/Poormans St/Culvert op. Fire Station	20.0	20.0	10.0	250.0	0.0	0.0	0.0	50.0	250.0	0.0
652079111088. Capital: Todds Valley Stream upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079111182. Maire Stream: Stage 1	150.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079111387. Brook Stream fish passage	80.0	50.0	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112073. Oldham Creek stormwater upgrade	0.0	0.0	0.0	0.0	0.0	0.0	80.0	50.0	10.0	820.0
652079112625. Review of Jenkins & Arapiki (airport)	0.0	0.0	116.3	54.1	54.0	540.5	0.0	0.0	0.0	0.0
652079112689. Saxton Creek upgrade	2,795.6	360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112721. Wakapuaka Flats Stormwater Network Upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	250.0
652079112867. Orchard Stream	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079112868. Jenkins Stream stormwater upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079112963. Brook Stream Outlet low flow	50.0	0.0	0.0	314.1	0.0	0.0	0.0	0.0	0.0	0.0
652079112965. Emano Street Channel	0.0	0.0	0.0	0.0	162.2	54.1	54.1	1,000.0	0.0	0.0
652079112966. Murphy Street	0.0	0.0	0.0	0.0	0.0	0.0	100.0	50.0	50.0	1,000.0
652079112967. Orphanage Stream Upgrade - Stage 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.1	50.0	50.0
652079112968. Orphanage Stream / Sunningdale	132.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112969. Poormans Stream	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	50.0	50.0
652079122866. Whakatu Drive (Storage World)	604.4	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079122964. Saxton Creek, Main Rd Stoke Culvert to Sea	150.0	3,023.0	3,783.5	1,125.0	0.0	0.0	0.0	0.0	0.0	0.0
652079123289. Orphanage Stream - bunding and Suffolk Road Culvert	140.0	840.0	640.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079902052. Brook Stream Catchment Improvements	0.0	0.0	108.1	108.1	20.0	540.5	540.5	540.5	0.0	0.0
652079902103. Inventory of Urban Streams	238.0	100.0	100.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
652079902104. Inventory of Rural Streams	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1	.2	.2
652079902657. Flood Mitigation	0.0	158.1	158.1	158.1	108.1	108.1	108.1	108.1	108.1	108.1
652079902962. Secondary Flow Paths	50.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65207997. LoS: investigation, options, testing, engagement	-16.3	0.0	-20.2	0.0	-60.8	0.0	-42.4	-92.2	0.0	0.0

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 systems. In some situations there can be revenue resulting from asset disposal.

Table 4-17: Disposal strategies /residual use

Strategy	Objective/ Description
Asset Disposal	<p>Assess each proposal to dispose of surplus or redundant assets on an individual basis, subject to the requirements of the relevant legislation.</p> <p>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.</p> <p>Redundant pipes are backfilled or removed where their alignment clashes with replacement pipelines or where their existence is considered dangerous. This is to ensure collapse does not occur.</p> <p>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.</p>
Residual Use	<p>Mechanical equipment that has 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.</p>
Residual Value	<p>The residual value (if any) of assets, which are planned to be disposed of, will be identified and provided for in financial projections.</p> <p>Abandoned wastewater 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.</p>
Record of Abandonment	<p>When a Stormwater asset is abandoned or replaced the Geographic Information System and fixed asset register are updated. A system of job number creation and asset identification is used to document this process.</p>

5. Risk Management Plan

This section describes the risk management procedures used in the stormwater and flood protection activity.

Applying risk management procedures enables decisions to be made about the best use of limited resources to achieve as much as possible of the Council's objectives from the maintenance and development of the assets.

Threats and opportunities are assessed against the objectives and levels of service set out in this plan.

As set out above 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

For practical purposes it is helpful to separately identify critical assets to the delivery of the stormwater and flood protection activity.

The asset manager applies professional judgement based on experience, considering risk of failure and lifelines evaluation to identify critical assets. Generally critical assets are considered to be those assets for which the consequence of failure is unacceptable given the difficulty of repair and/or the strategic role they play, and would result in a major disruption or failure in meeting one or more levels of service.

A more robust framework for identification of critical assets is noted in the improvement programme.

Assets that are considered critical within this activity are:

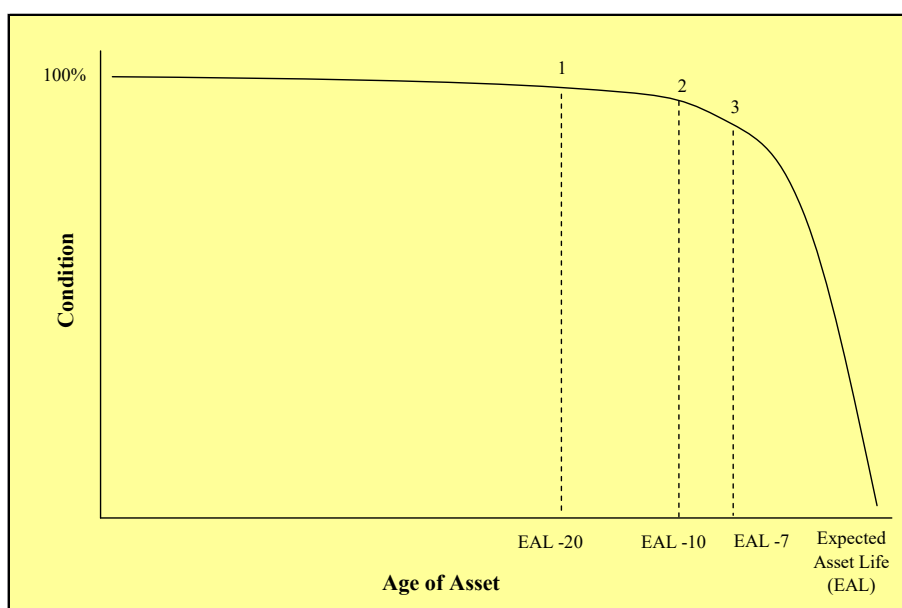
- All pump stations
- All rising mains
- All rivers and streams
- Detention dams

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.

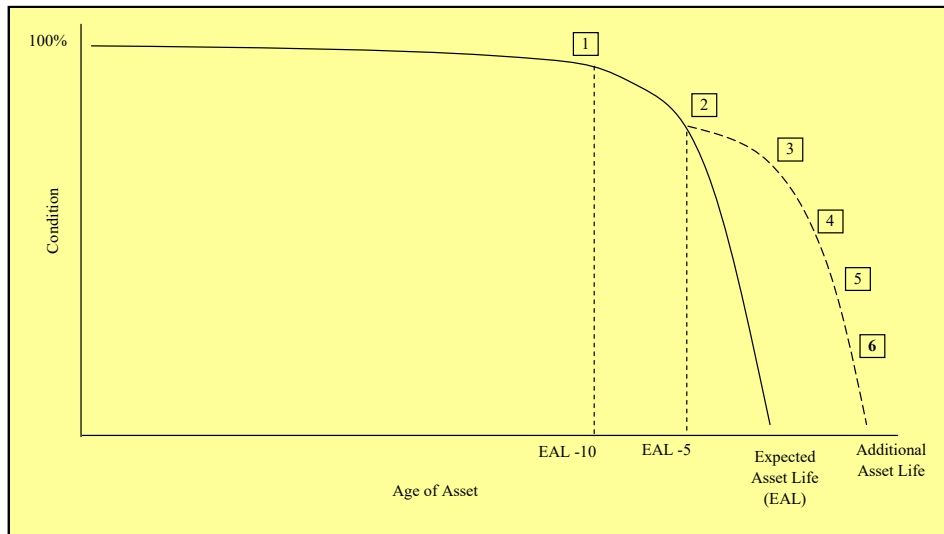
The following shows the nature and timing of interventions for both critical and non-critical assets.

Figure 5-1: Interventions for Critical Assets



Intervention: 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: 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

A methodology for determining asset criticality to a component level, along with options, will be determined to integrate criticality into the ongoing operation, maintenance, renewals and capital programme for this activity.

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 N
- Selecting the likelihood consequence combination from the council's criteria giving the largest risk for the event.

As this Asset management 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. It is our intention to review and update the risks set out in the risk register Appendix N so that the information is all on a consistent basis.

5.2.2. Top risks and how these will be managed

The level of risk established from the assessment process (formally called residual risk) is compared with the Council's residual risk tolerance as set out in Table 3 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 N. It includes information about how the risks could be further treated (i.e. further controls implemented or choices made to reduce risk levels).

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.

Climate Change and the Capacity of Rivers and Streams

Climate change is expected to bring with it more extreme weather in the form of higher intensity and duration rain events (with associated flood damage) and drought periods. The issue will be monitored and future asset management plans will be adjusted to address impacts as they become better understood.

Recent extreme events in excess of Q_{50} have led to the need to review the minimum design standard and consider whether this should be increased to Q_{100} (1% probability of occurrence in any year) or other appropriate standard as identified in a specific risk based assessment of individual streams and rivers. The LTP 2015/25 signalled that Council will review the risk profile of streams and rivers on a case by case basis before deciding on the appropriate response to flooding.

Options for addressing the flooding risk to urban properties are being considered for three broad timebands: Current day to 2040, 2040-2070 and 2070-2100. These timebands follow preliminary assessments of the impacts of climate change on rainfall intensities carried out by the National Institute of Water and Atmospheric Research Ltd (NIWA). Detailed design for upgrading works would ideally set a framework for protecting against current flood patterns while ensuring future generations can carry out the works required for flood flows at the time.

The broad strategy for flood protection through the city is currently based on:

- Upgrading the urban stretches of Saxton Creek, Orphanage Stream, Little-Go Stream and York Stream. Future stream and river works will follow a risk based approach;
- Secondary flow paths are identified and maintained from rivers, streams and detention dams- Protecting the Central Business District- Stoke area-Atawhai area to the top of the Gentle Annie Saddle;
- Extending the piped stormwater network through the city;
- Upgrading existing open channel drains;
- Identify, maintain and upgrade secondary flow paths.

Given the expectation that climate change will result in altered rainfall intensities and frequency of extreme events completing the inventory of all of the urban and rural rivers and streams is a priority.

Natural Hazards

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

- Direct damage from Earthquake shaking
- Damage from liquefaction in susceptible areas
- Damage from Tsunami
- Damage from Flooding and major storm events (including storm surge)
- Impact of potential climate change and sea level rise

Security of the network in light of the recent Canterbury Earthquakes and Nelson storm events, including wider network hazards- Earthquake fault line, liquefaction and climate change will influence network upgrades into the future.

In February 2018 the remnants of two tropical cyclones hit the Nelson Tasman region. Both caused extensive damage.

Coastal damage on 1 February 2018 was caused by a combination of ex- tropical cyclone Fehi's gale force northerly winds creating large waves (and possibly swells coming from where it travelled in an area west of the North Island), low barometric pressure and onshore wind creating storm surge, along with a predicted large high tide. The storm surge added an extra 60cm to the expected tide level.

Within the city seawater damaged buildings on Rocks Road and backflowed through sumps in low lying areas. Significant surface flooding occurred particularly at the Wakatu Industrial Estate, Hathaway Terrace and Wakatu carpark.

Ex-tropical cyclone Gita mostly affected the Motueka/Takaka Hill area on 20 February 2018. Damage was caused by a narrow band of intense rain, as well as a low level wind convergence between westerlies and easterlies. Debris flows on steeper catchments, resulting from the intense rain caused extensive slope failures that affected road closures, most notably on the Motueka side of Takaka Hill. Lower down, blockages caused by the larger and heavier debris deposits from the debris flows created debris floods in the Motueka Valley.

Future work will focus on 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.

The Christchurch Earthquakes of 2010 /2011 led to significant damage to that city's infrastructure including streams and rivers, pump stations and the underground pipe network from direct shaking and liquefaction. Recognising this and the results of other natural hazard investigation post the Nelson storm events of December 2011 and April 2013, Nelson City Council is reassessing the risk to the network from earthquakes (including liquefaction, tsunami and direct shaking), flooding, storms and sea level rise.

In particular a series of reports have been compiled, as part of the city's wider hazard planning, as follows:

- TSUNAMI MODELLING AND EVACUATION ZONE MODELLING FOR TASMAN AND GOLDEN BAY- GNS FEBRUARY 2012 (A261963)
- REVIEW OF TSUNAMI HAZARD IN NEW ZEALAND (2013 UPDATE)- GNS AUGUST 2013(A371109)
- ASSESSMENT OF THE LOCATION AND PALEOEARTHQUAKE HISTORY OF THE WAIMEA-FLAXMORE FAULT SYSTEM IN THE NELSON-RICHMOND AREA WITH RECOMMENDATIONS TO MITIGATE THE HAZARD ARISING FROM FAULT RUPTURE OF THE GROUND SURFACE- M. R. JOHNSTON A. NICOL GEOLOGICAL CONSULTANT GNS SCIENCE 395 TRAFALGAR STREET PO BOX 30368 NELSON LOWER HUTT GNS SCIENCE CONSULTANCY REPORT 2013/186 AUGUST 2013(A673742)
- REVISED PRELIMINARY ASSESSMENT OF THE LIQUEFACTION HAZARD IN TASMAN AND NELSON FEBRUARY 2013 (A597463)
- TAHUNANUI AREA LIQUEFACTION ASSESSMENT- TONKIN AND TAYLOR LTD NOVEMBER 2013(A1117884)
- MAITAI RIVER FLOOD HAZARD MAPPING MODELLING REPORT TONKIN AND TAYLOR LTD AUGUST 2013(A677152)

A further report is required to update the 2009 report by the National Institute of Water and Atmospheric studies (NIWA) looking at the latest state of knowledge of the impact of climate change on sea level rise.

The stormwater and flood protection network activity is likely to be impacted by sea level rise in line with other utilities 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. Pump stations are mostly positioned on lower level ground with potential for direct tidal impact.

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.

Risk summary

The extreme and high risks are associated with the following:

- Flood events
- Secondary flow paths
- Stormwater contamination

The Asset Risk Schedule 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:

- Increased maintenance
- Early replacement
- High level of procedures, decision making process, contingency plans and operation and maintenance manuals
- Accepting risk i.e. do nothing, monitor

These treatment options may increase operating and depreciation costs but offsets the high level of risks associated with Nelson City Council assets.

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 stormwater asset.

5.3. Infrastructure resilience approach

- *Development of **resilient infrastructure** to address climate change predictions and the capacity of urban rivers and streams to handle extreme weather events.*

Detailed computer models have been developed for eleven of the urban streams in the city. The flood plans from these models show that significant areas of the city are likely to be impacted by the larger storm events. 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 models will be used to identify the reliable existing channel capacity of the streams and help support the Whakamahere Whakatū Nelson Plan hazards section and guide future development rules in areas subject to flooding.

- ***Natural Hazard Security** of the network in light of the recent Canterbury and Kaikoura Earthquakes and various storm events.*

Further work is proposed in this asset management plan to build on the hazard vulnerability studies carried out by Treasury in 2017 in response to the recent Canterbury and Kaikoura Earthquakes and multiple flood events across the country.

Natural hazard resilience will include 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. The work will link with similar projects in the wastewater and water supply activities.

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

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 the asset management plan is to complete the Maitai River flood response options and identify implications for the central business district and the Wood from the Maitai River, Brook stream and York stream flood flows.

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	JLT TOS 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 from 1 July 2017 after withdrawing from the Local Authority Protection Programme Disaster Fund.

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 \$160 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 \$160m was deemed to be the mean 1 in 750 ARI (annual return interval) loss estimate.

