Urban Stormwater Strategy

Final

August 2019

Revision History

Status	Date Reviewed	Author(s)	Reviewed By	Released By
Draft for discussion	19 March 2018	Jan Heijs (Morphum Environmental Ltd)	Jenna Neame (TDC)	Not released
Draft for public consultation	30 January 2019	Wouter Woortman (TDC)	Jenna Neame (TDC)	Full Council
Final	1 August 2019	Wouter Woortman (TDC)	Jenna Neame (TDC)	Full Council

This Strategy was prepared for Tasman District Council with help from Morphum Environmental Ltd

Contents

Executive Summary

Our fresh water and marine waters are vital to the well-being of our communities and are one of the defining features of the Tasman District. They include streams, rivers, lakes, wetlands, aquifers and springs; all discharging into the coastal marine areas of the Waimea Inlet, Tasman Bay, Golden Bay and the West Coast. Together they form an important part of the unique culture and natural values of the district, shaping the landscape and our heritage. They are of fundamental importance to Tangata Whenua, highly valued by our residents and visitors and crucial to the health of the environment in which we live.

Our communities and the receiving environments are affected by stormwater discharges from our urban areas. Urbanisation and other changes in land use have led to increased stormwater runoff that contribute to flooding, loss of aquatic habitat and water quality issues. It also impacts on the ability to use water for amenity purposes and food gathering. The Council has a responsibility to manage stormwater in a way that supports the environmental, social, cultural and economic well-being of current and future generations.

Urban catchment management planning is an effective way of co-ordinating efforts to address multiple stormwater issues i.e. flood management, freshwater management, aquatic habitat management and amenity values within urban stormwater catchments.

Catchment management plans will assist The Council and communities in identifying integrated solutions to resolve existing issues and the ability to avoid or minimise risk for future issues. Once in place they will also assist in cross Council alignment and efficiency improvements. Although the focus of this strategy and the catchment management plans will be on the urban areas, the catchments may have up and downstream rural areas that need to be taken into account.

The purpose of this Strategy is to provide direction to the development of urban stormwater catchment management plans in the Tasman District to support the analyses, planning and management of stormwater, consolidated in urban catchment management plans and to support the development of other strategic documents.

This Strategy will provide the framework against which the assessments in the Catchment Management Plans will be undertaken. It is anchored on our vision to protect and enhance the mauri of wai / life force of water and to provide for:

- Te Hauora o Te Wai – the health of the water;
- Te Hauora o Te Taiao – the health of the environment;
- Te Hauora o Ngā Tangata – the health of the people.

Prudent stormwater management will contribute to this vision through an integrated and sustainable approach that supports economic vitality, desirable lifestyle and ecological health.

This Strategy has identified a range of goals and objectives. It also incorporates best practices to support the goals and how they can be achieved (see Appendix 1). We have identified the following long term aspirations for stormwater management:

1. Our urban streams, aquatic habitats and coastal marine environment are healthy and accessible
2. Stormwater discharges do not degrade water quality and ecosystem health of our streams and estuaries
3. Stormwater flooding does not create a hazard to our community or cause damage to properties
4. We enable water sensitive growth for future generations
5. We manage stormwater in a holistic, efficient and cost effective manner

1.0 Introduction

Our communities and the receiving environments are affected by stormwater discharges from our urban areas. Urbanisation and other changes in land use have led to increased stormwater runoff that contribute to flooding, loss of aquatic habitat, loss of places that are of significance to iwi and water quality issues. It also impacts on the ability to use our waterways for recreation, amenity and māhinga kai (food gathering). The Council has a responsibility to manage stormwater in a way that supports the environmental, social, cultural and economic well-being of current and future generations.

1.1 Catchment Management Planning Framework

Urban catchment management planning is an efficient and effective way of co-ordinating efforts to address multiple stormwater issues i.e. flood management, freshwater management, aquatic habitat management and amenity values within urban stormwater catchments.

Catchment management plans (CMPs) will assist the Council in identifying integrated solutions to address existing issues and the ability to avoid or minimise risks for the future. Once in place they will also assist in cross Council alignment, collaboration and efficiency improvements. Although the focus of the catchment management plans will be on the urban areas, the catchments will have up and downstream rural areas that need to be taken into account.

The council has an obligation to manage adverse effects from stormwater discharges from its network. The CMPs will clarify how the Council will manage these effects and form the basis for authorisation of a global discharge consent.

The Stormwater Catchment Management Framework consists of three key components:

1. Urban Stormwater Catchment Strategy
2. Catchment Management Plans
3. District-wide Urban Stormwater Consent

The contents of the framework provides direction to other Council processes and legal documents such as the Long Term Plan (LTP), Activity Management Plans (AMPs), Land Development Manuals (LDM) and Tasman Resource Management Plan (TRMP). It is important that these documents, including this Strategy, will be reviewed as and when required to ensure alignment.

Figure 1 shows the different components of the strategy and how they interact together. The Catchment Management Framework and the three separate components are developed in close collaboration between Council and iwi. Stakeholder consultation and public feedback is sought separately at appropriate times during development of the CMPs.

