Stormwater Policy and Plan Provisions Stocktake and Assessment

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1 Introduction

1.1 Background

At present the design, management and use of urban areas and performance of three waters infrastructure services in New Zealand is failing to adequately address the adverse effects of urban pressures. This has led to adverse effects on natural freshwater systems and resources, and people's relationships with them.

Drinking water, wastewater and stormwater are critical for the health and wellbeing of New Zealand, and for upholding Te Mana o te Wai – including the health of the water, the health of the environment, and the health of the people. However, it has become clear that we cannot always be confident that our water is safe to drink, swim / play in, or that acceptable environmental outcomes are being achieved.

In 2019/2020 the Government reviewed how to improve the regulation and supply arrangements of drinking water, wastewater and stormwater (three waters) to better support New Zealand's prosperity, health, safety and environment. In addition, there is the Essential Freshwater Programme which includes work to improve urban water governance under the framework of Te Mana o te Wai. As part of this work, government are working on a national urban water legislative and policy framework to improve the health of urban water and promote good management practices.

Against this backdrop, the Ministry for the Environment (the Ministry) engaged WSP in October 2019 to provide:

- A stocktake of provisions (objectives, policies, rules and methods) relevant to stormwater in a selection of Resource Management Act (RMA) planning documents
- An assessment of how well the provisions direct good management practices that are consistent with the Urban Water Principles

- A suite of exemplar planning provisions that may be useful to regional and district councils for advancing good management practices in regional policy statements, regional plans and district plans
- Commentary on any observed or assessed barriers to implementation of good stormwater management practices in relation to the Urban Water Working Group's Urban Water Principles
- Commentary on any observed or assessed barriers to implementation of good stormwater management practices in relation to the National Policy Statement for Freshwater Management and National Policy Statement for Urban Development Capacity.

The scope does not include how stormwater policy and plan provisions are implemented, monitored or evaluated for their effectiveness.

1.2 Stormwater Management

Stormwater is the water that runs off from land, including impervious (water resistant) surfaces such as roofs, roads, driveways and footpaths when it rains. Traditionally in urban areas, runoff goes down drains into stormwater pipes or channels and is carried to rivers, lakes or the sea.

The definition of stormwater within the National Planning Standard states:

"any run-off that has been intercepted, channelled, diverted, intensified or accelerated by human modification of a land surface, or run-off from the surface of any structure, as a result of precipitation and includes any contaminants contained within". Examples of the risks associated with stormwater are that it:

- Can cause flooding and erosion
- Contains contaminants and has the potential to affect the ecological health of our waterways and coastal waters, as well as on the economic, social and cultural value of these environments
- Can be costly to operate and maintain reticulated networks within urban networks costing millions of dollars each year, including upgrades and additions to the stormwater network.

Over the last decade the realisation that water bodies are increasingly at risk from flooding and poor water quality has led to a shift in stormwater management. There is also increasing awareness that urbanisation, and particularly imperviousness changes the flow patterns in streams, and this has adverse effects on ecological health. Ecological health is also affected by stream modification like piping, straightening and/or lining channels. The shift has been towards a whole-of-system approach that seeks to protect and enhance the freshwater environment through sustainable stormwater management. This whole-of-system approach is not just about stormwater 'devices' but a holistic approach to mimicking natural processes, reducing and attenuating flows and by treating stormwater contaminants, as opposed to systems designed principally for drainage. There is also a need to consider climate change including changes to rainfall patterns and characteristics of rainfall.

There are a number of different names used around the world for this holistic stormwater management approach: water sensitive urban design (WSD in Australia), low impact development (LID in the United States), sustainable drainage systems (SuDS in the United Kingdom), and water sensitive design (WSD¹ here in New Zealand).

WSD takes a collaborative approach to water management and is applied to land use planning and development. It provides a process

for integration of land use and water management, and in particular provides for minimising the adverse effects of stormwater on receiving environments. It can be applied at multiple scales (region, catchment, development and site) and is appropriate for both greenfield sites and brownfield redevelopment. Whilst the goal of WSD is to better manage freshwater systems, applying WSD at the planning and design phase of development can maximise wider environmental, cultural, social and economic benefits. A close link between stormwater and freshwater management policy is therefore important.