Emergency Management

Civil Defence and Emergency Response Plans

The following documents are available for guidance in the Civil Defence and Emergency Management:

- Civil Defence Emergency Management Plan.
- Nelson City Council Emergency Procedures Manual - exercises are carried out on a six monthly basis to ensure all staff are familiar with the procedures.

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"

Local Civil Defence Emergency Management Arrangements

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

The Nelson Tasman Civil Defence Emergency Management Group Plan provides for an 'all hazards' approach to emergency management planning and activity within the Civil Defence Emergency Management Group area for Nelson City and Tasman District. The Civil Defence Emergency Management Group Plan states the civil defence 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—

(a) 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 Nelson-Tasman Engineering Lifelines project as a life line utility.

The following table indicates the status of the stormwater schemes in the areas of Risk Reduction, Readiness, Response and Recovery.

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
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.	Stormwater Mutual Aid Plan.
Recovery	Addressing the long-term rehabilitation of the community.	Nelson-Tasman Civil Defence Emergency Management Group.

Electricity Supply

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

Energy supply is currently via a contract with Trustpower.

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.

Figures 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.

Figure 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
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

Figure 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
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.

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 assists in ensuring 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 asset management plans. In order to ensure greater effectiveness there is a need to improve planning and recording of strategies over the next three years.

Climate Change Effects

Significant development has occurred on historical flood plains as the City has grown. Areas that would once have contributed to the passage of flood waters are now occupied by buildings and structures.

There has been considerable work undertaken at a national level on the possible effects of climate change and sea level rise.

The Ministry for the Environment have provided the following information regarding the likely impacts of climate change in the Nelson-Tasman Region:

“Temperatures are likely to be around 0.9°C warmer by 2040 and 2.0°C warmer by 2090, compared to 1990. By the end of the century, some parts of Nelson-Tasman are projected to have about 10--40 extra days per year where maximum temperatures exceed 25°C, with around 10–40 fewer frosts per year”

“Rainfall will vary locally within the region. In Nelson, average annual rainfall is likely to increase by 4 per cent by 2090. Seasonal projections show summer, autumn and winter rainfall increasing by 5–6 per cent in Nelson by 2090, with very little change in spring rainfall. For Motueka and the Waimea plains, annual average rainfall is likely to increase slightly by 2090. Seasonal projections show slightly more rainfall in most seasons (except spring) for much of this part of Tasman. The western part of the Tasman district is likely to experience slightly less rainfall in summer, but significantly more rainfall in winter, especially by 2090. Very heavy rainfall events are likely to become more frequent throughout the Nelson-Tasman region. For example, in Richmond heavy rainfall events are likely to occur twice as often by 2090.”

The key climate influences on the stormwater activity is more intense rainfall, higher sea level and tides, and storm surges.

Sea Level Rise:

According to the Ministry for the Environment, the average relative sea level rise for the 100 years leading up to 2015 was around 1.8mm a year. For future sea level rise, the Ministry recommends the adoption of four New Zealand wide sea level projection scenarios for use in 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 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 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 hazards and to formulate minimum ground and floor level requirements for low lying sites in the proposed Whakamahere Whakatū Nelson Plan and Land Development Manual. 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.

Rainfall:

The High Intensity Rain Fall Analysis for Nelson Urban Area carried out by NIWA in 2008 indicated the following: *The present Nelson City design storm intensity chart is somewhat conservative: the 50 year return period totals on this chart are close to 100 year return period HIRDS estimates. However, a degree of conservatism in the estimates is probably desirable, especially since intensities increase moving to higher elevations inland from the coast.*

The proposed LDM is making use of the NIWA website for rainfall intensity information that may be required to assess storm flows.

Climate Change and the Capacity of Rivers and Streams

Options for addressing the flooding risk to urban properties are being considered for three broad timebands: Current day to 2040, 2040-2070 and 2070-2100. These timebands follow preliminary assessments of the impacts of climate change on rainfall intensities carried out by the National Institute of Water and Atmospheric Research Ltd (NIWA).

Serious flooding in the Orphanage Stream and Saxton Creek areas during April 2013 has led to the need for urgent works to be carried out on both streams. Nelson City Council and Tasman District Council are jointly developing plans for Saxton Creek to upgrade culverts in Champion Road and the stream channel from Champion Road to Main Road Stoke. Nelson City Council will need to continue with upgrading works downstream of Main Road Stoke in future years.

Given the expectation that climate change will result in altered rainfall intensities and frequency of extreme events an inventory of all of the urban and rural rivers and streams is currently underway.

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).

In determining how activities will be funded Local Authorities are required to take the following into consideration:

- The contribution to the achievement of 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 well-being of the community (ability to pay principles).

This Asset Management 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 three categories:

- Operations and Maintenance Expenditure
- Capital Expenditure –Renewal/Replacement
- Capital Expenditure –Creation/Acquisition/Augmentation for both level of service compliance and growth

Table 6-1: Stormwater & Flood Protection Expenditure Years 1-10 of the 2018/28 Long Term Plan (\$000)

Account	2018/19 LTP Final Uninflated	2019/20 LTP Final Uninflated	2020/21 LTP Final Uninflated	2021/22 LTP Final Uninflated	2022/23 LTP Final Uninflated	2023/24 LTP Final Uninflated	2024/25 LTP Final Uninflated	2025/26 LTP Final Uninflated	2026/27 LTP Final Uninflated	2027/28 LTP Final Uninflated
6510 Stormwater	4,171.8	6,264.8	7,767.1	6,374.3	5,760.5	8,578.2	6,261.6	5,563.3	6,675.9	8,497.5
Expenses	682.9	736.3	788.8	774.6	767.5	746.4	675.1	666.5	703.6	580.5
Base Expenditure	277.1	269.1	277.1	259.1	267.1	259.1	267.1	259.1	267.1	259.1
Unprogrammed Expenses	220.0	220.0	220.0	240.0	240.0	240.0	240.0	240.0	240.0	240.0
Programmed Expenses	185.8	247.3	291.7	275.6	260.3	247.4	167.9	167.5	196.5	81.5
Capital Expenditure	3,488.8	5,528.5	6,978.3	5,599.6	4,993.1	7,831.8	5,586.5	4,896.8	5,972.4	7,917.0
Renewals	70.7	65.0	45.0	25.0	75.0	275.0	275.0	76.2	66.2	150.0
Capital Growth	1,129.0	1,423.1	1,237.1	1,171.9	1,679.9	2,247.1	1,561.4	1,237.1	1,237.1	1,237.1
651076102838. Marybank / Tresillian Ave	0.0	54.1	108.1	10.5	540.5	1,000.0	0.0	0.0	0.0	0.0
651076102863. Network Capacity Confirmation for Growth Areas	0.0	0.0	0.0	0.0	0.0	108.1	108.1	108.1	108.1	108.1
651076102961. York Terrace	0.0	0.0	0.0	32.4	10.4	10.0	324.3	0.0	0.0	0.0
65107691. Vested Assets	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0	1,129.0
651076912826. Hill Street North stormwater	0.0	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Increased LOS	2,289.2	4,040.4	5,696.2	4,402.7	3,238.2	5,309.7	3,750.1	3,583.5	4,669.0	6,529.9
651079101057. Capital: Poynters Cres	0.0	0.0	30.0	10.2	21.6	300.0	0.0	0.0	0.0	0.0
651079101071. Capital: Shelbourne St s/w upgrade	0.0	0.0	54.1	162.2	0.0	0.0	0.0	0.0	0.0	0.0
651079101173. Capital: Freshwater Improvement Programme	0.0	0.0	50.0	50.0	50.0	25.0	25.0	100.0	100.0	100.0
651079102051. Capital: Rangiora Tce	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.1	0.0	0.0
651079102054. Montcalm/Arrow/Wash Vly/Hastings	37.9	1,081.3	1,081.0	756.7	0.0	0.0	0.0	0.0	0.0	0.0
651079102055. Capital: Viewmount/Ridgeway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	17.0	10.2
651079102059. Capital: Arapiki Road	0.0	0.0	40.1	10.2	250.3	0.0	0.0	0.0	0.0	0.0
651079102061. Capital: Main Rd Stoke (Hays cnr - Louis)	0.0	0.0	40.0	10.0	10.0	550.0	0.0	0.0	0.0	0.0
651079102062. Capital: Main Rd Stoke (Louisson - Marsd)	0.0	0.0	40.0	10.0	10.7	752.7	0.0	0.0	0.0	0.0
651079102068. Capital: Railway Reserve/ Newall/Bledisloe	0.0	0.0	0.0	0.0	0.0	0.0	54.1	24.1	24.1	540.5
651079102074. Capital: Milton: Grove-Cambria	0.0	0.0	27.0	10.0	246.0	0.0	0.0	0.0	0.0	0.0
651079102075. Capital: Halifax St: Tas-Miltn	0.0	0.0	0.0	0.0	0.0	0.0	25.7	25.7	10.7	900.0
651079102079. Capital: Mount St / Konini St	10.0	10.0	540.5	10.0	10.0	540.5	0.0	0.0	0.0	0.0
651079102095. Airlie St	50.0	0.0	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102097. Tipahi/Eckington	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	270.3	324.3

651079102127. Brougham St	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.4	10.3	10.3
651079102624. LOS: Nile Street East	807.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102814. Anglia/Scotia	0.0	0.0	0.0	0.0	20.1	10.2	10.2	162.2	0.0	0.0
651079102816. Black	0.0	0.0	0.0	10.0	25.0	200.0	0.0	0.0	0.0	0.0
651079102817. Brooklands	55.0	0.0	166.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102818. Cawthron Crescent	30.0	10.4	21.6	225.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102819. Cherry/Baigent/Ridgeway	0.0	0.0	0.0	40.0	20.1	20.4	540.5	0.0	0.0	0.0
651079102820. Collingwood Street	0.0	0.0	0.0	0.0	0.0	0.0	36.5	54.1	21.6	250.0
651079102821. Dodson Valley	0.0	48.6	21.6	120.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102822. Examiner	20.0	54.0	10.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102824. Golf/ Parkers	0.0	0.0	37.8	10.0	10.0	432.4	0.0	0.0	0.0	0.0
651079102825. Hardy (Tasman-Alton)	0.0	0.0	0.0	0.0	0.0	48.6	21.6	10.0	500.0	0.0
651079102827. Isel Place	0.0	0.0	0.0	54.1	21.6	10.2	162.2	0.0	0.0	0.0
651079102828. Jellicoe/Bledisloe/Kaka/Kea/Freyberg/Maple	0.0	0.0	0.0	0.0	0.0	0.0	54.1	20.0	10.5	520.5
651079102829. Karaka	0.0	0.0	0.0	0.0	0.0	0.0	52.7	21.6	10.5	270.3
651079102831. Kauri/Matai/Titoki/Ranui	0.0	0.0	0.0	0.0	0.0	0.0	52.7	21.6	10.5	262.2
651079102832. Kipling	0.0	0.0	0.0	0.0	0.0	0.0	48.6	10.0	10.0	200.0
651079102833. Kowhai	0.0	0.0	0.0	30.0	10.1	250.0	0.0	0.0	0.0	0.0
651079102834. Mahoe/Orsman/Matipo	0.0	0.0	0.0	54.1	54.1	20.0	432.4	0.0	0.0	0.0
651079102835. Manson Ave	0.0	54.1	10.0	10.0	270.3	0.0	0.0	0.0	0.0	0.0
651079102836. Manuka	0.0	0.0	0.0	0.0	0.0	0.0	48.6	20.0	10.0	500.0
651079102837. Martin	0.0	0.0	0.0	0.0	0.0	54.1	20.1	10.6	270.3	0.0
651079102840. Nayland Road / Galway	206.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102842. Ngaio/Maitland	0.0	0.0	0.0	20.3	10.6	450.0	0.0	0.0	0.0	0.0
651079102843. Paru Paru	0.0	0.0	10.8	10.8	10.8	250.0	0.0	0.0	0.0	0.0
651079102844. Pateke	0.0	0.0	0.0	10.8	10.8	108.1	0.0	0.0	0.0	0.0
651079102847. Riverside	0.0	0.0	32.4	10.8	10.8	250.0	0.0	0.0	0.0	0.0
651079102848. Rotoiti	0.0	30.0	10.0	110.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102849. Russell Street Reserve	27.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102850. Little Go Stream upgrade Rutherford St	290.0	1,500.0	1,000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102851. Rutherford Stage 2 - Box Culvert	0.0	62.2	50.0	150.0	0.0	70.3	108.1	108.1	1,081.0	1,081.0
651079102853. Stafford Ave	0.0	0.0	0.0	0.0	0.0	0.0	32.4	21.6	10.6	162.2
651079102855. Tahunanui Hills Stormwater- Moana Avenue to Rocks Road	100.0	90.7	540.5	540.7	540.7	400.0	0.0	0.0	0.0	0.0
651079102858. Totara/Hutcheson	0.0	10.8	10.8	200.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102859. Trafalgar Square (Betts Carpark)	0.0	0.0	0.0	75.7	58.1	58.1	810.8	0.0	0.0	0.0

651079102860. Tui Glen	0.0	0.0	35.0	146.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102861. Vanguard Street Stormwater	316.0	0.0	0.0	0.0	54.1	70.3	200.3	0.0	0.0	0.0	0.0
651079102862. Natural Hazards Risk Remediation	0.0	0.0	108.1	108.1	108.1	0.0	0.0	0.0	0.0	0.0	0.0
651079102874. Beach Road	0.0	35.0	10.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102875. Ariesdale/Thompson Tce	0.0	0.0	0.0	30.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102954. Coleridge Place - Secondary flow path	0.0	0.0	0.0	0.0	0.0	20.5	10.5	84.1	0.0	0.0	0.0
651079102955. Harford Court - secondary flow path	0.0	0.0	0.0	0.0	21.6	11.6	86.5	0.0	0.0	0.0	0.0
651079102956. Marsden Valley Cemetery diversion	0.0	0.0	0.0	0.0	0.0	21.6	10.8	189.2	0.0	0.0	0.0
651079102957. Orakei/Tamaki/Rangiora Intersection	0.0	0.0	32.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102959. Renwick / Wellington Street / Waimea Road	0.0	0.0	54.1	52.7	310.0	0.0	0.0	0.0	0.0	0.0	0.0
651079102960. Seaton/Allisdair	0.0	54.1	20.1	10.5	216.2	0.0	0.0	0.0	0.0	0.0	0.0
651079102971. Beatson Road	0.0	0.0	0.0	0.0	54.1	54.1	20.3	324.3	0.0	0.0	0.0
651079103089. Strawbridge Sq Stormwater improvements	0.0	0.0	0.0	10.0	10.0	60.0	0.0	0.0	0.0	0.0	0.0
651079103218. Emano Reserve Stormwater	10.0	10.0	10.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111059. Private Drains/Sub	0.0	0.0	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0	0.0
651079111060. Pvt/Public Drains	58.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1	108.1
651079111069. Tosswill to Tahuna Stormwater Upgrade	100.0	30.0	20.0	450.0	250.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111070. Otterson Street to Pascoe Street Stormwater	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	10.0	250.0	0.0
651079111106. Athol Street Storm water	0.0	30.0	0.0	30.0	25.0	10.0	500.0	0.0	0.0	0.0	0.0
651079111109. Ashdonleigh Grove Storm water	0.0	0.0	20.0	10.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111110. Nile St East Storm water	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111111. Annesbrook Drive Storm Water	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111114. Marsden Road storm water	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111121. Railway Reserve (Bishopdale - St Vincent) stormwater improve	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079111196. Piping Ditches	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0	54.1	0.0	0.0
651079112473. Wastney Terrace stormwater (pvt drain prgm)	0.0	800.0	800.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112589. Stansell Pvt/ Pub Drains	55.0	5.0	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112815. Bisley Avenue	50.0	0.0	0.0	10.0	5.0	50.0	0.0	0.0	0.0	0.0	0.0
651079112830. Kauri Street	10.3	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651079112846. Public/Private Drains & Open Chanel Upgrade Progra	0.0	0.0	0.0	0.0	54.1	54.1	54.1	540.5	540.5	540.5	540.5
651079113143. Haven Rd open channel upgrade	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	25.0	350.0	0.0
651079113145. Nikau Rd open channel upgrade	0.0	0.0	0.0	0.0	0.0	0.0	20.0	10.0	10.0	150.0	0.0
651079122090. St Vincent/Hastings St Culvert	10.0	10.0	10.0	10.0	30.0	100.0	152.0	1,500.0	1,500.0	1,500.0	0.0