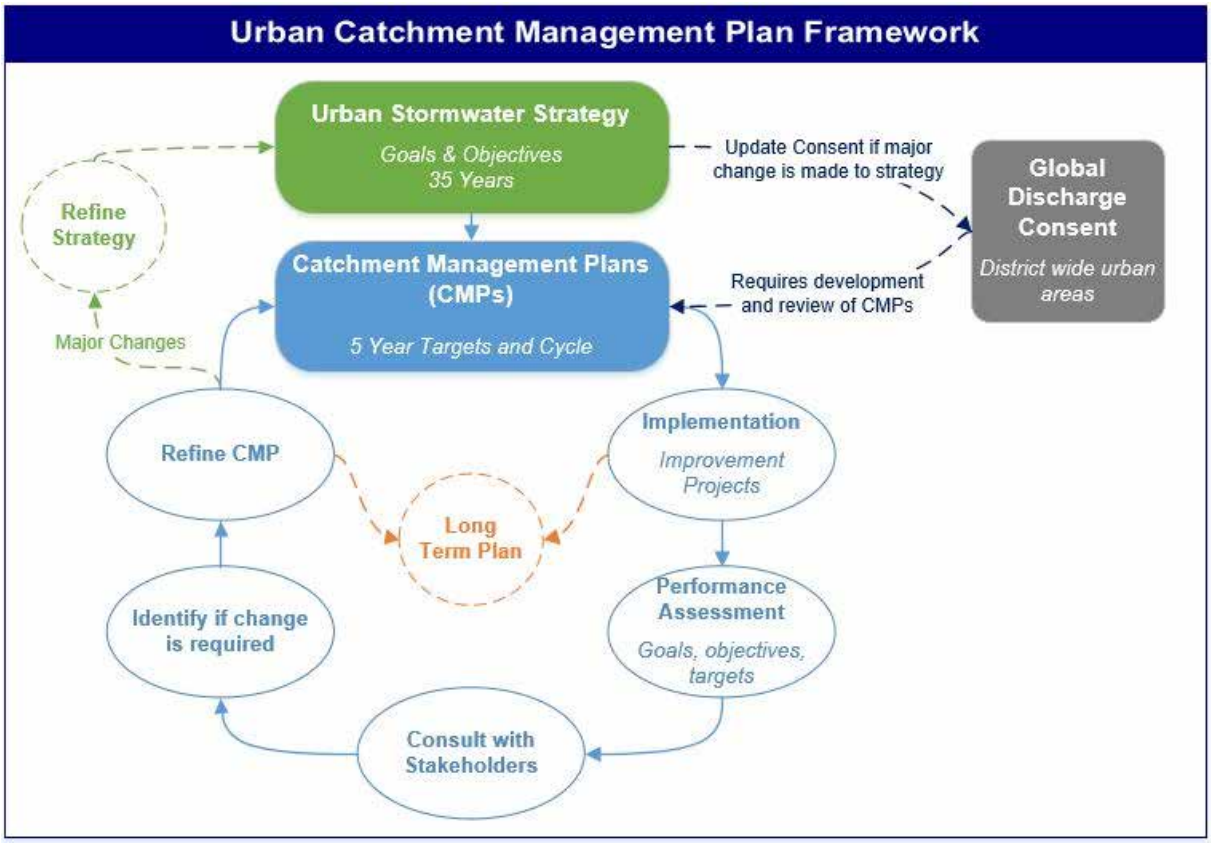


Figure 1: Framework Outline

1.2 Strategy Purpose

Provide direction to the development of urban stormwater Catchment Management Plans in Tasman District

- To support analysis, planning and management of stormwater, consolidated in catchment management plans
- To support the development of and alignment with other strategic documents (such as the AMP, LDM, LTP, National Policy Statement - Freshwater Management, and TRMP plan changes)

The purpose of this Strategy is to clearly articulate a long term vision for the District. The Strategy will be used to direct the development of CMPs for each urban settlement and provides the basis for a global discharge consent.

It is important that the strategy and future CMPs are aligned with and provide direction to other strategic documents issued by the Council.

This Strategy will provide the framework against which the assessments in the CMPs will be undertaken.

1.3 Scope

This Strategy is primarily intended to provide an assessment framework for urban stormwater catchment planning. It is not intended to be a Council wide surface water or 3-water strategy.

Because of the absence of tangible targets that can be used in an assessment framework, more generic outcomes have been developed. The assessments in the CMPs will be based on showing the degree to which outcomes expressed in this Strategy are met. Wherever possible and relevant, metrics and definitions have been used from other Council documents such as the State of the Environment report, and other industry best practices.

This Strategy applies to the following Urban Drainage Areas (UDA's) for which catchment management plans will also be developed:

Waimea Inlet	Tasman Bay	Golden Bay	Buller / West Coast
Richmond	Motueka	Takaka	Murchison
Wakefield	Tapawera	Pohara	St Arnaud
Brightwater	Mapua / Ruby Bay	Ligar Bay/ Tata Beach	
	Kaiteriteri	Patons Rock	
	Tasman	Collingwood	

1.3.1 Implementation of National Policy Statement – Freshwater Management

The National Policy Statement - Freshwater Management 2014 (amended 2017) (NPS-FM) requires Council to follow a specific process which includes defining Freshwater Management Units and identifying values, attributes, objectives, limits and methods.

Although there is clear overlap between the Stormwater Catchment Management Framework and the NPS-FM process, they work at different levels and require separate processes. The NPS-FM has a clear focus on water quality and ecosystem health, but it does not include water quantity aspects such as managing overland flow paths and flooding of properties. The catchment management plans will integrate both the water quality and quantity aspects of stormwater management.

The Council will be able to use the Catchment Management Planning Framework to implement water quality objectives of the NPS-FM within its urban areas.

We have incorporated values from the NPS-FM framework to enable alignment between the Stormwater Strategy, CMPs and the Council's NPS-FM activities.

2.0 Context

2.1 Strategic documents

The Council has a number of strategic documents related to stormwater and stream management, including but not limited to:

1. Tasman Resource Management Plan (TRMP)
2. Long Term Plan which includes agreed Levels of Service
3. Stormwater Activity Management Plan
4. Engineering standards, currently in the process of being replaced by a new Land Development Manual (LDM), a joint initiative by Nelson City Council and Council
5. NPS Freshwater Management documents currently being prepared (i.e. Freshwater Land Advisory Groups FLAG).

This Strategy is informed by the objectives and policies from existing strategic documents and vice versa. Updating and aligning strategic documents is an ongoing process. The CMPs will provide essential information into this Strategy, subsequent reviews and resulting actions to achieve the outcomes sought.

The Council's budgets and programmes for specific projects are set through the Long Term Plan process, the Council's priorities will be informed and supported by the catchment management plans and individual business cases.

2.1.1 About the National Policy Statement - Freshwater Management

The NPS-FM is about recognising the national significance of fresh water for all New Zealanders. It sets out objectives and policies that direct local government to manage water in an integrated and sustainable way, while providing for economic growth within set water quantity and quality limits.

The main focus of the NPS-FM is:

- setting freshwater objectives (goals that describe the desired state of freshwater now or in the future)
- setting limits (the maximum amount of the resource available for use)
- implementing methods to achieve the freshwater objectives and limits.

Some of the key requirements of the NPS-FM are to:

- consider and recognise Te Mana o te Wai in freshwater management
- safeguard fresh water's life-supporting capacity, ecosystem processes, and indigenous species
- safeguard the health of people who come into contact with the water
- maintain or improve the overall quality of fresh water within a freshwater management unit
- improve water quality so that it is suitable for primary contact more often
- protect the significant values of wetlands and outstanding freshwater bodies
- follow a specific process (the national objectives framework) for identifying the values that tāngata whenua and communities have for water, and using a specified set of water quality measures (called attributes) to set objectives
- set limits on resource use (eg, how much water can be taken or how much of a contaminant can be discharged) to meet limits over time and ensure they continue to be met
- determine the appropriate set of methods to meet the objectives and limits
- take an integrated approach to managing land use, fresh water and coastal water
- involve iwi and hapū in decision-making and management of fresh water.