In late 2017, the Ministry convened, and continues to support, the independent Urban Water Working Group to assess existing problems related to urban water and to inform the development of 'Good Management Principles and Practices' for improving urban water management. The Group comprises approximately 45 practitioners working in local government, the three waters sector and the wider urban development and design sectors. The Group has developed a set of Urban Water Principles (Appendix A).

The purpose of the Urban Water Principles is to guide decision-making that promotes sustainable behaviours and the creation of water sensitive urban spaces by drawing on mātauranga, the lessons of the past, international best practice, the needs of our present communities and a vision of a sustainable, resilient future.

¹ Auckland Council (2015), Water Sensitive Design for Stormwater, known as GD04

2 Plans Assessed and Criteria

2.1 Plans Assessed

A key part of the work has been to undertake:

- A stocktake of provisions (objectives, policies, rules and methods) relevant to stormwater in a selection of RMA planning documents in New Zealand
- An assessment of how well the provisions direct good management practices that are consistent with the Urban Water Principles.

The list of plans to be assessed was provided by the Ministry based on whether they are in a high or medium urban growth area under the National Policy Statement for Urban Development (NPS-UD) (Table 2-1 to Table 2-3). The list covered 45 plans across New Zealand, including district, coastal, regional and unitary plans and regional policy statements (Figure 2-1). Appendix B provides more detail on which plans were used including the version.



Figure 2-1: Types of plans assessed

Table 2-1: High Growth Urban Areas and corresponding local authorities

	Policy Statements and Plans		
High Growth Area	Territorial Authority	Regional Council	
Auckland	Auckland	d Council	
Christchurch	Christchurch City Council	Canterbury Regional Council	
Hamilton	Hamilton City Council, Waipa District Council	Waikato Regional Council	
New Plymouth	New Plymouth District Council	Taranaki Regional Council	
Tauranga	Tauranga City Council, Western Bay of Plenty District Council	Bay of Plenty Regional Council	
Queenstown	Queenstown Lakes District Council	Otago Regional Council	
Whangarei	Whangarei District Council	Northland Regional Council	

Table 2-2: Medium Growth Urban Areas and corresponding local authorities

	Policy Statements and Plans		
Medium Growth Area	Territorial Authority	Regional Council	
Dunedin	Dunedin City Council	Otago Regional Council	
Gisborne	Gisborne Distr	ict Council	
Kapiti	Kapiti Coast District Council	Greater Wellington Regional Council	
Marlborough	Marlborough District Council		
Napier- Hastings	Napier City Council, Hastings District Council	Hawkes Bay Regional Council	
Nelson	Nelson City Council, Tasman District Council		
Palmerston North	Palmerston North District Council	Manawatu Wanganui Regional Council	
Rotorua	Rotorua Lakes Council	Bay of Plenty Regional Council	
Wellington	Porirua District Council, Lower Hutt City Council, Wellington City Council	Greater Wellington Regional Council	

Table 2-3: Urban Areas and corresponding local authorities

	Policy Stateme	ents and Plans
Urban Area	Territorial Authority	Regional Council
Carterton and Masterton	Wairarapa Combined Plan	Greater Wellington Regional Council
Greymouth	Greymouth District Plan	West Coast Regional Council
Invercargill	Invercargill City Council	Southland Regional Council

2.2 Stocktake Process

The overall purpose of the stocktake was to assess the effectiveness of existing policy and plan provisions in promoting good stormwater management. Therefore, this stocktake was undertaken against good practice, not all stormwater provisions in plans.

The provisions relating to stormwater management were assessed as to whether they promote good stormwater management that is consistent with the Urban Water Principles. An assessment was made based on different criteria (see section 2.3) and scales as to how well the provisions direct good management practices.

The stocktake process was a "capture and code" task carried out through an 'audit' type approach. The analysis was qualitative, and the assessment results were captured. Each of the selected RMA planning documents was assessed against the criteria.