65107997. LoS: investigation, options, testing, engagement	-18.1	-75.8	-114.0	-109.1	-87.6	-50.9	-81.5	-14.8	0.0	0.0
6520 Flood Protection	4,817.1	5,408.1	5,532.9	2,486.3	1,101.2	1,700.1	1,293.6	4,117.8	1,129.2	3,055.4
Expenses	157.2	140.9	161.1	140.9	201.7	140.9	183.3	233.2	140.9	140.9
Base Expenditure	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9	60.9
Unprogrammed Expenses	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Programmed Expenses	16.3	0.0	20.2	0.0	60.8	0.0	42.4	92.2	0.0	0.0
Capital Expenditure	4,659.8	5,267.1	5,371.8	2,345.3	899.5	1,559.2	1,110.3	3,884.6	988.3	2,914.5
Capital Growth	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0
65207691. Vested Assets	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0	166.0
Capital Increased LOS	4,493.8	5,101.1	5,205.8	2,179.3	733.5	1,393.2	944.3	3,718.6	822.3	2,748.5
652079101100. Capital: York Stream Channel Upgrade	0.0	0.0	50.0	20.0	350.0	50.0	50.0	1,500.0	0.0	0.0
652079101178. Maitai flood management	100.0	50.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0
652079102080. Capital: Arapiki Stream	0.0	0.0	0.0	0.0	0.0	0.0	54.1	54.1	54.1	270.3
652079102087. Main Rd Stoke/Poormans St/Culvert op. Fire Station	20.0	20.0	10.0	250.0	0.0	0.0	0.0	50.0	250.0	0.0
652079111088. Capital: Todds Valley Stream upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079111182. Maire Stream: Stage 1	150.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079111387. Brook Stream fish passage	80.0	50.0	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112073. Oldham Creek stormwater upgrade	0.0	0.0	0.0	0.0	0.0	0.0	80.0	50.0	10.0	820.0
652079112625. Review of Jenkins & Arapiki (airport)	0.0	0.0	116.3	54.1	54.0	540.5	0.0	0.0	0.0	0.0
652079112689. Saxton Creek upgrade	2,795.6	360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112721. Wakapuaka Flats Stormwater Network Upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	250.0
652079112867. Orchard Stream	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079112868. Jenkins Stream stormwater upgrade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	50.0
652079112963. Brook Stream Outlet low flow	50.0	0.0	0.0	314.1	0.0	0.0	0.0	0.0	0.0	0.0
652079112965. Emano Street Channel	0.0	0.0	0.0	0.0	162.2	54.1	54.1	1,000.0	0.0	0.0
652079112966. Murphy Street	0.0	0.0	0.0	0.0	0.0	0.0	100.0	50.0	50.0	1,000.0
652079112967. Orphanage Stream Upgrade - Stage 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.1	50.0	50.0
652079112968. Orphanage Stream / Sunningdale	132.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079112969. Poormans Stream	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	50.0	50.0
652079122866. Whakatu Drive (Storage World)	604.4	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
652079122964. Saxton Creek, Main Rd Stoke Culvert to Sea	150.0	3,023.0	3,783.5	1,125.0	0.0	0.0	0.0	0.0	0.0	0.0
652079123289. Orphanage Stream - bunding and Suffolk Road Culvert	140.0	840.0	640.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

652079902052. Brook Stream Catchment Improvements	0.0	0.0	108.1	108.1	20.0	540.5	540.5	540.5	0.0	0.0
652079902103. Inventory of Urban Streams	238.0	100.0	100.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
652079902104. Inventory of Rural Streams	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1	.2	.2
652079902657. Flood Mitigation	0.0	158.1	158.1	158.1	108.1	108.1	108.1	108.1	108.1	108.1
652079902962. Secondary Flow Paths	50.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65207997. LoS: investigation, options, testing, engagement	-16.3	0.0	-20.2	0.0	-60.8	0.0	-42.4	-92.2	0.0	0.0

Group Account	2018/19 LTP Final Uninflated	2019/20 LTP Final Uninflated	2020/21 LTP Final Uninflated	2021/22 LTP Final Uninflated	2022/23 LTP Final Uninflated	2023/24 LTP Final Uninflated	2024/25 LTP Final Uninflated	2025/26 LTP Final Uninflated	2026/27 LTP Final Uninflated	2027/28 LTP Final Uninflated
6510 Stormwater	4,171,792	6,264,822	7,767,124	6,374,274	5,760,548	8,578,240	6,261,586	5,563,290	6,675,926	8,497,505
Expenses	682,945	736,333	788,846	774,638	767,458	746,419	675,057	666,508	703,565	580,505
Base Expenditure	277,127	269,050	277,112	259,050	267,112	259,053	267,115	259,053	267,115	259,055
Unprogrammed Expenses	220,000	220,000	220,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Programmed Expenses	185,818	247,283	291,734	275,588	260,346	247,366	167,942	167,455	196,450	81,450
Capital Expenditure	3,488,847	5,528,489	6,978,278	5,599,636	4,993,090	7,831,821	5,586,529	4,896,782	5,972,361	7,917,000
Renewals	70,653	65,000	45,000	25,000	75,000	275,000	275,000	76,215	66,215	150,000
Capital Growth	1,129,000	1,423,050	1,237,100	1,171,930	1,679,930	2,247,100	1,561,400	1,237,100	1,237,100	1,237,100
Capital Increased LOS	2,289,194	4,040,439	5,696,178	4,402,706	3,238,160	5,309,721	3,750,129	3,583,467	4,669,046	6,529,900
6520 Flood Protection	4,817,055	5,408,071	5,532,933	2,486,284	1,101,190	1,700,090	1,293,640	4,117,790	1,129,240	3,055,440
Expenses	157,215	140,940	161,130	140,940	201,734	140,940	183,298	233,159	140,940	140,940
Base Expenditure	60,940	60,940	60,940	60,940	60,940	60,940	60,940	60,940	60,940	60,940
Unprogrammed Expenses	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Programmed Expenses	16,275	0	20,190	0	60,794	0	42,358	92,219	0	0
Capital Expenditure	4,659,840	5,267,131	5,371,803	2,345,344	899,456	1,559,150	1,110,342	3,884,631	988,300	2,914,500
Capital Growth	166,000	166,000	166,000	166,000	166,000	166,000	166,000	166,000	166,000	166,000
Capital Increased LOS	4,493,840	5,101,131	5,205,803	2,179,344	733,456	1,393,150	944,342	3,718,631	822,300	2,748,500

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

Figure 6-1: Level of Service Capital Expenditure



Figure 6-2: Trends from the previous 2-3 years



6.2. Funding strategy

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 New Zealand equivalents to International Financial reporting Standards (NZ IFRS).

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

- The contribution to the achievement of 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)

This Asset Management Plan provides the basis for meeting these requirements.

REVENUE AND FINANCING POLICY - STORMWATER

Distribution of Benefits

Community benefits

- 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 used 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. 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.

See Nelson City Council Long Term Plan 2018/28 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.

6.3. Valuation forecasts

Table 6-2: Stormwater and Flood Protection Asset Valuation – June 2016

Asset Category	June 2016					
	Quantity			RV	DRV	Depr
	km	units	m2	(\$)	(\$)	(\$)
Mains Up To 600mm	161.1			78,577,115	53,247,025	881,768
Mains > 600mm	41.0			54,107,640	34,189,570	599,020
Channels	1.3			273,571	146,922	3,287
Culverts	6.2			16,623,457	11,874,525	185,212
Rocks Rd Culvert	0.3			3,100,197	2,741,632	34,447
Intakes		110		654,114	465,757	8,065
Manholes		4,563		22,358,930	16,539,757	247,955
Outfalls		79		437,281	274,219	7,156
Sumps		606		1,400,207	998,261	15,489
Pump Stations		2		3,471,998	2,019,534	105,870
Tide Gates		24		179,019	89,175	5,143
TOTAL				181,183,529	122,586,375	2,093,411
Flood Protection Asset Valuation						
Asset Category	June 2016					
	Quantity			RV	DRV	Depr
	km	units	m2	(\$)	(\$)	(\$)
Bank Protection			59,693	19,953,182	13,589,824	287,203
Detention Dams		9		1,702,111	1,512,483	9,400
TOTAL				21,655,294	15,102,307	296,603

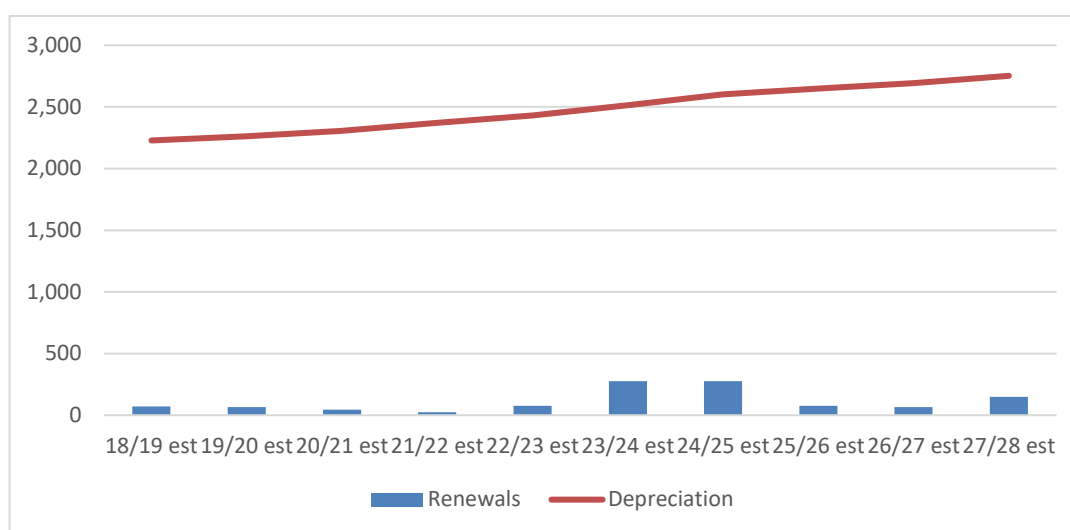
The 2017 indexed valuation of the stormwater and flood protection assets are Stormwater \$126,585,000 and Flood Protection \$22,478,000.

Table 6-3: 2014 Stormwater and Flood Protection Asset Valuation

Asset Category	Quantity	Unit	Replacement Value \$
Stormwater 2014			
Mains Up To 600mm	159.4	km	75,557,050
Mains > 600mm	40.5	km	47,371,923
Channels	1.2	km	251,352
Culverts	5.8	km	16,554,691
Rocks Road Culvert	0.3	km	3,039,409
Tide Gates	24	No	175,509
Intakes	93	No	526,970

Asset Category	Quantity	Unit	Replacement Value \$
Stormwater 2014			
Manholes	4,404	No	20,324,201
Outfalls (with wing walls)	77	No	394,041
Sumps	593	No	1,384,972
Pump Stations	2	No	3,343,711
TOTAL			168,923,829
Flood Protection 2014			
Bank Protection	59,222	m ²	11,978,760
Detention Dams	9	No	1,645,220
TOTAL			13,623,980

Figure 6-3: Forecasts of depreciation



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.

Table 6-4 below details the possible and actual significant forecasting assumptions and uncertainties relating to the Nelson City Council stormwater system.

Table 6-4: 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 5%.	Low	Level of debt is moderate. Interest costs are not expected to vary significantly.
2	Growth is based on figures provided by statistics New Zealand and Nelson City Council growth projections.	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 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.	Low	Replacement values have gone through a review process.
5	Upgrade/capital estimates are as follows: Concept +/- 30% Initial & Planning +/-10 to +/- 25% Delivery/Construction +/- 5% 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 without detailed project planning.
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 proposed condition assessments indicate that Councils mains have decreased useful lives, depreciation presently taken will be less than that required for replacement.

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 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.

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 legal road.
- All manholes are stormwater assets.
- Culverts crossing legal road which have open channel on both sides are roading, others are stormwater, with a few exceptions of special culverts which run parallel to legal road and are stormwater assets.

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 with roads and overland flow providing the flow path 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 stormwater works than Q15

No new environmental legislation will be imposed during the next decade that would require a higher level of flood protection works than Q100.

A Q100 rainfall event is defined as one with a 1% probability of occurring in any year. We expect, on average, to have one of these events every 100 years.

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.

6.5. Forecast reliability and confidence

Table 6-5: 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 5%.	Low	Level of debt is moderate. Interest costs are not expected to vary significantly.
2	Growth is based on figures provided by statistics New Zealand and Nelson City Council growth projections.	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 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.	Low	Replacement values have gone through a review process.
5	Upgrade/capital estimates are as follows: Concept +/- 30% Initial & Planning +/-10 to +/- 25% Delivery/Construction +/- 5% 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 without detailed project planning.
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 proposed condition assessments indicate that Councils mains have decreased useful lives, depreciation presently taken will be less than that required for replacement.