2.1.2 Freshwater Management Unit (FMU)

Defining Freshwater Management Units (FMUs) is part of the wider NPS-FM process. FMUs are set at an appropriate spatial scale for which an accounting system, objectives and limits will be set. It is anticipated that Tasman's urban waterbodies such as urban streams, creeks and drains will be grouped and managed as a single Freshwater Management Unit because they are similar both physically and socially (i.e. how they are used and by whom). This process will be conducted separately to the development of CMP's.

2.1.3 National Values and uses for freshwater

We have incorporated values from the NPS-FM framework to enable alignment between this Strategy and Council's NPS-FM activities. These values are:

- Ecosystem health
- Human health for recreation
- Natural form and character
- Wai tapu (sacred water)

- Māhinga kai (food gathering)

2.1.4 About the New Zealand Coastal Policy

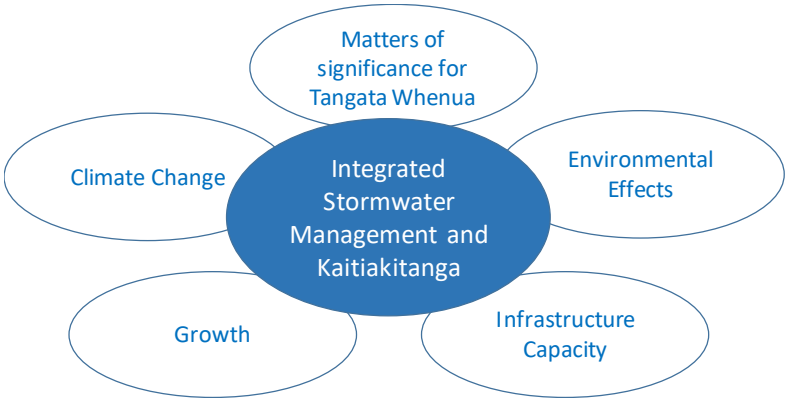
The New Zealand Coastal Policy Statement (NZCPS) is a national policy statement under the Resource Management Act 1991 (RMA). The purpose of the NZCPS is to state policies in order to achieve the purpose of the RMA in relation to the coastal environment of New Zealand. The NZCPS identifies poor and declining coastal water quality in many areas as a consequence of point and diffuse sources of contamination, including stormwater and wastewater discharges.

Some of the key requirements of the NZCPS that relate to the effects of Stormwater discharges on coastal marine areas are:

- Subdivision or development will not result in a significant increase in sedimentation in the coastal marine area, or other coastal water.
- Reduce sediment loadings in runoff and in stormwater systems through controls on land use activities.
- Take steps to avoid adverse effects of stormwater discharge to water in the coastal environment, on a catchment by catchment basis
- Reduce contaminant and sediment loadings in stormwater at source, through contaminant treatment and by controls on land use activities
- Promote design options that reduce flows to stormwater reticulation systems at source.
- Promote integrated management of catchments and stormwater networks.

3.0 Key Issues and Challenges

We have identified five key challenges with regards to urban stormwater management. There is a clear overlap between all five challenges and how they impact on each other. Therefore the key challenges should be addressed through a holistic approach rather than in isolation.



3.1 Matters of significance for Tangata Whenua

Contamination of habitats and loss of waahi taonga species

Farming, horticulture, forestry, industrial operations and residential uses all contribute to a reduction in water quality. Given that current land use patterns are intensifying and urban areas are expanding, tangata whenua iwi are concerned that contamination of the land and water resources will increase and the health of the taiao/ natural environment will deteriorate further.

Key concerns relate to the adverse effects on aquatic ecology from alterations in water temperature, the content of suspended solids and the chemical composition of storm water entering waterways.

Tangata whenua iwi are concerned about specific impacts on species migration through the catchments and the impact on habitat and breeding grounds. For example, Borck Creek provides a migration route to inanga spawning grounds. Contaminated stormwater could result in a change in habitat and the subsequent loss of waahi taonga species, such as the Kokopū. The ability for tangata whenua iwi to harvest kai/ food from this area would be diminished as a result. Other key concerns are maintenance work to scrape out the riverbed to clear for flood zone, the removal of existing sparse habitat and riparian margins along the river, and the kōura and native fish exposed to the sun because there is no shade available.

Diminishing mauri of the wai

For tangata whenua iwi, an over-arching concern is the diminishing mauri / life force of catchments as a result of urban and contaminated storm water discharges. The mauri of the wai / water flowing through the catchments is deteriorating and resources that rely on wai/ water for their survival (flora and fauna; native fisheries and bird life taonga species) are being compromised. This concern extends to the mauri of the coastal and estuarine habitats. Land use activities are intensifying throughout the District and subsequently the risk of contaminants entering the waterways through stormwater run-off is increasing.

When the mauri of water is diminished, it loses its vitality and life force, and the people that depend on this taonga will ultimately suffer. The diminishing mauri of in-stream species and habitats and of the estuarine and coastal species and habitats is therefore of great concern to tangata whenua iwi.

Destruction or contamination of waahi tapu

There is a high risk of stormwater contaminating waahi tapu / sacred places in and adjacent to waterways. Rising stormwater flows, accelerating erosion and increasing contaminants entering water environments in the catchment all have the potential to destroy or contaminate waahi tapu.

Ability to practice Kaitiakitanga

Tangata whenua iwi have a responsibility as kaitiaki / guardians to sustain healthy wai / water for future generations. This is an intergenerational obligation to uphold the mana of the people through this process. At the heart of kaitiakitanga is the restoration of the mauri of the wai, to ensure the waters are not degraded further. Contaminants entering the waterways via the stormwater systems weaken the ability of tangata whenua iwi to act as kaitiaki over ancestral lands and waters – this in turn undermines the ability of tangata whenua iwi to exercise rangatiratanga / chiefly authority over the wai in the rohe/ district.

3.2 Growth

We expect significant population growth over the next 10 years in the Tasman District. To accommodate this growth new houses will need to be built. As new houses are built, the nature of surface water runoff changes due to permeable areas of ground becoming sealed surfaces such as houses, roads and carpark areas. This increases the volume of stormwater that the Council needs to collect and discharge as well as putting a strain on the health of the receiving environment.

The Council can meet this increased demand through existing infrastructure where capacity is available. Where capacity is not available, or if the infrastructure does not exist, the Council will need to provide upgraded or new infrastructure to enable development to continue.