The criteria were 'coded' using either a 0 to 5 scale, a Yes / No response or a statement for those criteria that had open ended questions. The 0 to 5 scale used was:

- 0 No reference / silent
- 1 Minimal
- 2 Some
- 3 Moderate
- 4 Substantial
- 5 Fully.

Not all criteria are relevant to all plans, for example, discharge quality limits are not expected to be in district plans.

The plans were worked through based on the policy hierarchy of regional policy statement – regional plan / coastal plan - district plan to allow for the identification of any links between regional and district planning documents.

Only the chapters / sections of each plan considered relevant to stormwater outcomes were assessed. This included sections that covered the following topics:

- Regional Policy Statement iwi / tangata whenua, integrated management, freshwater, coastal, urban growth / built environment, natural hazards
- Coastal Plan discharges
- Regional Plan iwi values / tangata whenua, water quality, values of waterways, stream works, natural hazards
- District Plan iwi / tangata whenua, natural hazards, infrastructure / utilities, subdivision, ecosystems / natural character / biodiversity, development controls.

Criteria Ref	Urban Water Principle	Technical Area	Criteria Measurement
A1	NGA WAI TUKU KIRI	Relationship	What role does mana whenua have?
A2	NGA WAI TUKU KIRI	Relationship	Does the plan weave in the cultural aspects of water (reflected in both Urban Water GMP and Essential Freshwater, e.g. mauri of water or Te māna o te wai)
A3	PAPATUANUKU	Integrated approach	How mature is the strategic direction? - how far do the objectives go to recognise the need for an integrated approach to managing land and water?

Table 2-4: Criteria used for stocktake

2.3 Assessment Criteria

In developing the assessment criteria, it was assumed that RMA planning documents that would result in or encourage good practice would be those documents that included provisions that embody or help to realise and promote the Urban Water Principles as part of developments. Therefore, it was determined that the criteria should primarily be based on the Urban Water Principles. Twenty-four criteria were developed. The criteria range in scale from high level to more basic information that was used to build a broader picture.

Criteria Ref	Urban Water Principle	Technical Area	Criteria Measurement
A4	PAPATUANUKU	Integrated approach	Are there any objectives specific to stormwater?
A5	PAPATUANUKU	Ecosystem health	Promote ecosystem health - are there any policies that protect the health of freshwater ecosystems through the management of freshwater and stormwater at the catchment scale?
A6	PAPATUANUKU	Ecosystem health	Promote ecosystem health - are there any policies that require protection of waterbodies - including intermittent streams?

Criteria Ref	Urban Water Principle	Technical Area	Criteria Measurement
Α7	PAPATUANUKU	Ecosystem health	Promote ecosystem health - are there any policies that require setbacks/riparian margins for activities?
A8	PAPATUANUKU	Ecosystem health	Is there a requirement to enhance or improve water quality?
A9	PAPATUANUKU	Ecosystem health	Are there clearly defined outcomes for freshwater bodies (eg. water quality limits) and a requirement for projects to be assessed against these outcomes?
A10	PAPATUANUKU	Ecosystem health	What level of treatment (water quality/sedimentO is required for discharges? (policy and/or rules)
A11	PAPATUANUKU	Design practice	Is green infrastructure encouraged / required / integrated as part of a required regenerative/water sensitive design approach?
A12	PAPATUANUKU	Design practice	Is there a stormwater hierarchy with preference for natural systems - those that mimic natural

Criteria Ref	Urban Water Principle	Technical Area	Criteria Measurement
			systems - containment - end of pipe solutions?
A13	PAPATUANUKU	Design practice	Is treatment required at source as opposed to end of pipe?
A14	PAPATUANUKU	Design practice	Is there a requirement for new developments to account for pre- and post-development flows?
A15	PAPATUANUKU	Design practice	Are there impervious limits and / or site coverage to control runoff rates / volumes?
A16	TIAKINA MO APOPO	Resilience	Is there a requirement to protect overland flow paths?
A17	TIAKINA MO APOPO	Resilience	Is there a requirement to protect the floodplain / avoid development in the floodplain?
A18	TIAKINA MO APOPO	Resilience	Is there a stated requirement to allow for climate change and sea level rise with respect to stormwater?
A19	TANGATA	Integrated approach	Is there any encouragement of multi- use facilities? eg. stormwater and recreation / amenity