7. Asset Management Practices

The goal of infrastructure asset management is to:

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

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:

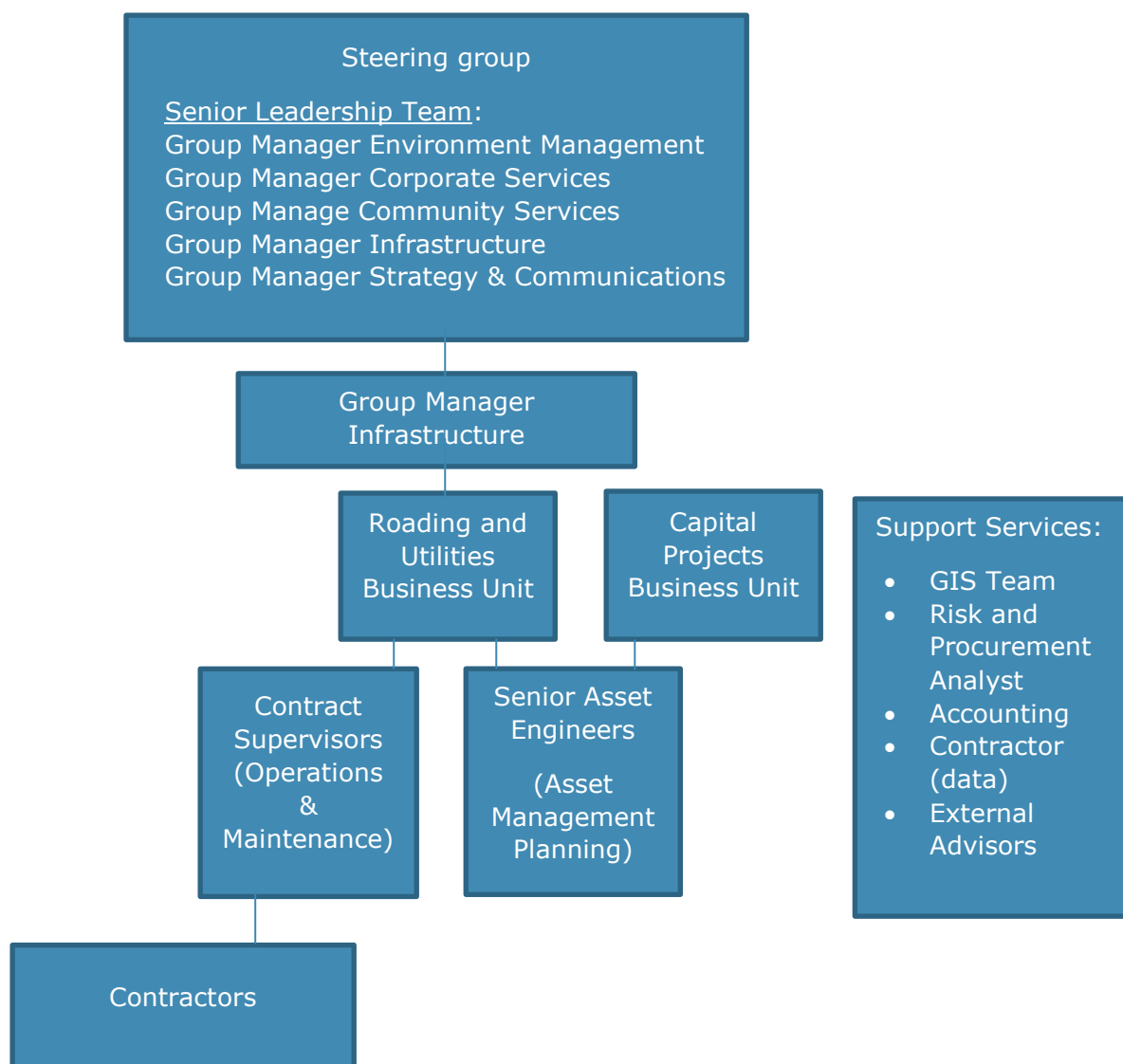
- Improved governance and accountability
- Enhanced service management and customer satisfaction

- Improved risk management
- Improved financial efficiency
- More sustainable decisions

The key elements of Asset Management are as shown below:



7.1. Asset management leadership and structure



7.2. Management systems

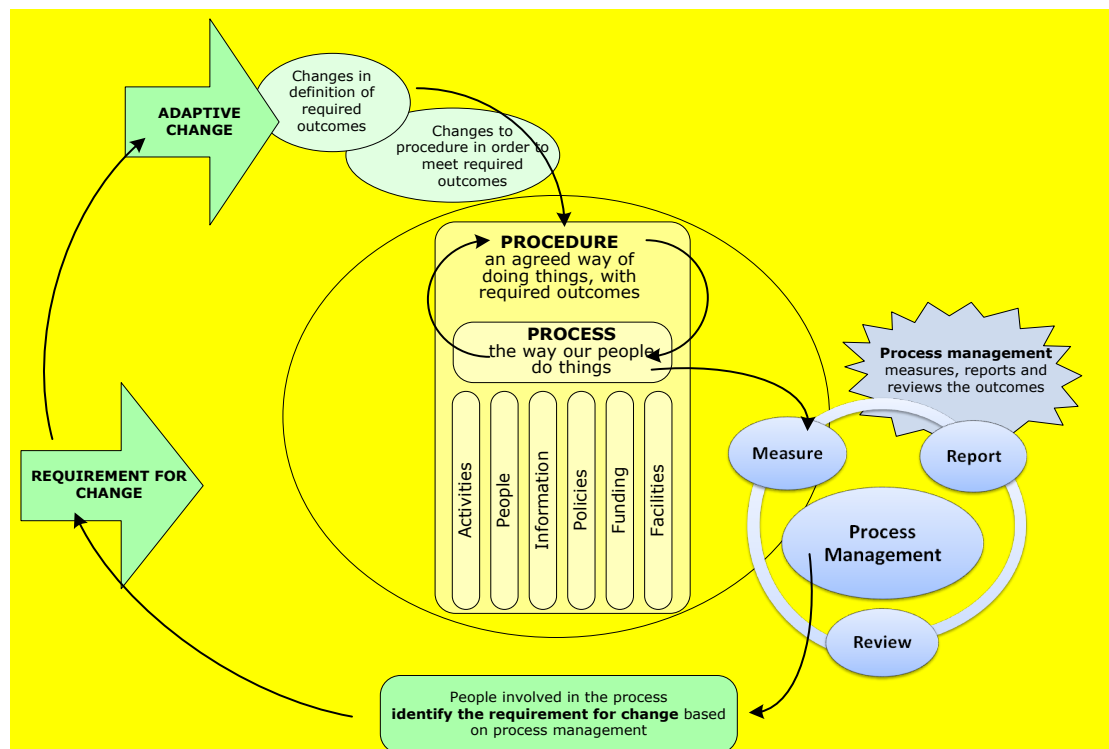
A management system is defined as the set of procedures an organisation needs to follow in order to meet its objectives.

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 deliver 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.

Quality Management Lifecycle:



1: Define the Process: Document the Procedure

NCC's Quality Management system (QMS) is a process-based approach. A process is a set of interrelated or interacting activities which transforms inputs into outcomes. Required outcomes are achieved more efficiently when activities and related resources are managed as a process.

A procedure is an agreed way to carry out a process. A procedure includes and defines:

Required outcomes from the procedure (most important)

- Definition of the required outcome forms the "quality" standard for the process
 - Agreement of the required outcomes tells us what would success look like (our KPIs)
- We need to ensure that required outcomes are recorded so that they can be measured later - not just what needs to be achieved, but when, and how many, and what exceptions

People involved in the procedure (equally important)

- Definition of all of the people involved in all aspects of the process, including the customer, those "doing stuff", those "accountable for stuff" and any suppliers directly involved in the process
- Are the people involved the most effective, most efficient way to do this?

Activities comprising the procedure

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

1: Define the Process: Document 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.

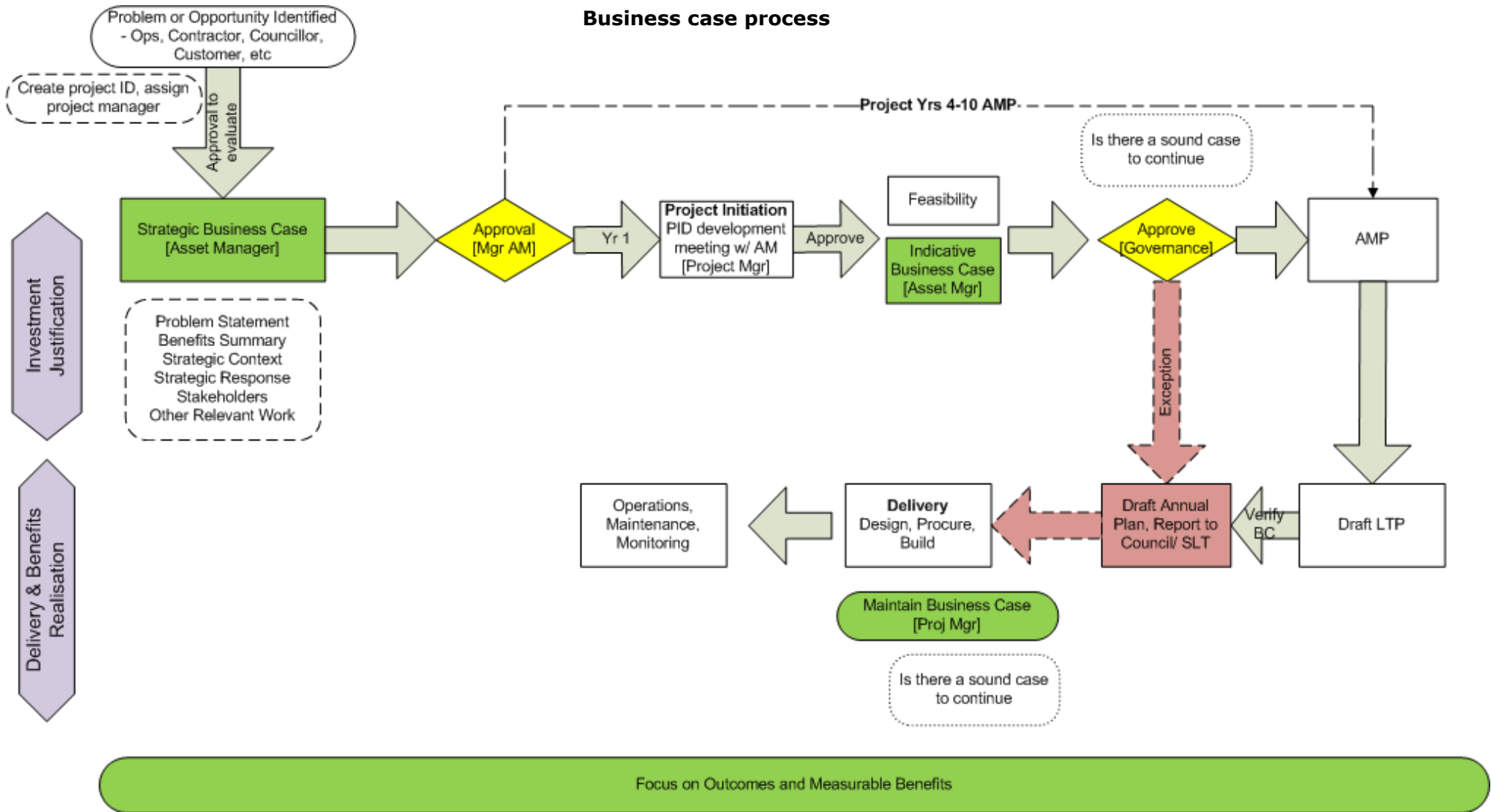
People involved with processes identify and initiate change:

- 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.

Business case process



7.3. Information systems

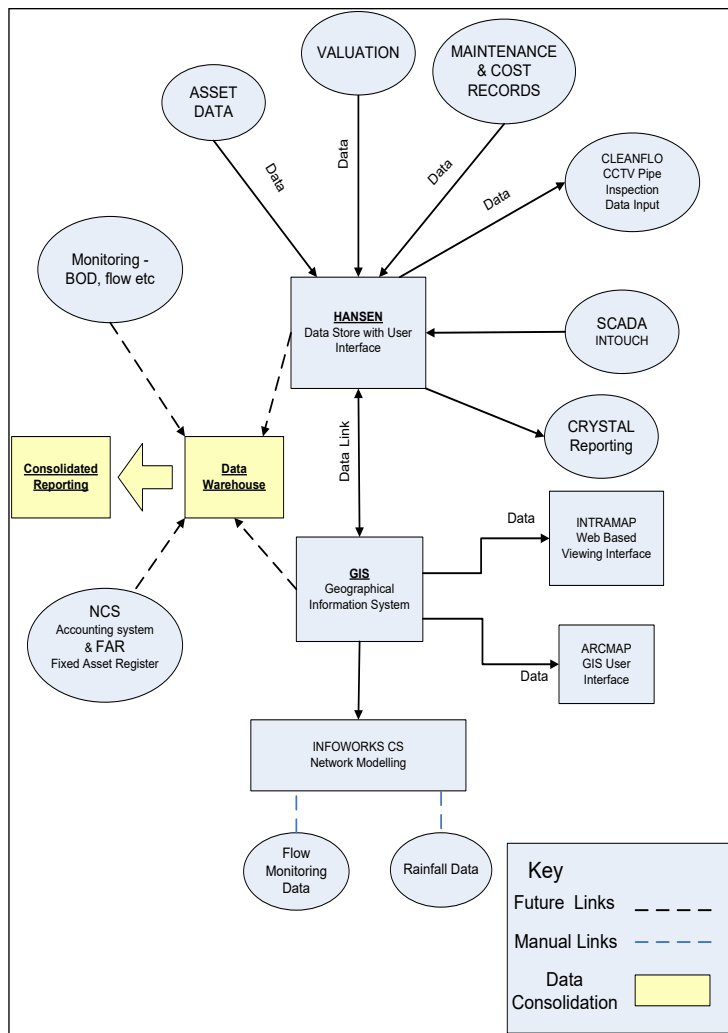
Asset Management Information Systems provide an understanding of assets to optimise lifecycle costs, identify required work, record completed work and cost of work. It benefits general management, long-term planning and data analysis.

All asset information is stored in the Asset Register linked with GIS.

An overview of the asset information system in its existing state and future state is depicted in Figure 7-1 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, InTouch, Network Model, and closed circuit television) 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 activity.

Figure 7-1: 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 on a monthly basis via Nelson City Council engineering staff.

Council's Engineering Standards require that any work on a Council sewer 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 now updated into the asset register by Nelson City Council Engineering and Finance staff. This ensures a high level of reliability.

Closed Circuit Television

Currently, Closed Circuit Television condition inspections are carried out by an external contractor only as required.

The Infor system is used to assist in the selection of pipes to be checked. The Closed Circuit Television inspection records are inputted into the Infor system via Cleanflow.

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 forms 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 alert for operational issues. With confirming the required reporting outputs for all levels of management 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 parties are met.

ProMap

ProMap is Nelson City Council's procedures library

Supervisory Control and Data Acquisition System (SCADA)

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.

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 the 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 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 Supervisory Control and Data Acquisition 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 Supervisory Control and Data Acquisition system has grown to the point that without the current Supervisory Control and Data Acquisition system, maintaining the existing Levels of Service would be difficult. Supervisory Control and Data Acquisition has given the ability for Council to ascertain faults and instigate repairs without affecting the service to the consumer and has significantly increased efficiency and reliability of the utility schemes. The Supervisory Control and Data Acquisition system is a critical system in Council's operation.

Review and Upgrade

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

Future Strategy for Councils Supervisory Control and Data Acquisition

Council's strategy for the ongoing use of Supervisory Control and Data Acquisition is:

- Maintain Supervisory Control and Data Acquisition system 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.