3.3 Infrastructure Capacity and Flooding

Many of Tasman's stormwater pipes and drains are too small to cope with intense rainfall events and do not meet current design standards. When the capacity of the primary network (pipes) is exceeded, the secondary network (roads and overland flowpaths) enable stormwater to flow overland. During intense rainfall events there tends to be nuisance surface water flooding, and sometimes homes and businesses are flooded.

Figure 2: flood mitigation works in Queen street - Richmond

In recent years, some urban areas across the district have been subject to major flood incidents and Council considers these a high priority. Mapping and understanding current and future flood risks is essential to support future decisions.

More effort is required to establish, protect and enforce secondary flow paths. Increased awareness is required within our communities to understand that overland flow paths are an essential part of the stormwater network and that structures within flow paths may obstruct flows and lead to increased flood risk or damage to property.

Flood waters also pose a threat to human and ecosystem health because these are likely to be contaminated by pollutants picked up by runoff such as sediments, oils, greases and metals as well as from (overflowing) wastewater.

3.4 Climate Change

The anticipated effects from climate change in Tasman District include:

- An increase in seasonal mean temperature and high temperature extremes.
- A significant increase in rainfall in winter for the entire district and varying increases of rainfall in other seasons in different areas.
- Rising sea levels, increased wave height and storm surges.
- Floods, landslides, droughts and storm surges are likely to become more frequent and intense.

The effects of climate change will put further strain on the already limited capacity of our networks. Discharging stormwater from our coastal communities will become increasingly difficult during high tide and will result in more frequent flooding. In other areas the increase in rainfall will lead to stormwater networks reaching their capacity sooner and the need to better manage overland flow paths to avoid flooding of properties. Providing solutions to appropriately address the effects of climate change will require significant investments that may not always be practical, affordable or cost effective. In some areas, especially low lying areas close to the coast, a certain level of acceptance and adapting to nuisance flooding may be required.

3.5 Environmental Effects

Waterways are culturally significant and the protection or return to a healthy mauri of all waterbodies is important. Streams, stream corridors, estuaries and coastal waters are important features in the urban landscape and contribute to the general wellbeing of the community.

Figure 3: access and amenity

Urban activities often adversely affect stream health, caused by:

- Stormwater runoff from contaminated surfaces
- Increase in stormwater runoff (quantity and quality)
- Reduced base flows through reduced rainwater retention and infiltration to groundwater
- Stream loss
- Loss of riparian cover which is important to support stream health
- Loss of in-stream habitat for invertebrates and fish by modification of streams by straightening, lining, piping, etc
- Weed infestation
- Inorganic debris in and around streams
- Introduction of barriers to fish passage

Effects include stream and outfall erosion, loss of riparian cover and poor ecosystem health.

The potential adverse effects associated with stormwater discharges can be divided into 'quality', 'quantity' and 'stream modification' effects.

The quality effects stem from the fact that urban land uses such as roads, parking, industrial zones and certain building materials generate contaminants, such as treated timber and zinc galvanised roofs that are picked up by stormwater runoff and accumulate in fresh water and marine water receiving environments where they have an adverse effect on ecosystems. The health of our streams, wetlands and coastal waters is affected by these discharges. It is acknowledged in Council documents that urban stormwater runoff is very similar to that found in many other urban centres in New Zealand and often contains contaminants such as sediments, oils, greases, metals, rubbish, organic material and contaminants illegally discharged. Urban runoff may also lead to increased water temperature in summer which has an effect on stream life. Similarly, forestry activity and construction sites with the associated earthworks have the potential to generate high sediment loads which can be discharged into waterways and physically disturb the beds of the waterways and effect aquatic habitat.

In addition, contamination also includes bacterial pollution in part from wastewater overflows and (leaky) sewers.

There is a large body of literature about the effects of contaminants. Because of the large natural backdrop behind most of the urban areas in the District, measurable contaminants are mostly within acceptable levels although some have been shown to be increasing. It is however likely that over time some contaminant levels will exceed accepted levels but somewhat later compared to other urbanised areas in New Zealand. In addition, the implementation of the National Policy Statement - Freshwater Management will require Council to adopt standards for water quality and seek improvements where these standards are not met.

The quantity effects stem from the fact that urbanisation leads to increased areas of impervious surface which in turn leads to a decrease in groundwater recharge and increased stormwater runoff. The increased runoff leads to higher flow velocities that can cause scour and streambank erosion. In more extreme storm events the increased runoff will contribute to flooding issues. Earthworks, compaction and deforestation also change the hydraulic response of an area leading to an increase in peak flows and volumes. The effect of reduced groundwater recharge leads to reduced base flows in streams especially during dry periods.

Stream modification affects the health of the stream such as a result of changes in morphology, riparian margins, habitat, loss of seeps and springs, etc. Many of these changes are triggered by the desire to manage stormwater and facilitate urban development, with unintended and often avoidable effects. Examples are piping, lining of streams, removal of riparian vegetation, straightening, etc.

Figure 4: highly modified stream

4.0 Our vision and aspirations

Table 2 defines the different terminology and how it is used in the context of this strategy.

Table 2: Definitions

Term	Definition	Document
Vision & Principles	Overall and high level outcomes for the environment and the community	Stormwater Strategy
Aspirations	Long term outcomes that the Council aims to achieve	Stormwater Strategy
Objectives	Measurable steps to support the long term aspirations	• Stormwater Strategy • Catchment Management Plans
Best practice	Guidance and processes to support how the goals and objectives should be achieved	• Stormwater Strategy • Catchment Management Plans • Nelson Tasman Land Development Manual • Practice Notes • Design guidelines

4.1 Tūruapō - Our Vision

Te Mana me Te Mauri o Te Wai me Te Mana o Te Whenua

The first right to water is to water itself. Water and the land are interconnected and therefore need to be considered together to improve catchment health.

Our vision for stormwater management is to protect and enhance the mauri of wai / life force of water and to provide for:

- Te Hauora o Te Wai – the health of the water;
- Te Hauora o Te Taiao – the health of the environment;
- Te Hauora o Ngā Tangata – the health of the people.

4.2 The Five Pou – Our guiding principles

The five pou are principles that guide our decision-making and direct us towards achieving our aspirations. The pou are based on the National Urban Water Principles, a collaborative project involving representatives from iwi, local government, industry and Ministry for Environment

KO PAPATŪĀNUKU RĀUA KO RANGINUI – "Our relationship with the land and water relies upon the health and wellbeing of Papatūānuku and Ranginui"

We protect and enhance ecosystem health of all receiving environments by co-designing with nature an integrated and restorative approach to urban development. We address the effects of stormwater as close as possible to the source of the issue.

NGĀ WAI TUKU KIRI – "Our waters are a gift of life provided to us by our tupuna".