Criteria Ref	Urban Water Principle	Technical Area	Criteria Measurement
A20	TANGATA	Integrated approach	Is there refence to network consents that the local authority holds?
A21	TANGATA	Design practice	Is there any incentive for good practice? eg. rules hierarchy, toolbox
A22	TANGATA	Design practice	What type(s) of good practice guidance or promotion is provided? eg. reference to design

Criteria Ref	Urban Water Principle	Technical Area	Criteria Measurement
			guidelines, best practice guides
A23	TANGATA	Design practice	Is there reference to design having to meet best practice guides, Development Codes?
A24	TE HAPORI ME TE WAI	Roles	For non-regulatory methods: are parties other than the Council included as having a role?

3 Stocktake Findings

3.1 Introduction

This section provides and overview of the findings of the stocktake by type of plan.

The majority of the plans were operative (Figure 3-1) and a significant number of these had been subject to plan changes but not necessarily related to stormwater provisions.

Throughout this section we have referred to plans as 'newer' and 'older'; this age categorisation is based on when the plan was made operative, proposed or when plan changes were made (Figure 3-2). Note: where plan changes had been made to a plan, the plan change version was used whether it contained matters relevant to stormwater or not.



Figure 3-1: Status of the plans assessed



Figure 3-2: Age and status of plans assessed

Reference is made to design standards and codes, which are often appendices or separate documents to the plan that provide a code of practice or design guidelines for stormwater systems.

3.2 Regional Policy Statements

The policy framework in regional policy statements (RPS) set the highlevel direction for resource management issues in regional plans and district plans across NZ. A large majority of provisions do not address stormwater management directly; stormwater management is usually addressed in general discharge objectives and policies, or objectives and policies that manage the three waters (water use, wastewater and stormwater) together. Eight stand-alone RPS were assessed, six from high growth areas, three from medium growth areas and one from the urban area. The age of the regional policy statements ranged from 2010 to 2019, some of which are combined with the relevant regional plan.

There were no obvious trends, other than age, arising out of the stocktake of RPS in terms of good management practice for stormwater. Age was generally a factor in the maturity of the policy framework in terms of taking an integrated approach to the management of land and water resources. One of the 'mid-age range' plans, (operative 2013) has a specific stormwater policy requiring that the regional plans *"include policies, rules and/or methods that protect aquatic ecosystem health by minimising ecotoxic and other contaminants in stormwater that discharges into water, or onto or into land that may enter water, from new subdivision and development." It goes further noting the need for an integrated approach by setting out stormwater design and treatment approaches that shall had be regard to when considering resource consent applications, notices of requirement and district plan changes and reviews.*

The incorporation of WSD, or low-impact urban design is starting to be touched on in some newer RPS (eg. encouraging the use of green infrastructure), but it is mostly high-level direction for regional and district plans to follow. As expected, given the nature of RPS, there is minimal reference to design standards and codes for good management practice; industry best practice in general is often referred to but at the RPS level it does not get into the specifics. More typically, non-regulatory methods are used and directed at councils and industry to develop and implement good management practices and codes. This sets the scene for regional and district plans to incorporate into their provisions.

3.3 Regional Plans

Regional plans must give effect to the provisions set in RPS and set the policy and rules for region-wide issues as directed by the RPS. Regional plans cover the issues within functions of the regional council such as water quality and quantity, aquatic ecosystems and the discharge of contaminants. The level that these issues are addressed within regional plans varies highly from region to region. Many regional plans address stormwater directly in the objectives and policies, whereas some regional plans combine stormwater with the three waters to be managed as one, or to be managed in general with other discharges.

Nine regional plans were assessed, five from high growth areas, three from medium growth areas and one from the urban areas category. The age of the regional plans range from 2013 through to 2019, some of which are combined with the RPS for the region.