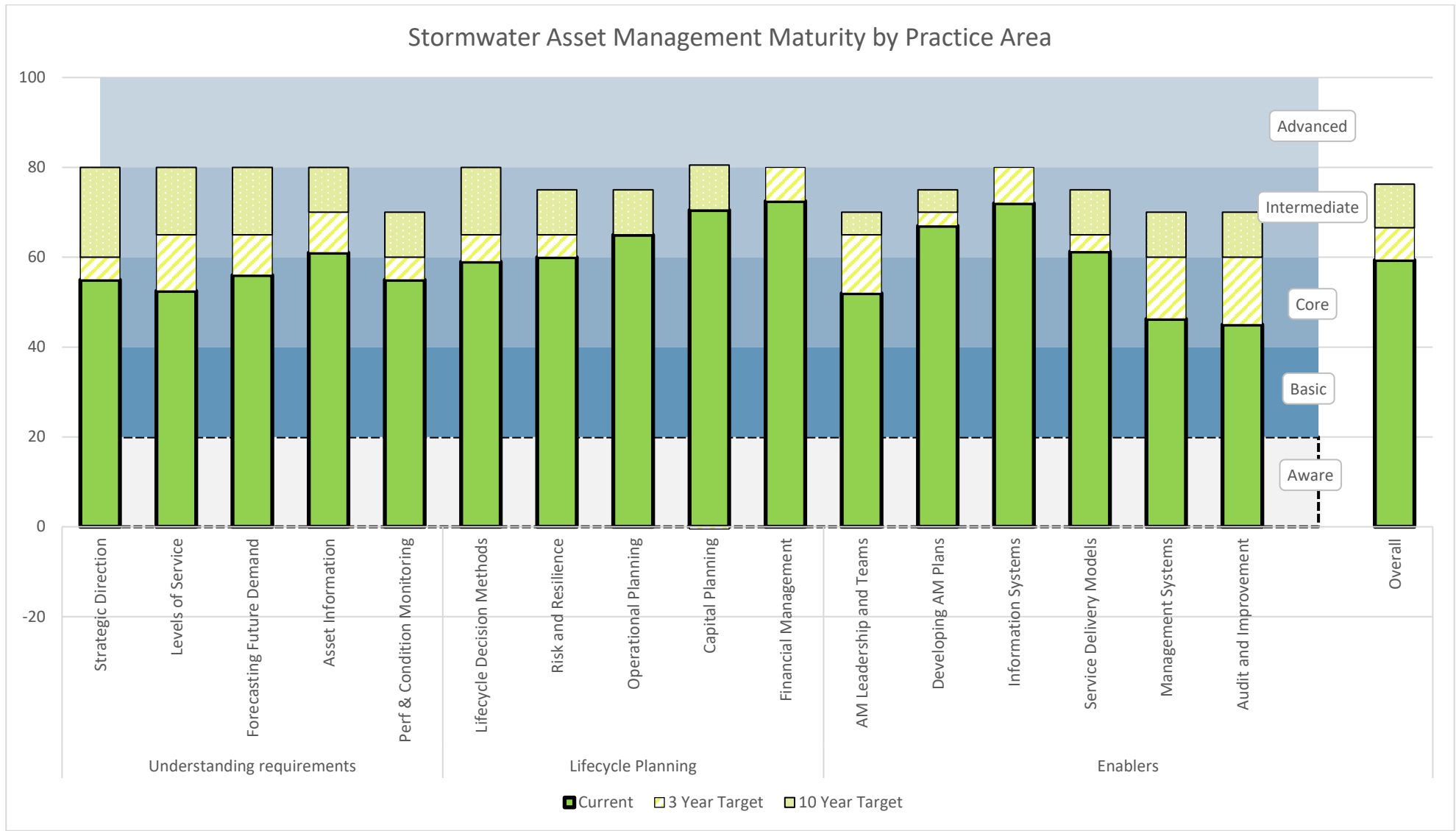
Council maintains an in-house professional services capability balanced with external consultants as required to achieve best value for money. Additional professional services are sometimes required.

8. Plan improvement and monitoring

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

8.1. Status of AM practices

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



8.2. Improvement programme

An important component of this Asset Management 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: Ten Year Improvement Programme

Improvement Programme

Action
Review Levels of Service (especially in relation to sustainability & infiltration)
Improve accuracy of data through review and modification of collection, storage, and auditing
Include a more detailed strategy for critical assets such as open channels and streams and rivers
Expand focus on inter-relationship of network components and development of improved strategies for maintenance, renewals, and upgrades
Expand sustainable practice throughout stormwater activity
Ongoing refinement of lifecycle decision making and financial forecasts
Develop Risk Plans
Investigate better reporting options regarding blockages to pipe network so that service requests identify whether a roading or stormwater issue
Improve reporting on response times. The median time reported is currently based on 50% of requests
Develop catchment management plans
Complete computer modelling for Maitai River, Brook & York Streams
Improve linkage to Environmental Activity & Transport Asset Management Plans including creating a chart to show the links
Investigate reporting processes and procedures from Infor and maintenance contractors to ensure that the appropriate levels of service and asset management reporting is available
Review condition assessments
Review confidence rating tables
Review life expectancy
Develop index of intensity, location and effects of flood events and location of flood data and continue to record and assess storm surges.

8.3. Monitoring and review procedures

Nelson City Council Stormwater Asset Management 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 Nelson City Council policy changes that may impact on the levels of service.

The Asset Management Plan will be improved throughout its life cycle as further information about the stormwater system assets are collected in terms of condition, performance and service delivery. Nelson City Council is committed to advanced data

collection and management systems that will allow for a greater appreciation of the performance and condition of the Nelson City Council assets.

Nelson City Council will report variations in the adopted annual plan budgets against the original asset 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. 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, financial 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 Asset 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. \$/m/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.

In 2014 Nelson City Council participated in a Local Government New Zealand benchmarking exercise for water based utilities.

How the effectiveness of the AM plan will be measured

The effectiveness of the Asset Management 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 on a monthly basis

The continued monitoring of these procedures and ongoing analysis of results 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

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 cashflow 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.
Asset Management Plan	A plan developed for the management of one or more infrastructure assets 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 cashflow 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.

Term	Definition
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, 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.

Term	Definition
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	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).
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,

Term	Definition
	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 Pipe Inspection Manual - National manual for inspecting and scoring stormwater pipes. Published by NZWWA - Second 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.
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.

Term	Definition
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 asset 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

Term	Definition
	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.
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.

A1 Acronyms

Term	Definition
AC	Asbestos cement pipe
ADWF	Average dry weather flow
ATAD	Autothermal thermophilic aerobic digestion plant
AV	Average flow
BOD	Biochemical oxygen demand
BTWWTP	Bells Island waste water treatment plant
CCTV	Close circuit television
CDEM	Civil Defence Emergency Management
FAR	Fixed asset register
GAAP	Generally Accepted Accounting Principles
KPI	Key Performance Indicators
LA	Local Authority
LID	Low impact design
LAPP	Local Authority Protection Programme Disaster Fund
LDM	Land Development Manual 2010
LTCCP	Long Term Community Plan
MCA	Multi-Criteria Analysis
NAMS	National Asset Management Steering Group
NCS	Napier Computer System

Term	Definition
NPV	Net present value
NRSBU	Nelson Regional Sewerage Business Unit (replaced NRSA in July 2000)
NTL	Network Tasman Ltd
NUGS	The Nelson Urban Growth Strategy
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
uPVC	Unplasticised Polyvinyl Chloride pipe
WWTP	Wastewater treatment plant

APPENDIX B: BIBLIOGRAPHY

Title	Date	Author
Nelson City Council Stormwater Asset Management Plan	2003	Nelson City Council
The Development of Business Process Mapping for Asset Management Systems	June 2000	Opus International Consultants Ltd
New Zealand Infrastructure Assets Grading Guidelines	1999	NZWWA
The High Intensity Rain Fall Analysis for Nelson Urban Area	2008	NIWA
Nelson City Council Long Term Council Community Plan 2006-16	2006	
Nelson City Council Stormwater Bylaw		Nelson City Council
2008 Valuation	Sept 2008	Nelson City Council
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**

Value	Description
2000	2000: Meter type
3000	3000: Meter type
ACBK	Black Asbestos Cement
ACMT	Asbestos Cement
ALUM	Aluminium
ARMC	ArmourCoil
BLBT	Blue Brute Pipe
BLKA	Black Asbestos Cement
BRCK	Brick
CIDT	Ductile Cast Iron
CIPT	PitCast Iron
CISP	Spun Cast Iron
CNIL	Concrete (InsituFORM lined)
CONC	Concrete
COPR	Copper
DRNC	Drainage Coil
DTRPL	Deep Trap Large
EWRE	Earthenware
FGLS	Fibreglass
FLDT	Field Tiles
GALV	Galvanised
HDPE	High-density polyethylene pipe
HELA	Helcoil Aluminium
HELS	Helcoil Steel
MDPE	Medium Density Pe

Value	Description
NAPP	Not Applicable
OTHR	Other
PE1H	Pe 100 Material
POLE	Pole Construction
PRFC	Perforated Concrete
PVC	uPVC
STCL	Steel Concrete Lined
STNY	Nylon Coated Steel: Used in pump stations
STPL	Steel Pitch Lined
UNKW	Unknown

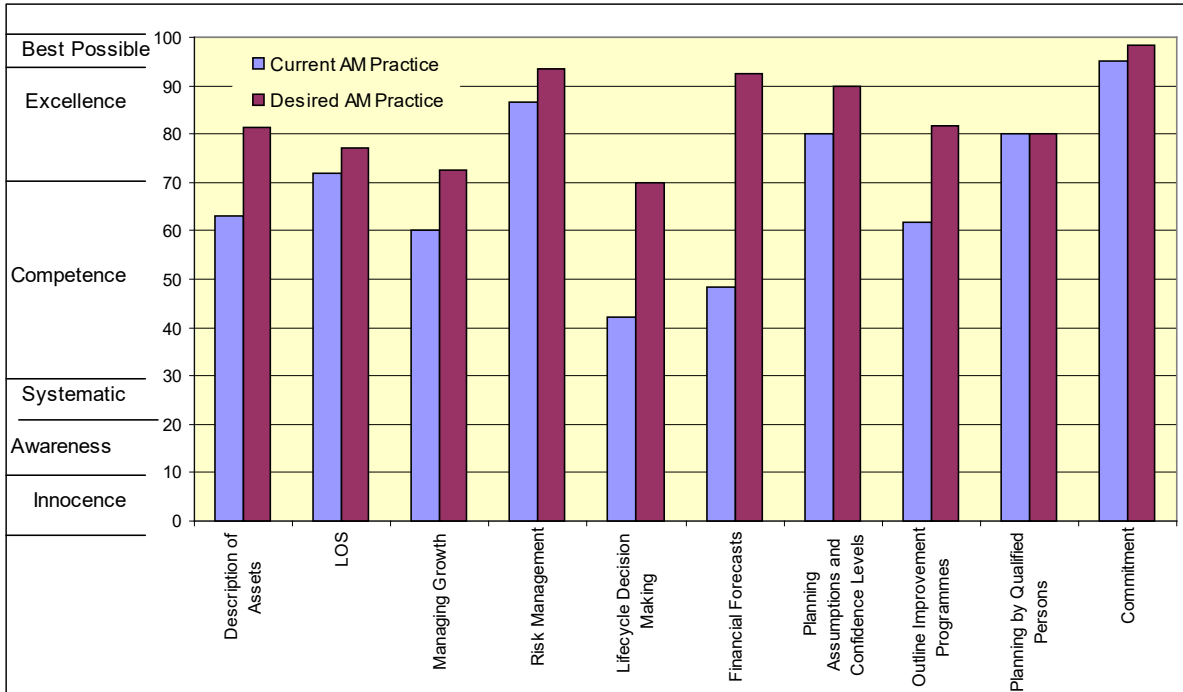
Appendix Table C-3: Intakes, Manholes, Wing Walls and Sumps

Diameter / Description	Number	Replacement Value \$,000
Intakes		
Dia < 300	20	
300 <= Dia < 600	40	
600 <= Dia < 900	13	
900 <= Dia < 1500	17	
Dia >= 1500	7	
Total	97	
Manholes		
1,050	2,548	
1,350	727	
1,500	226	
1,800	96	
Special	43	
DTRPL	4	
Total	3,644	
Wing Wall Outfalls		
Dia < 300	8	
300 <= Dia < 600	27	
600 <= Dia < 900	15	
900 <= Dia < 1500	8	
Dia >= 1500	12	
Total	70	
Sumps		
Standard	547	
Non return	1	
Total	548	

APPENDIX D: GAP ANALYSIS AND APPROPRIATE PRACTICE

Figure D1-1 below indicates the desired Asset Management level and performance in the ten areas of Asset Management for the stormwater services.

Appendix Figure D-1: Nelson City Council Appropriate Asset Management and Performance Analysis



Inconsistent scores are indicated across the ten areas of Asset Management practices, with ratings in the low average competence to the high excellence range

Appendix Table D-1: GAP Analysis and Appropriate Practice

Stormwater				Maturity Levels					w						
Reference	Question	Section	Why	Aware Ad hoc processes, minimal documentation.	Basic Process and documentation in development	Core Main process components developed and documented	Intermediate Process complete, optimisation developing	Advanced Optimised process in place, documentation complete.	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap
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.			55	60	80		
			Strategic context (internal / external) analysed and AM implications understood.						25%	50					
			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%	60					
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.			52.5	65	80		
			Customer engagement to understand level of service requirements.						25%	35				Done through LTP & Annual Plan. Don't facilitate wide customer group discussions	
			Levels of service and performance measures defined						25%	70					
			Measurement and reporting occurs, including analysis of trends.						25%	70					
			Level of service and cost relationship analysed.						25%	35				Not done for changes to L.O.S.	L.O.S. and cost linkage
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	A range of demand scenarios is developed (eg: high/medium/low). Demand management is considered in all strategy and project decisions.			56	65	80		
			Historical demand / consumption of services recorded and trends analysed history recorded						20%	75					
			Demand factors identified and analysed						20%	75					
			Demand forecast models developed						20%	50					Better use of model
			Demand management strategies identified and impacts on future demand quantified						20%	50					Better use of model
			Risk associated with demand uncertainty understood, scenarios are developed and managed						20%	30					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.			61	70	80		
			Asset hierarchy defined and data requirements for each level of the hierarchy specified.						20%	55					
			Basic physical information captured against assets (age, material, type, etc)						20%	55					
			Spatial / location information recorded or links to GIS from asset register (if separate)						20%	65					
			Asset age / life / replacement cost recorded at asset level (information for valuation / renewals)						20%	65					
			Asset criticality data recorded at asset level						20%	65					

Stormwater				Maturity Levels					w							
Reference	Question	IIMM Descriptors	Why	Aware	Basic	Core	Intermediate	Advanced	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap	
				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.								Rarely
Section				0-20	25-40	45-60	65-80	85-100								
Understanding and Defining Requirements																
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.			55	60	70		
		Condition and performance monitoring programmes established								25%	55					
		Condition data captured in asset register								25%	45				Not checked, no trend data analysis	
		Performance data captured in asset register (eg: service outages)								25%	55					Accessibility 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.			59	65	80		
		Good information available to support AM decisions.								20%	50					Improve condition data
		Options developed and analysed (including 'do nothing')								20%	65					
		Agreed frameworks / techniques applied to support decision making								20%	65					Record process better
		Decision frameworks are aligned to strategic objectives / levels of service								20%	65					Matrix - see business case renewals
		Sensitivity analysis / scenario testing used to assess robustness of result								20%	50					
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.			60	65	75		
		Risk policy / framework in place								20%	80					
		Risks are identified and recorded in risk register.								20%	80					
		Risk actions are identified, monitored and reported.								20%	30					Set time frames for mitigation measures
		Strategy for management of critical assets in place								20%	50					
		Assessments of network resilience to major hazards								20%	60					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.			65	65	75		
		Operational programmes and processes are developed and optimised								25%	65					Check what contract says
		Operational objectives and intervention criteria are defined								25%	65					
		Emergency response arrangements are in place and tested								25%	65					Updating emergency management
		Operational performance is monitored and improvements identified								25%	65					Improve monitoring of KPI

Stormwater				Maturity Levels					w						
Reference	Question	IIMM Descriptors	Why	Aware	Basic	Core	Intermediate	Advanced	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap
				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.							
Section				0-20	25-40	45-60	65-80	85-100							
Understanding and Defining Requirements															
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.			70.5	70	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%	65				Time constraints
		Capital projects are prioritised within and between activities and work areas								25%	65				
		Renewal forecasts are modelled based on age, condition, performance								25%	75				
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.			72.5	80	80	
		Budget categorisation supports analysis of asset-specific financial requirements								25%	75				
		Long term financial forecasts are developed								25%	65				
		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			52	65	70	
		Leadership supports and actively advocates investment in AM.								20%	60				Current workshop
		AM roles and role interfaces are defined.								20%	55				Improve job description and organisational structure
		Resources (internal and external) to support an effective 'AM System' are in place.								20%	55				Need extra contractor resources or capital projects engineer
		All staff understand AM and their role / contribution to the AM System.								20%	45				
		AM capability requirements are reviewed and provided								20%	45				
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 its new and existing infrastructure, based on the organisations understanding of demand, customer requirements and its 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.			67	70	75	
		AMP development includes relevant staff and stakeholders								20%	60				More trend analysis to optimise decision making
		AMP content in line with IIMM								20%	65				
		AMP document is of good quality, readable for target audience								20%	65				Improve use of AMP content to be more user friendly and appropriate
		AMPs are integration with other business processes / plans								20%	55				Content of AMP relevant and easy to use
		AMPs are communicated to / approved by Council / Executive / key stakeholders								20%	90				