We recognise and respect the life force quality of wai / water and the whakapapa relationship that binds us all.

TĀNGATA – "Our environments are where we live".

We identify and consider community values for urban water and reflect them in decision-making. Environmental, social and cultural benefits are optimised when investing in stormwater infrastructure.

TE HĀPORI ME TE WAI – "The community's love and care for water is enduring".

Kaitiakitanga and custodianship of wai/ water will be promoted and fostered amongst all communities. We will collect and share information to promote common understanding of urban water issues, solutions and values.

TIAKINA MŌ APŌPŌ – "In building future resilience, our connectedness with the environment is our strength".

We increase opportunities to enhance and protect the environment to build resilience to natural hazards and climate change. The sustainable supply of cost effective three waters services for housing, businesses and community services must provide tangible positive outcomes for both the environment and people.

4.3 Our Aspirations and Objectives

A whole of catchment approach takes into account multiple values for stormwater management. This concept recognises the catchment as a whole entity rather than isolated features. This view of the environment acknowledges the relationship between all living things. To safeguard the integrity of wai / water, it is essential that all activities within the catchment are managed in an integrated way. Our aspirations, for the different aspects of the catchment are:

1. Our urban streams, aquatic habitats and coastal marine environment are healthy and accessible
2. Stormwater discharges do not degrade water quality and ecosystem health of our streams and estuaries

3. Stormwater flooding does not create a hazard to our community or cause damage to properties
4. We enable water sensitive growth for future generations
5. We manage stormwater in a holistic, efficient and cost effective manner

Aspiration 1: Our urban streams, aquatic habitats and coastal marine environment are healthy and accessible

Urban streams provide opportunities for ecological corridors, public access, amenity and connectivity for walking and cycling. A positive inclusion of streams in the urban landscape will render multiple benefits, not only in relation to stormwater management. Water Sensitive Design (WSD) includes components that look to protect and improve stream health through all phases of the design process.

Objectives:

1.1 Enhance habitat diversity and stream health, including riparian and wetland vegetation, diversity of bed/bank substrate (including woody debris), meander, diversity of width/depth, floodplain connectivity and diversity of bank shape suitable for aquatic and riparian fauna needs

1.2 Minimise stream modification and loss of natural streams (including springs and seeps).

1.3 Maintain and restore fish passage at man-made instream structures.

1.4 Provide for public access, amenity and connectivity along our urban stream network, creating green linkages connecting our hill country to the sea

1.5 Protect and restore specific areas of cultural and community significance within the stream corridors.

Aspiration 2: Stormwater discharges do not degrade the water quality and ecosystem health of our streams and estuaries

The most viable option is to integrate contaminant management in all (private and public) activities, by:

1) avoidance
2) treatment at source
3) tagging any water quality improvement options to other projects

There are many uncertainties such as future contaminant loads, the effectiveness of treatment, future costs and the effects on human and ecosystem health.

In the short term, contaminant management will be based on the current understanding of high risk areas such as roads with high traffic volumes, large carparks and industrial areas. Water Sensitive Design is an important tool to avoid and reduce contaminant loads at source.

Objectives:

2.1 Avoid contamination of stormwater through source control

2.2 Treat stormwater runoff from (re)developments, where avoidance is not possible, in accordance with requirements of the Nelson Tasman Land Development Manual.

2.3 Retrofit stormwater treatment to existing discharges, focusing on high risk areas such as busy roads, intersections and large carparks.

2.4 Implement a targeted approach to stormwater management and treatment of runoff from

industrial, commercial and residential areas aimed at identified contamination risks related to specific activities.

Aspiration 3: Stormwater flooding does not create a hazard to our community or cause damage to properties

Flooding typically occurs around stream corridors, overland flow paths and in low lying areas. Flooding can also be caused by sea inundation. Flood risk is increased by:

- More and faster stormwater runoff due to urbanisation and piped networks that are at capacity.
- The piping of streams that reduces the natural flow capacity and storage capacity.
- Poorly managed overland flow.
- Climate change causing more intense rainfall, sea level rise and higher ground water levels.

Piped networks have a limited capacity and are largely aimed to minimise nuisance flooding during small to medium storm events. Design standards require primary systems to be designed to convey flows up to a 10% annual exceedance probability (AEP) event. The design target for overland flow is to convey all flows up to a 1% AEP event.

Our existing piped networks often have a much lower design capacity between 20% AEP and 50% AEP. There is no agreed trigger for system upgrades. In addressing existing flooding issues the Council has set a clear priority:

Priority 1: address flooding issues that cause hazards to people
Priority 2: address issues that cause damage to property
Priority 3: address issues that cause nuisance

Objectives:

3.1 New and existing properties are serviced by a primary network with capacity to convey flows of at least 10% AEP

3.2 No habitable floors are expected to flood as a result of a storm event of 1% AEP or less (as measured through stormwater modelling)

3.3 Flooding is addressed in a prioritised order of
1st – Hazards (minimise safety effects)
2nd – Damage (minimise economic effects)
3rd – Nuisance (minimise social effects)

3.4 Overland flow paths are improved and protected to safely convey up to 1% AEP without any flooding of habitable floors

3.5 Climate change effects are accounted for in flood risk assessments

3.6 New developments are designed in accordance with the Nelson Tasman Land Development Manual

3.7 Understand and manage residual flood risks (above 1% AEP) appropriately

Aspiration 4: We enable water sensitive growth for future generations

Structure planning and master planning both by the Council as well as by developers needs to use water sensitive design as a guiding design method throughout the design process. It is important that a relationship is established with the developers and contractors to create clarity and certainty about what

is expected and required. Clear rules and guidance through the TRMP, LDM and supporting practice notes is a key component in this process. Where possible, input from the development community will ensure these rules and requirements are implementable.

Objectives:

4.1 Utilise and support the implementation of Water Sensitive Design as the guiding design principle for all new developments and redevelopments.

4.2 Council will provide clear guidance through structure planning on catchment specific stormwater requirements in new growth areas

4.3 Establish good working relationships with the development community to support the development of rules, requirements and supporting practice notes that are clear and implementable and reduce uncertainty.

Aspiration 5: We manage stormwater in a holistic, efficient and cost effective manner

There is a common organisational goal related to stormwater management to recognises that; (1) stormwater needs to be managed in a unified way and; (2) that stormwater management solutions more often than not, cover more than one theme.

Objectives:

5.1 Partner with tangata whenua and collaborate with internal and external stakeholders to achieve better stormwater outcomes

5.2 We manage stormwater so that it addresses the needs of multiple values in a balanced and practical manner throughout the entire life of the asset (design, operation, decommissioning).

5.0 Stormwater Management Best Practices

This section outlines best practices for stormwater management and guidance to how our aspirations and objectives should be achieved.

5.1.1 The use of Water Sensitive Design (WSD) and Green Infrastructure

Water Sensitive Design (WSD) is considered best international practice and is increasingly advocated, used and required inside and outside New Zealand. WSD is based on a design approach looking to mimic natural processes and often uses green infrastructure such as raingardens, swales and wetlands instead of pipes or other "hard" infrastructure. The key principles[1] of WSD are:

a. Use an inter-disciplinary planning and design process
b. Protect and enhance natural systems and their values
c. Address (and avoid) stormwater effects close to the source
d. Mimic natural processes for stormwater management

Figure 5: Raingarden (6 months old)

As urban areas become more intensely developed sufficient space for green and blue infrastructure comes under more pressure. At the same time, there is an increasing demand from the community for open (green) space which includes natural areas such as streams. Additionally, the demand on man-made and natural drainage systems also increases from a hydrological point of view.

For WSD to be successful, it is to be considered from the start of a design process including but not limited to the following steps:

1. Retain waterways and protect riparian margins and other natural features (constraints).
2. Minimise development within floodplains (generally around streams)
3. Understand and manage overland flowpaths
4. Minimise earthworks / compaction
5. Minimise impervious area (public and private)
6. Consider future land use and design of private and public spaces including roads
7. Provide stormwater treatment at source (e.g. rain gardens, permeable paving, roof gardens, rain tanks etc.) before discharging into the natural environment.

Stream corridors are not only important to protect stream health but also to provide opportunities for ecological corridors (between the estuary and the hills), amenity values and connectivity for walking and cycling.

Best practice:

- *WSD is the preferred stormwater management practice and should be used from the start of the design process for new urban areas as well as changes to existing developed areas.*

[1] Auckland Council GD04

- *WSD requirements should be included in all areas of Council (e.g. roading, parks and properties) and in all regulatory documents including the TRMP.*
- *Integration of WSD (stormwater focus) with other green/ecological objectives such as the need for greenways is a good example of maximising community outcomes.*

5.1.2 1st Avoid, 2nd Remedy, 3rd Mitigate

Fixing existing problems within an urban environment with limited space is complex and expensive, if at all possible. The problems relate to flooding, the health of our natural waterways and contaminants entering these waterways and estuaries such as the Waimea Inlet.

The highest priority is given to avoidance of the problem in the first place. Only when effects cannot be avoided, should we look at remediation or mitigation.

There are many ways to prevent or avoid future issues. Examples include minimising impervious areas, reducing compaction, not using building materials that can leach out heavy metals such as Zinc and Copper and not building in flood plains or significant overland flow paths.

Figure 7: Flood mitigation is expensive - photo Queen Street project

If avoidance is not feasible or only partially addresses existing or new issues, the next most effective stormwater management approach is either remediation of the problem or mitigation at source (2nd and 3rd priority). The remediation of a stormwater issue takes the actual cause of the issue away, so the effect can no longer occur, for example by reinstating the natural situation. Within the context of urban development, remediation is often not feasible. The mitigation of a stormwater issue, means that the effects are minimised, for example by providing stormwater treatment. Mitigation of stormwater is most effective when done as close to the source as possible.

Traditional stormwater management uses an end-of-pipe approach. Cumulative effects are often difficult to predict but are clearly evident now. Quality treatment is more effective at source than at the bottom of a catchment where contaminants are often diluted and more difficult and expensive to remove. Minimising increases in runoff at source will bring the hydraulic response from a rainfall event closer to pre-development levels and reduces flood risks.

Best practice:

- *Avoidance of issues is the most effective way to manage stormwater.*
- *If avoidance is not feasible, mitigation at source is the best approach and is more effective than end-of-pipe stormwater management. This applies to quantity (reducing changes in runoff) as well as quality management (water quality treatment).*

5.1.3 Holistic and catchment wide approach

The different stormwater challenges that the Council and community is facing in the district are often interrelated. It is important to ensure that multiple issues are addressed holistically, rather than in isolation to ensure that proposed solutions do not impact negatively on each other. An integrated or holistic approach may also provide opportunity to address multiple issues through a single solution.

Most stormwater effects cannot be linked back to a single cause (e.g. discharge). Traditional effect assessments on a case-by-case basis have been unable to prevent increasing problems related to flooding, pollution and stream health.

Cumulative effects should be considered on a catchment level and translated into fit-for-purpose stormwater management responses which include regulatory and non-regulatory methods.

Best practice:

- *Key stormwater issues are often interrelated and should be addressed taking a holistic and catchment wide approach*
- *Cumulative effects related to stormwater management need to be assessed and addressed at a catchment wide scale.*

5.1.4 Structure planning

A site or area specific catchment plan or stormwater structure plan provides direction as to how a new area can be developed (in more detail) taking into account natural stormwater features, including the location of stream corridors, floodplains and overland flow paths. Without the direction provided by a site specific stormwater plan or structure plan, there is a considerable risks, similar to other asset areas, that stormwater solutions become sub-optimal and disjointed.

New infrastructure needs to meet the Council's design specification. Growth can also trigger the need to upgrade existing infrastructure, for example when connecting to existing infrastructure or when redevelopment in existing brown field areas is proposed.

Best practice:

- *New developments require (stormwater) structure planning and urban planning that consider the various opportunities and constraints, including specific engineering requirements from transportation, parks & reserves, utility services, etc.*
- *Re-development (such as intensification) provide an opportunity to improve stormwater management practice including upgrades to existing infrastructure, improvements to natural assets and stormwater treatment.*

5.1.5 Cross Council integration

Many stormwater improvement works are very expensive and hard to justify in isolation. Any change in the urban environment provides a unique opportunity to achieve improved stormwater management outcomes. These principles apply to new developments as well as to any changes / works in existing urban areas. Examples are the inclusion of stormwater treatment as part of a road upgrade, stream enhancement as part of a reserve upgrade, or better flood management as part of a redevelopment initiative. The Council is always seeking efficiencies. The integration of improved stormwater management outcomes into Council and community initiatives is one way of achieving this.