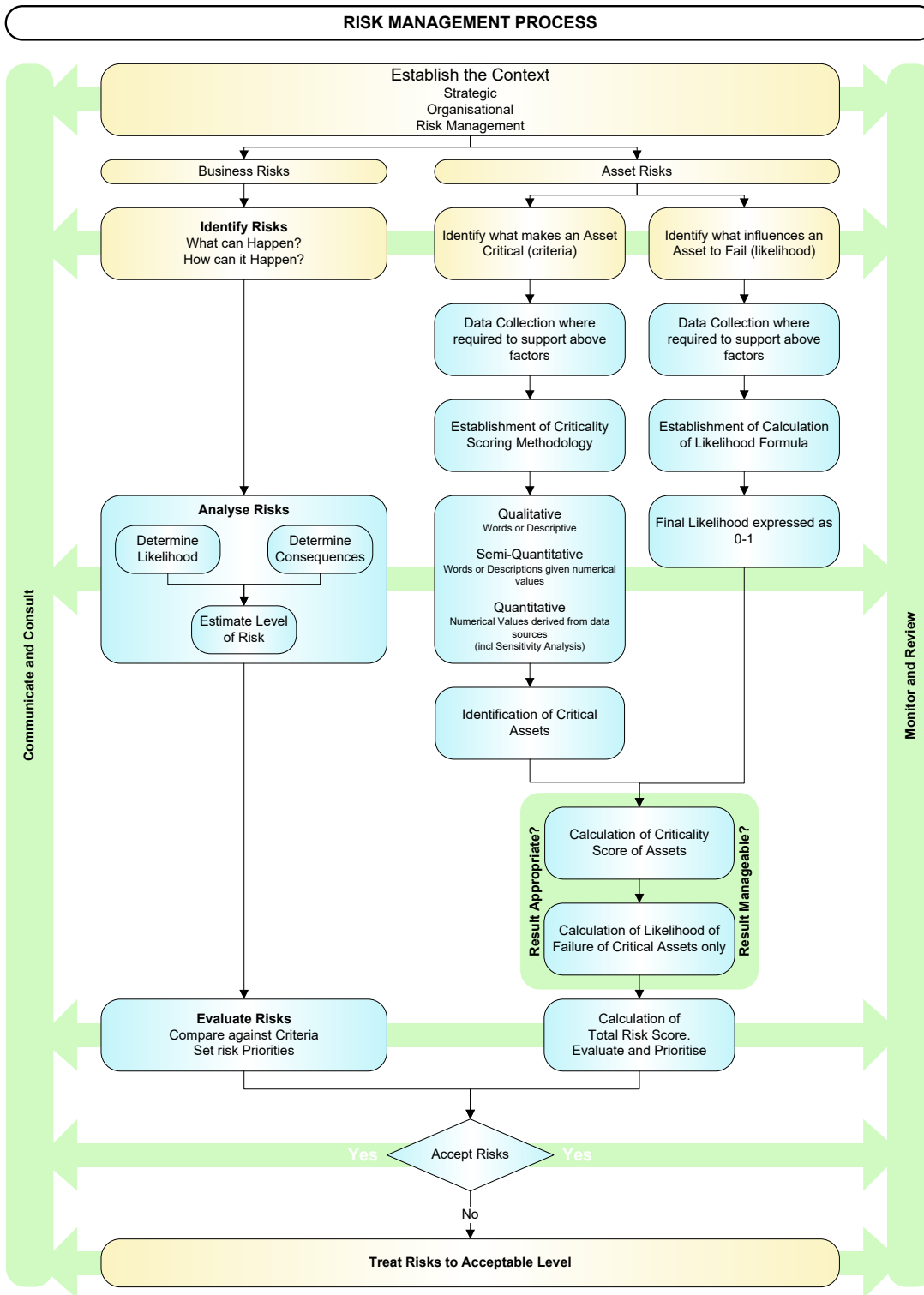
Stormwater				Maturity Levels					w							
Reference	Question	IIMM Descriptors	Questions	Why	Aware	Basic	Core	Intermediate	Advanced	Element %	Element Score (out of 100)	Current Score	Appropriate Target (3 yrs)	Target (10 years)	Reason for scores	Improvement Tasks to close gap
					Ad hoc processes, minimal documentation.	Process and documentation in development	Main process components developed and documented	Process complete, optimisation developing	Optimised process in place, documentation complete.							
					0-20	25-40	45-60	65-80	85-100							
Understanding and Defining Requirements																
IIMM 4.3	15	Establishing and Maintaining Management Systems	How does your organisation ensure that its 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.			46.25	60	70		
			Management systems are in place to support AM.							25%	60					
			AM processes are documented within a management system framework							25%	45				Business cases/PIDs/Data Analysis/Computer models	
			Processes are subject to review, audit and continual improvement							25%	45					
			AM System is aligned / certified to ISO 55001							25%	35					
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	80	80		
			IS records asset data within a hierarchy							20%	80					
			IS enables tracking of service requests and scheduling of planned maintenance							20%	80					
			IS supports AM analysis (performance evaluation, valuation / renewal forecasting)							20%	70				Not sure of capabilities	Need training
			IS reporting supports management and AMP requirements							20%	65				Not sure of capabilities	Need training
			Information systems share / exchange data							20%	65					
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.			61.25	65	75		
			Service delivery roles / functions defined (O&M, capital project delivery, etc)							25%	65					Documenting
			Functions allocated to roles / teams / contracts							25%	60					Documenting
			Service delivery options are evaluated and a strategy for outsourcing is in place							25%	60				Nelmac contract	Documenting
			Contracts / SLAs are in place for outsourced / in house service delivery							25%	60					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.			45	60	70		
			Gap analysis used to identify AM improvement tasks							25%	50					Document it
			Improvement tasks prioritised and developed into an AM improvement plan with allocated resources / timeframes / deliverables							25%	50					Document it
			Project scope / brief developed for major improvement tasks.							25%	40					Document it
			Progress against the AM improvement programme is regularly monitored and reported to management							25%	40					Document it

Gap Analysis	Assessment Source	Risk Management									Lifecycle Decision Making							Financial Forecasts								
		4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.2	5.3	5.5	5.6	5.7	6.1	6.2	6.3	6.4	6.5	6.6					
Best	100																									
Excellence	95																									
	90																									
	85																									
	80																									
	75																									
Competent	70																									
	65																									
	60																									
	55																									
	50																									
	45																									
	40																									
Systematic	35																									
	30																									
Aware	25																									
	20																									
Innocent	15																									
	10																									
	5																									
											CA	NCA	CA	NCA	CA	NCA	CA	NCA	CA	NCA						
Current		90	90	90	90	90	80	80	80	90	80	30	80	50	30	30	30	30	30	30	70	70	50	50	25	25
Desired		100	100	100	90	90	90	90	90	90	90	50	90	50	90	50	90	50	90	50	95	95	95	90	90	90
5 Year Gap		10	10	10	0			10	10	0	10		10		60		60		60		25	25	45	40	65	65

Gap Analysis	Assessment Score	Planning Assumptions and Confidence Levels									Outline Improvement Programmes						Planning by Qualified Persons		Commitment					
		List all assumptions and possible effects	Confidence level on asset condition, performance	Accuracy of asset inventory	Confidence level demand/growth forecasts	Confidence level on financial forecasts	List all assumptions including organisations strategic plan that support Asset Management - linkages with other planning	Confidence levels - Inventory Data; Critical Assets (1),	Confidence levels - Condition Data; ; Critical Assets (1-2), Non Critical (1,2,3)	Confidence levels- Performance Data; ; Critical Assets (1-2), Non Critical (1,2,3)	Identify improvements to AM processes & techniques	Identify weak areas & how they will be addressed	Timeframes for improvements	Identify resources required (human & financial)	Improvement programmes are monitored against key performance indicator's	Previous improvements identified and formally reported against key performance indicator's	Asset Management Planning should be undertaken by a suitably qualified person	Process should be Peer reviewed	Plan adopted by Council including improvement programme	Plan key tool to support Long Term Council Community Plan	AM Plan regularly updated and should reflect progress on improvement plan	Asset Management Plan requirements are being implemented and discrepancies	Asset Management Plans evolving as Asset Management systems provide better information	Asset Management Plans updated every 3 years along with organisations strategic planning cycles
		7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.1	8.2	8.3	8.4	8.5	8.6	9.1	9.2	10.1	10.2	10.3	10.4	10.5	10.6
Best	100																							
Excellence	95																							
	90																							
	85																							
	80																							
	75																							
Competent	70																							
	65																							
	60																							
	55																							
	50																							
	45																							
	40																							
Systematic	35																							
	30																							
Aware	25																							
	20																							
Innocent	15																							
	10																							
	5																							
Current		80	80	80	80	80	80	80	80	80	70	60	70	70	50	50	80	80	100	100	100	95	95	80
Desired		90	90	90	90	90	90	90	90	90	90	80	80	80	80	80	80	80	100	100	100	95	95	100
5 Year Gap		10	10	10			10		10	10	20	20	10	10	30	30	0	0	0	0	0	0	0	20

APPENDIX E: RISK

Appendix Figure E-1: Risk Management Process

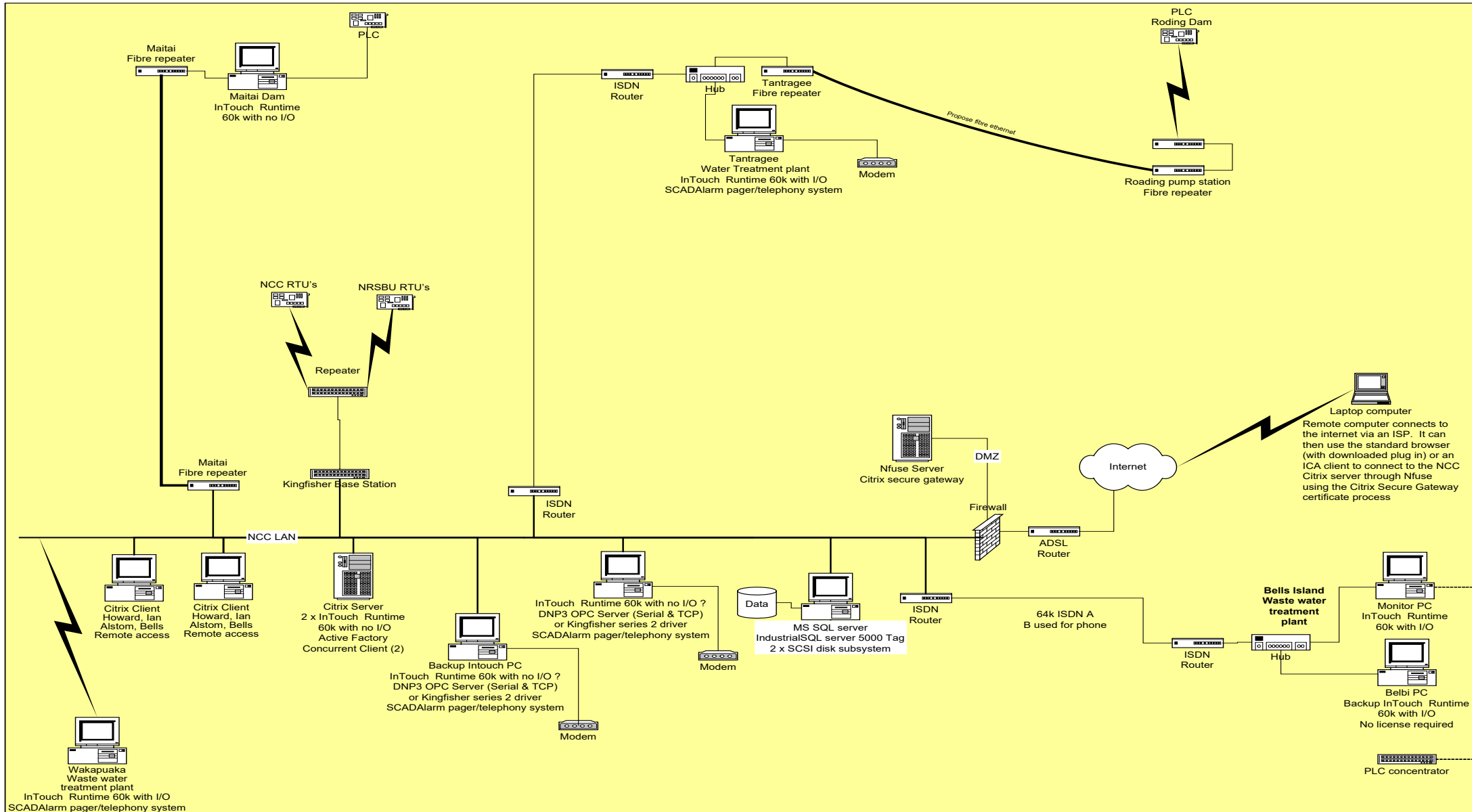


APPENDIX F: DECISION CRITERIA (RENEWAL)**Appendix Table F-1: Decision Criteria (Renewal)**

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 Schematic



APPENDIX H: 1996 SW STRATEGIC PLAN PROGRAMME

Nelson City Draft Strategic Plan 1996 - 2016

STORMWATER		Total For 26 Years	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
1	Investigate B/C of household water storage tanks	50			50																		
2	York Stream Box Culvert	1,400	500	900																			
3	Wood Area	3,500			700	700	700	700	700														
4	Golf Road P/S	1,500		1,000	300					200													
5	Poomans Stream	700										700											
6	Jenkins Stream	700											700										
7	Maitai River	2,100													700	700	700						
8	Moyland Road (to Saxon)	700															700						
9	Main Road Stone (to Orphanage)	700																700					
10	Railway Reserve (to Saxon)	700																	700				
11	Todds Valley	1,400																		700	700		
12	Orphanage Creek	700																				700	
13	Oldham Creek	1,000	300	300	200	200																	
14	York Stream (below Welmea)	1,100	200	200	200	300	200																
15	Aspid Stream	3,700		200	300	200	300	400	200	100		400	400	400	400	400							
16	Orchard Creek	1,200				200	200	200	300	100	200												
17	Collingwood Street	700					200	500															
18	Campbell / Turner	1,000							400	600													
19	Rutherford to Brook	100								100													
20	Victoria Heights / Queens	300									300												
21	Adol Street/Glen	300									300												
22	Songer Street	500									100	700											
23	Wylie Street	200												200									
24	Manson Avenue	100													100								
25	Mallows Street	200														200							
26	Golf Road/Beach Road	200																					
27	Cleveland Terrace/ Almore Terrace	300																					
28	Endavour / Hampden	400														300							
29	Rangers Terrace	40														400							
30	St Vincent / Jensen	200																					
31	Riverside	40																					
32	Mount / Konie	200																					
33	Angela / Scott	100																					
34	Kauri / Maitai / Tikaki / Rangi	100																					
35	Rutherford	20																					
36	Tessell / Tamaki	60																					
37	Examiner / Shebourne	100																					
38	Tasman (Bronie-Nga)	60																					
39	Quebec/Monica/Aerow	300																					
40	Ngaho/Maitani	110																					
41	Ima	60																					
42	Stanley/Beachville	250																					
43	Marybank	100																					
44	Sadler/Hobhouse/Miles/Saer	150																					
45	Stansell Ave	60																					
46	Takui	40																					
47	Mahoe/Osman/Malipo	110																					
48	Seymour	30																					
49	Karaka	170																					
50	Stefford	60																					
TOTAL PAGE 1		28,160	1,300	2,600	1,750	1,600	1,900	1,800	1,600	1,100	900	1,800	1,800	1,800	1,800	1,750	1,410	1,010	700	700	700	700	