Best practice:

- *Land requirements for effective stormwater management and integrated urban design are identified and secured early in the planning and design process, including space for stream (corridors), flooding, overland flow and stormwater treatment.*
- *Stormwater management is integrated into all Council activities, including urban planning, reserve management and road corridor design.*
- *Integration with other Council projects provides a unique opportunity to achieve improved stormwater management outcomes.*
- *Catchment Management plans will be developed in partnership with Iwi.*

5.1.6 Future proof design

Many assessments of effects of future changes in runoff (quantity and quality) are based on a range of assumptions (e.g. climate change, future growth, expectations, legal requirements, treatment efficiencies, etc.). The cost related to future upgrades when the full range of necessary assumptions is not taken into account in the design phase are very high compared to the incremental costs to cover for uncertainty. Future proofing design solutions is seen as good practice in stormwater management. An options assessment should include a sensitivity analysis related to the assumptions made and the consequences related to scope and costs.

Best practice:

- *When considering the effects of possible changes in runoff or when scoping works to mitigate the effects of stormwater runoff a precautionary approach should be taken (within reason).*
- *Risk to lifelines and critical infrastructure should be given special consideration.*

5.1.7 Value for money

Stormwater needs to be managed in an effective and efficient manner. When considering options for new developments as well as in existing brown field areas, the principles outlined in the previous sections should be used. The whole-of-life-cycle costs and benefits need to account for both public and private stakeholder's interests. This includes intangible benefits such as ecosystem health and amenity.

It is not uncommon that access for efficient operation and maintenance of assets is difficult, specifically related to natural assets, but access needs to be provided. Access also needs to be legally possible and secured, specifically when it requires access though private land.

Although Operation and Maintenance of man-made assets is included in the AMPs it is less common to include the need to look after natural assets in a similar systematic manner. It is desirable to include costs related to the environmentally friendly maintenance of natural assets in the AMPs.

Best practice:

- *Stormwater management related solutions should consider (life cycle) cost and tangible and intangible benefits across Council and community.*
- *Operation and Maintenance requirements of man-made and natural assets are scheduled.*
- *Access to manmade and natural assets is legally and physically enabled and protected*
- *Public and Private responsibilities related to all aspects of stormwater management are clear and clearly communicated.*

5.1.8 Cultural values

Te Ao Māori

For iwi, values are defined by Te Ao Māori, the Māori world view. Te Ao Māori is holistic and based on whakapapa and the relationship with all living things flora and fauna and natural resources. Te Ao Māori is the lens in which whanau, hapū and iwi identify values within the natural world, and has been defined as encoding of an experience in the natural world. Te Ao Māori perspectives are also founded on tikanga: a system or philosophy of conduct and principles practiced by a person or group. This is the interaction which whānau, hapū and iwi have with a geographical place or feature.

Mātauranga Māori

Mātauranga Māori or Māori knowledge systems are specific to Māori. The term has many definitions covering belief systems, values and knowledge, both in a traditional and contemporary sense. Māori values are derived from a traditional belief system based on Mātauranga Māori and can be defined as

instruments through which Māori make sense of, experience, interpret and manage their environment. The use of mātauranga and tikanga is fundamental in the management of the environment and their associated ecosystems. Healthy ecosystems sustain a diverse range of indigenous habitats and their inhabitants.

Whakapapa

Iwi believe there is a whakapapa connection to awa (rivers, streams and waterways) through long-term occupation and the interconnectedness to place through āhikaa-roa. This connection is a spiritual and physical link with awa. Through this whakapapa and spiritual connection, iwi have inherited obligation and responsibility to look after ecosystems and natural resources ngā taonga tuku iho associated with awa. For iwi, their spiritual and physical survival is dependent on their ability to safeguard wāhi tapu and taonga as kaitiaki of the rohe.

Kaitiakitanga

Through their whakapapa and spiritual relationship with awa, iwi have a duty to their future generations to take care and protect wai and other taonga, such as natural resources. Iwi are the āhikaa-roa, kaitiaki, a duty demonstrated in the practice of kaitiakitanga. Kaitiakitanga is a philosophy of traditional resource management, born of recognition that all elements of nature are related and that what happens 'upstream' affects what happens 'downstream'.

Pursuant to this philosophy, traditional rights to access and use key resources were premised and maintained on one's ability and willingness to uphold associated responsibilities. For example, 'rāhui' (temporary restrictions to access and use a given area or resource) may be imposed in order for the mauri of any given area or resource to be restored and thus the interests of future users recognised and provided for. Rights and responsibilities were collectively held and maintained by whānau, hapū and iwi depending on the resource in question. Failure to uphold one's responsibilities could result in the associated rights being removed or restricted.

Kaitiakitanga can be expressed in many different ways depending on the situation and all are correct for their context. Essentially, kaitiakitanga means rights, responsibilities and obligations to the next generations. Rights to access and use resources and the responsibility, duty of care and obligation to ensure the resources are accessible and fit for purpose for the next generations.

Mauri

From a Māori perspective, natural resources are imbued with mauri – an intangible and intrinsic value described as an elemental force that binds all things together and can be measured as the overall health of the natural world. Ensuring the mauri of natural resources are maintained is an integral part of the role of kaitiakitanga. The assertion is that small shifts in the mauri or life force of any part of the environment (for example through use or misuse) would cause shifts in the mauri of immediately related parts, which could eventually affect the whole system.

Ki uta ki tai

The concept of 'Ki uta ki tai' is an Te Ao Māori perspective outlining the way in which iwi exercise kaitiakitanga. It is a way to manage ecosystems and natural resources from a 'whole-of-landscape' approach from the mountains to the sea. This value underpins iwi priorities, emphasising the interconnectedness of ecosystems, which is intrinsically linked through whakapapa. Māori don't compartmentalise different aspects of the environment, but view it as one system.

Māhinga kai

Freshwater catchments have been identified by iwi as important māhinga kai areas. Resources are harvested from the estuaries, river valleys, wetlands, from the river mouths and along the coastal margins. These areas are home to a variety of taonga, kai species and ecosystems of cultural significance to iwi.

The spatial and temporal distribution of wāhi tapu is evidence that freshwater ecosystems sustained whānau tūpuna for generations. Rivers and streams provided native fish, including the grayling (now extinct), inanga, koaro, kokopu, tuna/eel and koura.

Traditionally, māhinga kai associated with these ecosystems were used to sustain the spiritual and physical wellbeing of whanau and hapū. Mānaakitanga, or providing hospitality to visitors, by offering local specialities from the area reflects on the mana of iwi. Safeguarding these resources is a priority for iwi.