APPENDIX 5 STORMWATER PROJECTIONS

12/1/1996

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Nelson City Draft Strategic Plan 1996 - 2016

STORMWATER		Total For 30 Years	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16
51	Bedsford/Louison/Howell	140																140				
52	Arlesdale/Thompson	140																140				
53	Eckington/Alfred/Hampden	80																80				
54	Fryberg/Leticia/Maple	60																60				
55	Hill (Trotter Sq - Collingwood)	30																	30			
56	Bridge (Tasman-Collingwood)	30																	30			
57	Tasman (Hardy - Bridge)	40																	40			
58	Hardy (Tasman-Alton)	30																	30			
59	Neale/Kea/Kaka	140																	140			
60	Viewmount/Hidgway	100																	100			
61	Dodson Valley	30																	30			
62	Tojara/Hulchison	50																	50			
63	Caerthon	60																	60			
64	Kowhai	50																	50			
65	Montrose/Hope/Alma	60																	60			
66	Fleehing	50																	50			
67	Russell	30																	30			
68	North Esk/Beccles	60																		60		
69	Vanguard (Hardy, Rutherford)	50																		50		
70	Isal Plan	100																		100		
71	Ty Slen	90																		90		
72	Brooklands	40																		40		
73	Wastrey	50																		50		
74	Kaping	30																		30		
75	Mansie	30																		30		
76	Shakespeare	40																		40		
77	Parere	30																		30		
78	Paru Paru	50																		50		
79	Baker/Alisdair	80																		80		
80	Cherry	50																		50		
81	Ratall	20																			20	
82	Martin	20																			20	
83	Sellview	20																			20	
84	Black	50																			50	
85	Patata	50																			50	
TOTAL PAGE 2		1,560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	700	700	180	0
TOTAL STORMWATER		39,120	1,000	2,500	1,750	1,600	1,600	1,500	1,500	1,100	900	1,500	1,800	1,800	1,500	1,750	1,410	1,410	1,420	1,400	860	700

APPENDIX 5 STORMWATER PROJECTIONS

12/1/96

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APPENDIX I: SUMMARY FINANCIALS FROM LONG TERM PLAN**Appendix Table I-1: Stormwater**

Project	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Airesdale/Thompson Terrace								214		
Airlie Street				278						
Alfred Street							25		474	
Anglia/Scotia Streets						179				
Arapiki Road			50		234					
Beach Road								194		
Black Street								97		
Brook Stream fish passage	79							65	68	354
Brooklands Road									81	
Brougham Street	29	312								
Catchment Management Plans	85	26	27							
Catchment/freshwater improvements	50								135	354
Cawthron Crescent								39	203	
Cherry								97		
Dodson Valley									61	
Examiner Street								65		354
Fifeshire Crescent									68	71
Halifax Street (Tasman-Milton)	45		215							
Hampden St/Wigzel Park						36		389		
Hardy Street (Tasman-Alton)									61	
Isel Place									68	
Jellicoe/Bledisloe/Kaka/Kea/Freyberg/Maple					575					
Karaka Street										71
Kauri/Matai/Titoki/Rainui area										71
Kipling									61	
Kowhai								39	135	
Main Rd Stoke (Hays Corner)		23		392						
Main Rd Stoke (Louisson - Marsden)		23		725						
Manson Avenue										71
Manuka								58		
Marlowe Street	147									
Martin Street										43
Marybank area					115	60	621			
Milton Street (Grove-Cambria)		24		224						
Montcalm/Arrow/Washington Valley/Hastings	75		266	278						
Morrison/Hope/Alma								117		
Mount Street/Konini Street	45					537				
Neale/Kea/Kaka/Railway Reserve	245									
Newmans Link							123			
Ngaio/Maitland					190					
Nile Street (Trafalgar Sq - Collingwood)									61	
North Esk/Beccles	47	260								
Oldham Creek	22	26	107							
Parere								58		
Paru Paru Road								97		
Pateke									102	
Piping ditches	175	119	122	126	130	134	138	142	147	152
Poynters Crescent				17		179				
Public/private drains	126	119	213	219	226	233	239	247	255	264
Pump stations: renewals		62		22		119			27	
Queens Road stormwater	236									
Railway Reserve to Saxton					1,208					

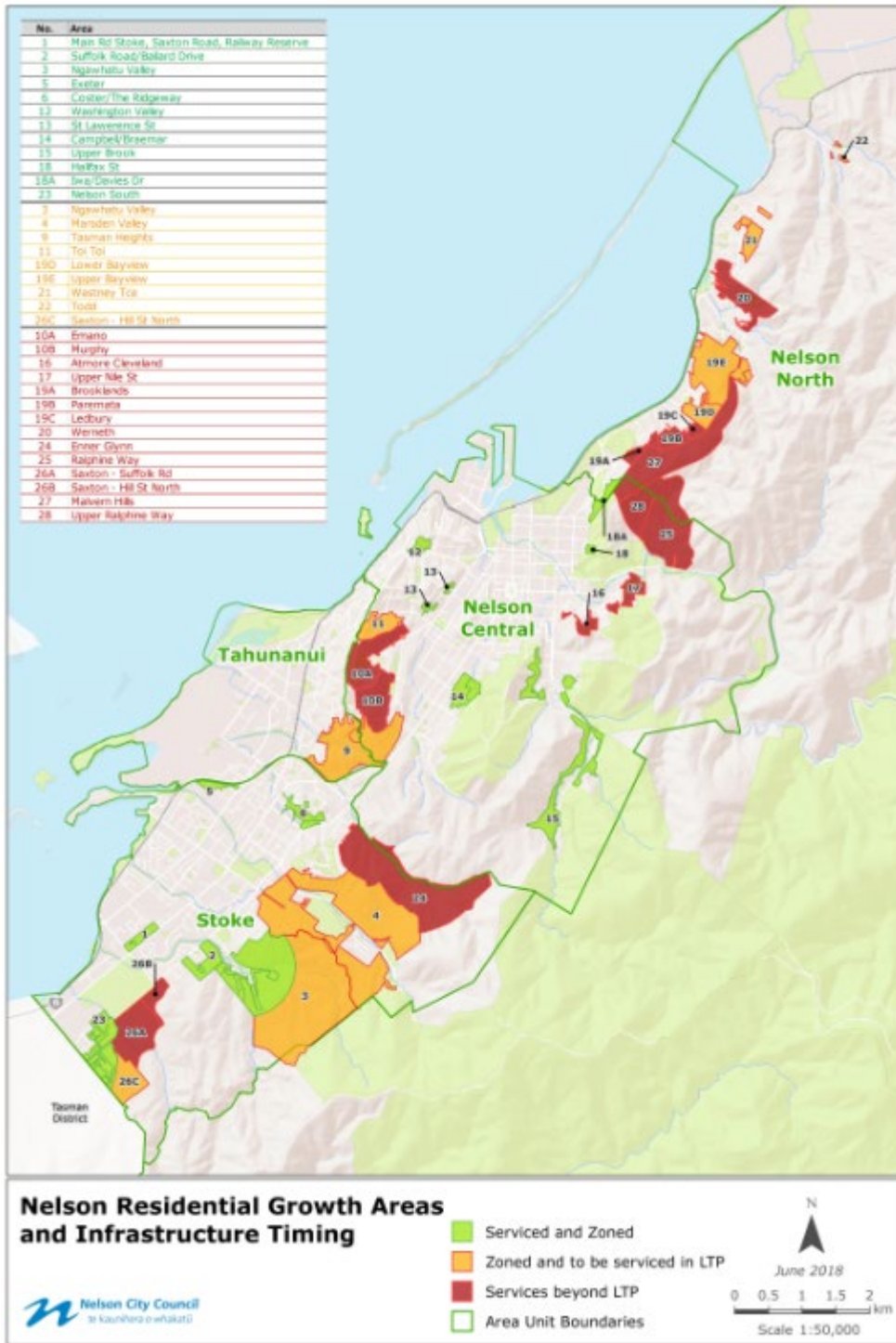
Project	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Railway Reserve/ Newall/Bledisloe/Louisson/Main Rd Stoke (West)		519								
Rangiora Terrace	88									
Riverside									81	
Rotoiti								39		
Rutherford								65		354
Sadlier/Hob/Mules/Suter					48		501			
Salt Water Creek/Haven Road culvert	140	83	744							
Seaton/Allisdair						60	25			
Seaview	47	208								
Shelbourne Street			54		288					
St Vincent/Hastings Street Culvert	140	79			3,173					
Stafford Avenue								39	203	
Stanley/Beachville Crescent	52	338								
Stormwater renewals	417	180	134	110	115	144	152	156	148	137
Sussex					58		311			
Tasman Street (Grove-Cambria)	5	208								
Tasman Street (Halifax-Grove)	20									
Tasman Street (Nile-Bronte)	57	286								
Tipahi/Eckington				278						
Totara/Hutcheson								97		
Tui Glen									183	
Upgrading private drains (50% share)	76	52	53	55	57	58	60	62	64	66
Vanguard Street (Victory to Gloucester)	131	338	268							
Viewmount/Ridgeway				28		179				
Staff time	246	2	4							
Total	2,826	3,282	2,256	2,751	6,416	1,918	2,195	2,376	2,686	2,362

Appendix Table I-2: Flood Protection

Project	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Arapiki Stream			54		288					
Hampden St East – Little Go Stream		83	53	822						
Inventory of rural streams				55	57	58				
Inventory of urban streams				55	57	58				
Jenkins Stream						1,254				
Main Rd Stoke/Poorman Valley Stream culvert			54	56	288					
Maire Stream	80				57	873				
Maitai River	100	104	762	788	817					
Oldham Creek							99	65		1,134
Todds Valley Stream	141	83	903	738						
York Stream channel	79	52	1,234							
Total	399	321	3,060	2,513	1,562	2,243	99	65	0	1,134

APPENDIX J: INFRASTRUCTURE PLANNING PROCESS FOR GROWTH PROJECTS

Appendix Figure J-1:



APPENDIX K: RELATIONSHIP WITH OTHER PLANS

Asset Management plans are a key component of the Council planning process, linking with the following plans and documents:

Long Term Council Community Plan: A plan required by the Local Government Act 2002 to cover a period of at least 10 years. This plan contains key information about the Council's activities, assets, levels of service and cost of providing services. It sets out the Council's funding and financial policies and also a financial forecast for the years covered by the plan. Levels of service and financial programmes as given in this document will be key information for this plan. The Asset Management plan provides the detail required to support the financial forecast.

Annual Plan: Detailed action plan on Council's projects and finances for each financial year. The works identified in the Asset Management plan form the basis on which annual plans are prepared. With the adoption of the Long Term Council Community Plan the Annual Plan mainly updates the budget and sources of funding for the year.

Water and Sanitary Services Assessment: A long-term assessment of the sanitary services provided by a local authority. These services include Wastewater Treatment, Stormwater, Public Toilet Facilities, Disposal from Wastewater Disposal Systems, Cemeteries and Crematoria and Landfills. The main focus of this assessment is to ensure that public health is maintained. Council prepared this assessment in 2005.

Resource Management Plan: The Resource Management Plan complies with the requirements of the Resource Management Act. It has implications for the Asset Management Plan in terms of discharge and land use policies and the control of environmental effects for new developments.

Bylaws, Standards and Policies: These tools for asset creation and subsequent management are needed to support Asset Management tactics and delivery of service.

Ngā Taonga Tuku Iho Ki Whakatū Management Plan: It is a collective initiative involving five of the six local iwi (Ngati Rarua, Ngati Toa, Te Atiawa, Ngati Koata and Ngati Tama) and gives a big picture approach to the management of ngā taonga tuku iho (the treasured resources).

Reticulated Stormwater Quality Improvement Plan: The Reticulated Stormwater Quality Improvement Plan 2006 is a requirement of the Nelson Resource Management Plan (Nelson RM Plan) 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.

Sustainability Policy: 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.

Communities for Climate Protection Programme: The Council recognises the need to reduce greenhouse gas emissions and is prepared to take action on this alongside the other 27 local authorities who have also joined the "Communities for Climate Protection programme". The primary focus is "stabilisation of emissions to 2004 levels by 2012 and reduction to 40% below 2004 levels by 2020".

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

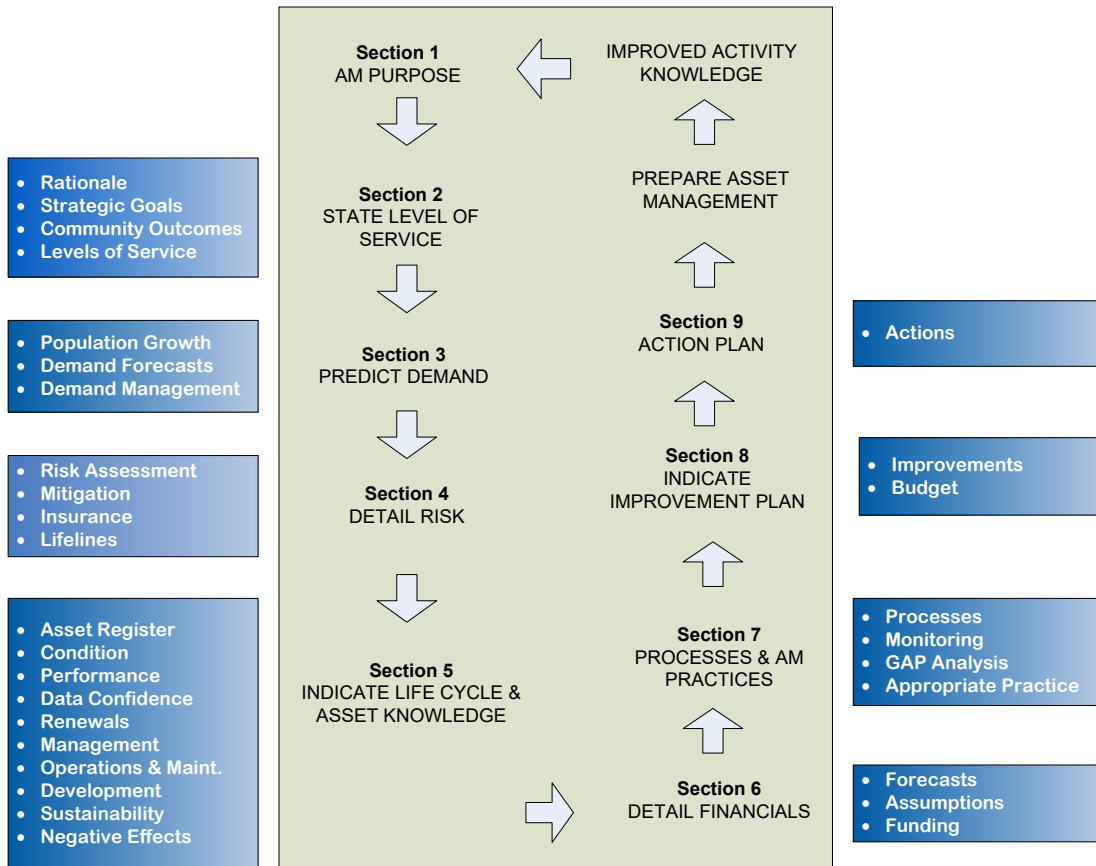
Esplanade and Foreshore Reserves Mgmt Plan: Identifies the issues relating to the management of reserves adjacent to water bodies. An important link to stormwater management.

Future Parks and Reserves Asset Management Plan(s): Recognises the shared interest in developing stormwater management wetlands throughout the city.

APPENDIX L: ASSET MANAGEMENT PLAN

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

Appendix Figure L-1: Asset Management Process



Advanced Asset Management

Nationally Asset Management practices are defined as 'core' or 'advanced'. The purpose of defining the appropriate level of Asset Management is twofold:

- To recognise the requirements of the New Zealand Auditor General
- To identify appropriate practice for the size of the Council as measured against "Best Practice" so that asset management functions do not become too onerous for the resources available and equally financially justifiable for the level of asset management proposed

The associated GAP analysis identifies the current practice Council is performing, the GAP between Appropriate Practice and Current Practice forms the basis on an improvement programme to close the GAP.

Selection of the appropriate level of Asset Management for the stormwater activity included the following factors:

- The costs and benefits to the organisation
- Legislative requirements
- The size and complexity of the assets

- The risk associated with failures
- The skills and resources available to the organisation
- Customer expectations

Core to “Core Plus” Approach

Asset Management plans evolve in a continuous cycle of review and improvement so the quality of outputs matches the changing business and legislative needs. The **International Infrastructural Management Manual 2006** details criteria for assessing conformity to “core” and “advanced” levels of Asset Management in New Zealand.

Features of Core Asset Management are:

- A lifecycle approach is taken;
- Core Asset Management plans are developed based on;
 - best available current information and random condition sampling,
 - simple risk assessment,
 - existing levels of service,
 - contrasting existing management strategies with opportunities for improvement;
- Capital works are prioritised using a simple ranking criteria;
- Long term cash flow predictions for maintenance, rehabilitation and replacement are calculated based on local knowledge of assets and options for meeting current levels of service;

Financial and critical service performance measures against which trends and Asset Management plan implementation and improvements can be monitored are provided.

Features of Advanced Asset Management are:

- Asset Management strategy is clearly derived from corporate strategic plan;
- Long term, whole life plans and cost/risk/benefit optimisation;
- Objectives and performance measures are aligned and complementary;
- IT systems are integrated, used, and understood;
- Competencies and training is aligned to roles, responsibilities and collaborative requirements;
- Strategies are risk based, with appropriate use of predictive methods, optimised decision making;
- Iterative continuous improvement.

Core to “Core Plus” Gap Analysis

In recent years it has been recognised that a new rating level of “Core Plus” is the most appropriate rating for cities of Nelson’s size. This rating reflects that parts of the asset can be managed at a Core level and parts at an Advanced level. The resultant provides an effective asset management tool without becoming un-necessarily expensive.

The next asset management plan review will look at the impact of “Core Plus” on the content and structure of the plan.

APPENDIX M: 30 YEAR INFRASTRUCTURE STRATEGY

The requirement for an infrastructure strategy arose from advice provided by Better Local Government programme advisory groups. The strategy is intended to improve local authorities' delivery of core infrastructure and management of physical assets. It should identify strategic issues facing the council and the future implications and is intended to add transparency for residents and ratepayers about these issues and their consequences.

The strategy is included in the LGA 2002 Amendment Bill (No 3) which is expected to be passed in current form in June 2014.

This Asset Management Plan contains the information that would form the basis of the Stormwater and Flood Protection utility section of an integrated strategy, in particular the following are addressed in the sub sections of the plan either directly or as areas that will require future work:

- What level of infrastructure investment, if any, is necessary to provide for growth in the community. See section 3.2 -Demand Forecast and section 6.5- Capital Programme;
- Managing the timing of investment for growth, to avoid constraints on growth from limited infrastructure capacity while minimising the costs to the community of underutilised infrastructure capacity. See section 3.2 -Demand Forecast and section 6.5- Capital Programme;
- What level of investment is needed to maintain, renew and replace existing assets.
See section 6.4-Renewal Strategy;
- Balancing service level expectations with affordability in the context of demographic changes such as depopulation and aging. See section 2- Levels of Service;
- What level of investment, if any, is needed to improve the level of service provided by those assets. See section 2- Levels of Service;
- Planning for maintenance, growth and possible increases or decreases in levels of service provided. See section 2- Levels of Service, section 3- Future Demand, section 6.3 - Operations and Maintenance Plan;
- Managing or improving public health and environmental outcomes, or mitigating adverse effects on them. See section 2 -Levels of Service;
- Managing the risks to and resilience of, infrastructure assets from natural disasters. See section 4- Emergency and Risk Management;
- Managing the financial provision for risks to infrastructure assets from natural disasters. See section 4- Emergency and Risk Management ;
- Indicative estimates of the projected operating expenditure and capital requirements for each year. See section 6.3- Operations and Maintenance Plan, section 6.4- Renewal Strategy, section 6.5 -Capital Programme;
- Assumptions about service levels and asset lives on which the projections are based.
See section 2- Levels of Service and section 6.2- Asset Valuation and Depreciation;
- Assumptions involving significant uncertainty- the nature of that uncertainty and its potential impacts. See section 4- Emergency and Risk Management.

APPENDIX N: RISK REGISTER

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

STORMWATER AND FLOOD PROTECTION RISK REGISTER	Objectives <ul style="list-style-type: none"> • 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 the Flood Protection Asset management Plan 	Assessed by Phil Ruffell
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Identification			Analysis: Residual Risk			Response	Treatments
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood		
FLOOD EVENT	RIVERS / STRUCTURES IN RIVERS / OPEN CHANNELS						
Flood event where river/stream /channel has insufficient capacity for Q20/Q50/Q100 @2100	Maitai River (QEII Drive– Hanby Park)	Flooding of multiple (approx. 2000) properties adjoining river and in wider flood path, 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. 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. Upgrade sections to capacity identified through risk-based approach.

Identification			Analysis: Residual Risk					
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level	Response	Treatments
	Maitai River (Hanby Park to dam)	Flooding of adjoining rural and residential properties (approx. 10), 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.
	Maitai stop bank	Failure of Maitai stopbank causing flooding of approx. 45 properties, erosion of banks, and foundation of structures. Minor health and safety issues	Regular inspections carried out under utility provider's maintenance contract.	Moderate (3)	Rare (1)	Low (3)		Engineering certification of structure required. Respond to damage after event. Upgrade stop bank to match river capacity identified through risk-based approach.
Flood event where river/stream /channel has insufficient capacity for Q20/Q50/Q100 @2100	Ten named streams in urban reaches of city	Flooding of multiple adjoining properties (approx. 4,000), 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. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Moderate (3)	Rare (1)	Low (3)		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 @2100	Open channel or ditch	Flooding of adjoining properties, erosion of banks and foundations of structures. Minor	Regular inspections and maintenance programme of public drain sections. Emergency Action Plan.	Moderate (3)	Rare (1)	Low (3)		Respond to damage after event. Upgrade public drain sections to capacity identified through risk-

Identification			Analysis: Residual Risk					
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level	Response	Treatments
		health and safety issues. Contamination from sewerage system may occur. Debris build up on structures	Emergency Procedures. Manual Civil Defence and emergency management response.					based approach and identify secondary flow paths.
Flood event after period of inadequate maintenance	Rivers or open channels	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 Procedures Manual. Civil Defence and emergency management response.	Moderate (3)	Possible (3)	Medium (9)		Regular inspections and maintenance programme of all public drain sections
Flood event after period of inadequate maintenance	Structures in rivers	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 structures. Emergency Procedures Manual. Civil Defence and emergency management response.	Moderate (3)	Possible (3)	Medium (9)		
FLOOD EVENT	PIPED NETWORK							
Flood event to existing piped network where insufficient capacity for Q15 @2100	Pipes >300dia	Serious flooding occurrence causing significant property and infrastructure damage. Minor health and safety issues.	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. Upgrade pipes to Q15/2100 and identify secondary flow paths

Identification			Analysis: Residual Risk					
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level	Response	Treatments
		Contamination from sewerage system may occur						
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 Q15/2100 and identify secondary flow paths.
FLOOD EVENT	DETENTION DAMS							
Flood event where downstream river/stream /channel has insufficient capacity for Q20/Q50/Q100 @2100	Detention dam	Detention dam failure causing flooding of adjoining property, erosion of banks and foundations of structures. Major health and safety issues. Contamination from sewerage system may occur. Debris build up on structures	Regular inspections and maintenance programme. Civil Defence and emergency management response.	Major (4)	Rare (1)	Medium (4)		Inspect and maintain existing capacity. Respond to damage after even. Upgrade sections to capacity identified through risk-based approach
FLOOD EVENT	STREETS WITHOUT RETICULATION							

Identification			Analysis: Residual Risk					
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level	Response	Treatments
Flood event where street has insufficient capacity for Q20/Q50/Q100 @2100	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 Q15/2100 and identify secondary flow paths.
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)	Acceptable risk. Increasing design capacity further would be uneconomical	Respond to damage after event
Electrical failure and 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. Civil Defence and emergency management response.	Minor (2)	Unlikely (2)	Low (4)		Respond to damage after event
FLOOD EVENT	RIVERS / STREAMS / STRUCTURES IN RIVERS, PIPED NETWORK, PUMP STATIONS							

Identification			Analysis: Residual Risk					
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level	Response	Treatments
Flood event coinciding with high tide or tidal wave (Tsunami)		Flooding occurrence causing property and infrastructure damage. Major health and safety issues. Contamination from sewerage. Loss of water supply.	Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response. Pump systems at Tahunanui and The Wood will mitigate the consequences to a limited extent. The remaining risk is insured.	Major (4)	Rare (1)	Medium (4)		Respond to damage after event. Upgrade sections to capacity identified through risk-based approach.
FLOOD EVENT	SECONDARY FLOWPATHS							
Flood event where secondary flowpath has insufficient capacity for > Q15 @2100 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 / STRUCTURES IN RIVERS / OPEN CHANNELS							

Identification			Analysis: Residual Risk			Response	Treatments
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood		
		Flooding occurrence causing property damage (potentially at Otterson Street, Hathaway Court, and Wakatu carpark and adjoining properties). Minor health and safety issues.	Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Minor (2)	Rare (1)	Very Low (2)	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.
EARTHQUAKE	RIVERS / 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	Major (4)	Rare (1)	Medium (4)	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.
EARTHQUAKE/FLOOD EVENT/ LANDSLIP/TRAFFIC IMPACT	PIPED NETWORK						
	Brick or earthenware >80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues. Contamination from sewage system may occur.	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response	Moderate (3)	Unlikely (2)	Medium (6)	Renew asset

Identification			Analysis: Residual Risk					
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level	Response	Treatments
	Concrete >80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues. Contamination from sewage system may occur.	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Minor (2)	Rare (1)	Very Low (2)		Renew asset
	Brick or earthenware 45 - 80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues. Contamination from sewage system may occur.	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Minor (2)	Rare (1)	Very Low (2)		Repair and monitor condition and performance, replace at-risk assets
	Concrete 45 - 80 years old, diameter > 300mm	Structure failure causing flooding of adjoining properties. Minor health and safety issues. Contamination from sewage system may occur.	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Minor (2)	Rare (1)	Very Low (2)		Repair and monitor condition and performance, replace at-risk assets
EARTHQUAKE	PUMP STATIONS							
Earthquake coinciding with Q15 flood event		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.	Minor (2)	Rare (1)	Very Low (2)		No change
EARTHQUAKE	DETENTION DAMS							

Identification			Analysis: Residual Risk					
Event Description	Asset Group	Consequence	Existing Controls	Consequence	Likelihood	Current Risk Level	Response	Treatments
Earthquake coinciding with flood event		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. Contamination from sewage system may occur.	Regular inspections and maintenance programme. Emergency Action Plan. Emergency Procedures Manual. Civil Defence and emergency management response.	Major (4)	Rare (1)	Medium (4)		Respond to damage after event
STORMWATER ASSETS NOT INSTALLED TO NCC ENGINEERING STANDARDS ON NEW DEVELOPMENT		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)		
DROWNING	ALL	Localised health impact to one person	No assessment been made of risk item	Minor (2)	Rare (1)	Very Low (2)		
TRAFFIC IMPACT/VANDALISM	ALL	Damaged or broken asset	Regular inspection and maintenance. Service requests.	Insignificant(1)	Unlikely (2)	Very Low (2)		

Appendix Table N-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 media) 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 (intentionally 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 N-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 N-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 O: NELSON – PROJECTIONS BY AREA

Statistics New Zealand provide projections by Census area units which give an indication of where growth is likely to occur across different parts of Nelson. This is based on demographics in each area (age, household types) and past migration trends.

Appendix Table O-1: Stoke Projections

	2018	2028	2048
Stoke			
Population	19,310	21,070	23,280
Population change		+1,760	+2,210
Number of households	7,890	8,870	10070
Housing change		+980	+1,200

The Stoke population projections above have been derived from Statistics NZ's 2016 updated population projections for Nelson, using the 2015 area unit population projection proportions. Official area population projections will be updated by Statistics New Zealand later in 2017.

Appendix Table O-2: Projected household demand (medium) and residential capacity, 2018-2048, Nelson¹

	Short & Medium Term		Long Term	
	Projected household demand 2018-2028	Projected residential capacity 2018-2028	Projected household demand 2028-2048	Projected residential capacity 2028-2048
Stoke	+980	+1,050	+1,200	+2,200
Tahuna	+240	+650	+270	+120
Central	+580	+890	+660	+260
North	+300	+150	+370	+430
Total Nelson	+2,100	+2,740	+2,500	+3,020

APPENDIX P: HEALTH AND SAFETY

Council has a Health and Safety Co-ordinator who in-conjunction with the Nelson City Council Health and Safety Committee ensures the responsibilities under the Health and Safety in Employment Act 1992 are met. Regular safety training is provided to staff and induction processes have been established for contractors and consultants working on Council sites where required. Council contracts and tenders require stringent HSE compliance.

APPENDIX Q: ASSET VALUATIONS

Appendix Table Q-1: Asset Valuations

Asset Category	June 2012				June 2010			
		RV	DRV	Depr		RV	DRV	Depr
	Km/ units/ m ²	(\$)	(\$)	(\$)	Km/ units/ m ²	(\$)	(\$)	(\$)
Mains Up To 600mm	144.9	53,228,816	37,410,981	600,708	142.1	55,493,451	39,813,603	626,988
Mains > 600mm	41.1	45,003,941	30,133,239	498,195	39.0	42,487,525	28,978,587	470,472
Channels	1.2	259,945	145,504	2,963	1.2	245,993	143,411	2,805
Culverts	6.1	16,282,692	12,006,413	181,315	6.0	15,042,650	11,338,210	167,590
Rocks Road Culvert	0.3	3,039,410	2,822,960	33,771	0.3	2,867,369	2,726,933	31,860
Bank Protection	59,222	11,986,491	8,839,660	119,311	59,222	11,325,561	8,572,539	112,905
Intakes	95	533,926	390,652	6,574	98	514,693	376,926	6,344
Manholes	4,241	17,774,535	13,671,923	197,200	4,031	17,319,610	13,444,797	192,109
Outfalls	70	288,763	181,330	4,955	70	272,443	176,658	4,681
Sumps	588	1,195,976	892,089	13,235	556	895,155	673,973	9,907
Pump Stations	2	3,343,720	2,234,913	102,455	2	3,154,461	2,298,778	97,058
Tide Gates/flaps	13	175,521	105,237	5,168	13	165,600	107,962	4,936
Detention Dams	6	1,196,169	1,076,071	4,933	6	1,130,354	1,026,569	4,645
TOTAL		154,309,906	109,910,972	1,770,783		150,914,863	109,678,945	1,732,298