Best practice:

- *Establish and facilitate a good working relationship and communication strategy between iwi and Council. This involves establishing a meaningful relationship whereby iwi have a management role, with input into decision-making beyond the RMA consenting processes.*
- *Catchment Management plans will be developed in partnership with Iwi to integrate Te Ao Māori values and kaitiakitanga aspirations.*
- *Indigenous vegetation is used where riparian margins are restored.*

Appendix 1 Summary Table

Tūruapō – Our Vision for stormwater management	
Our vision for stormwater management is to protect and enhance the mauri of wai / life force of water and to provide for: • Te Hauora o Te Wai – the health of the water; • Te Hauora o Te Taiao – the health of the environment; • Te Hauora o Ngā Tangata – the health of the people.	
The Five Pou – our guiding principles	
1. KO PAPATŪĀNUKU RĀUA KO RANGINUI – "Our relationship with the land and water relies upon the health and wellbeing of Papatūānuku and Ranginui" **2. NGĀ WAI TUKU KIRI** – "Our waters are a gift of life provided to us by our tupuna". **3. TĀNGATA** – "Our environments are where we live". **4. TE HĀPORI ME TE WAI** – "The community's love and care for water is enduring". **5. TIAKINA MŌ APŌPŌ** – "In building future resilience, our connectedness with the environment is our strength".	
Aspirations and Objectives **(The stormwater outcomes that we want to achieve)**	**Best practice** **(How we want to achieve the outcomes)**
Aspiration 1: **Our urban streams, aquatic habitats and coastal marine environment are healthy and accessible**	***The use of Water Sensitive design and green infrastructure*** • WSD is the preferred stormwater management practice and should be used from the start of the design process for new urban areas as well as changes to existing developed areas. WSD means: o An inter-disciplinary planning and design process o Protecting and enhancing natural systems and values o Addressing stormwater effects close to the source
1.1 Enhance habitat diversity and stream health, including riparian and wetland vegetation, diversity of bed/bank substrate (including woody debris), meander, diversity of width/depth, floodplain connectivity and diversity of bank shape suitable for aquatic and riparian fauna needs	
1.2 Minimise stream modification and loss of natural streams (including springs and seeps).	

1.3	Maintain and restore fish passage at man-made instream structures.	o Mimicking natural hydrological processes • WSD requirements should be included in all areas of Council (e.g. roading, parks and properties) and in all regulatory documents including the TRMP. • Integration of WSD (stormwater focus) with other green/ecological objectives such as the need for greenways is a good example of maximising community outcomes. ***1st avoid, 2nd remedy, 3rd mitigate*** • Avoidance of issues is the most effective way to manage stormwater. • If avoidance is not feasible, remediation or mitigation at source is the best approach and is more effective than end-of-pipe stormwater management. This applies to quantity (reducing changes in runoff) as well as quality management (water quality treatment). ***Holistic and catchment wide approach*** • Stormwater issues are often interrelated and should be addressed taking a holistic and catchment wide approach • Cumulative effects related to stormwater management need to be assessed and addressed at a catchment wide scale. ***Enabling sustainable growth*** • New developments require (stormwater) master planning and urban planning that consider the various opportunities and constraints, including specific engineering requirements from transportation, parks & reserves, utility services, etc. • Re-development (such as intensification) provide an opportunity to improve stormwater management practice including upgrades to existing infrastructure, improvements to natural assets and stormwater treatment.
1.4	Provide for public access, amenity and connectivity along our urban stream network, creating green linkages connecting our hill country to the sea	
1.5	Protect and restore specific areas of cultural and community significance within the stream corridors.	
Aspiration 2: Stormwater discharges do not degrade water quality and ecosystem health of our streams and estuaries		
2.1	Avoid contamination of stormwater through source control	
2.2	Treat stormwater runoff from (re)developments, where avoidance is not possible, in accordance with requirements of the Nelson Tasman Land Development Manual.	
2.3	Retrofit stormwater treatment to existing discharges, focusing on high risk areas such as busy roads intersections and large carparks.	
2.4	Implement a targeted approach to stormwater management and treatment of runoff from industrial, commercial and residential areas aimed at identified contamination risks related to specific activities.	
Aspiration 3: Stormwater flooding is not a hazard to our community and does not cause damage to properties		
3.1	New and existing properties are serviced by a primary network with capacity to convey flows of at least 10% AEP or more	
3.2	No habitable floors are expected to flood as a result of a storm event of 1% AEP or less (as measured through stormwater modelling)	
3.3	Flooding is addressed in a prioritised order of 1st – Hazards (minimise safety effects) 2nd – Damage (minimise economic effects) 3rd – Nuisance (minimise social effects)	

3.4	Overland flow paths are improved and protected to safely convey up to 1% AEP without any flooding of habitable floors	***Cross council integration*** • Stormwater management should be integrated into all Council activities, including urban planning, reserve management and road corridor design. • Integration with other Council projects provides a unique opportunity to achieve improved stormwater management outcomes. • Land requirements for effective stormwater management and integrated urban design should be identified and secured early in the planning and design process, including space for stream (corridors), flooding, overland flow and stormwater treatment. ***Future proof design*** • When considering the effects of possible changes in runoff or when scoping works to mitigate the effects of stormwater runoff a pre-cautionary approach should be taken (within reason). • Risk to lifelines and critical infrastructure should be given special consideration. ***Value for money*** • Stormwater management related solutions should consider (life cycle) cost and tangible and intangible benefits across Council and community. • Operation and Maintenance requirements of man-made and natural assets are scheduled. • Access to manmade and natural assets is legally and physically enabled and protected • Public and Private responsibilities related to all aspects of stormwater management are clear and clearly communicated ***Cultural Values*** • Establish and facilitate a good working relationship and communication strategy between iwi and Council. This
3.5	Climate change effects are accounted for in flood risk assessments	
3.6	New developments are designed in accordance with the relevant engineering standards	
3.7	Understand and manage residual flood risks (above 1% AEP) appropriately	
Aspiration 4: We enable water sensitive growth for future generations		
4.1	Utilise and support the implementation of Water Sensitive Design as the guiding design principle for all new developments and redevelopments.	
4.2	Council will provide clear guidance through structure planning on catchment specific stormwater requirements in new growth areas	
4.3	Establish good working relationships with the development community to support the development of rules, requirements and supporting practice notes that are clear and implementable and reduce uncertainty.	
Aspiration 5: We manage stormwater in a holistic, efficient and cost effective manner		
5.1	Partner with tangate whenua and collaborate with internal and external stakeholders to achieve better stormwater outcomes.	
5.2	We manage stormwater so that it addresses the needs of multiple values in a balanced and practical manner throughout the entire life of the asset (design, operation, decommissioning).	

		involves establishing a meaningful relationship whereby iwi have a management role, with input into decision-making beyond the RMA consenting processes. • Catchment Management plans will be developed in partnership with Iwi to integrate Te Ao Māori values and kaitiakitanga aspirations. • Indigenous vegetation is used where riparian margins are restored.