There are not as obvious trends across regional plans that linked the age of the regional plan to the level of good management practice direction as is seen in coastal and district plans. Across almost all regional plans, there is a recognition in the objectives and policies that mitigation and remedying effects on water quality is not enough anymore, and there is an obvious shift towards maintaining or enhancing the water quality of water bodies. However, across many plans the freshwater outcomes for water bodies are not clearly defined, and the requirement for proposals to be assessed against these outcomes is missing.

The shift away from piped systems and towards using source control and WSD methods is yet to be adopted into most regional plans meaning there is still a large focus on piped reticulated systems for stormwater management and treatment of stormwater at the end of the system.

There is very little recognition in older regional plans of the importance of an integrated approach to freshwater management at the

catchment scale. The provisions within new plans and plan changes require that water bodies are protected at the catchment scale, and that activities with adverse effects are avoided, rather than mitigated or remedied. In the newer regional plans, there are much more developed policy frameworks but the next step towards fully developed policy that integrates WSD and mimicking natural processes in stormwater and freshwater management is largely still absent. Regional plans that have a developed integrated policy framework are most often those that have been made operative or proposed in accordance with a new RPS.

There is a prominent relationship between the age of a regional plan and the maturity of the framework in terms of integrated management of land and water resources at the catchment scale. In many newer plans, regional councils have whole chapters which focus on each catchment and the management of resources within and between the catchments.

3.4 Coastal Plans

Eight stand-alone coastal plans were assessed, five from high growth areas, two from medium growth areas and one from the urban areas category – one plan was a combined regional and coastal plan. The age of the coastal plans ranged from 2012 to 2019.

A common relationship seen in the coastal plans was the relationship between the age of the plan and the level of good stormwater management practices set in the provisions. This relationship was most commonly seen in newer coastal plans that have been made operative or proposed following new RPS and/or since the New Zealand Coastal Policy Statement 2010. The provisions in most of New Zealand's coastal plans are lacking direction towards best practice stormwater management.

In those newer coastal plans, which have been made operative or proposed following changes to or new RPS in that region, there is a mature policy framework that focuses on the integrated management of land and water and promoting and protecting the health of ecosystems through the management of stormwater at the catchment scale. Coastal plans made operative or proposed from 2018 onwards all have a requirement for source control for stormwater management, as opposed to stormwater treatment at the end of the system or the pipe.

In older coastal plans, there is little to no mention of catchment management or reference to good management practices. The older plans also lack the proactive, more advanced focus on the cultural aspects of water for tangata whenua than some of the newer coastal plans.

3.5 **District Plans**

Stormwater management controls vary from district to district and often within district plans themselves, as specific stormwater management controls are often applied to plan changes in new growth areas (often as part of a structure planning process). Provisions can include a comprehensive approach to stormwater management through to managing the effects of development on stormwater quality and quantity, waterway health, riparian margins and flood hazard areas. Other district plans focus only on managing development in flood hazard areas and, to a lesser extent, stormwater quality management.

The provisions of fifteen district plans across New Zealand were audited, seven from high growth areas, six from medium growth areas and two from urban areas. There are general trends throughout the district plans that show a direct relationship between the age of the plan and the maturity of the policy framework towards taking an integrated approach to the management of land and stormwater and incorporating WSD into stormwater management controls. Interestingly, there are some district plans covering provincial towns that have more advanced provisions than those plans that include cities however, there are no specific trends. Older district plans focus on managing flood hazard areas and have site coverage limits set in specific zones, although they are not always specifically related to stormwater management. The role that māna whenua have in older district plans mainly consists of identifying their values and some sites of significance in the region. These older plans make reference to subdivision guides and codes which are focussed on engineering and infrastructure, these plans often do not include provisions and codes for stormwater management controls.

Comparatively, in the newer district plans, there is a very comprehensive approach to stormwater management being introduced in new plan changes and provisions. Seven out of nine district plans from 2017 onwards have design codes and practices for subdivision and land development that all new subdivisions must be designed in accordance with. These subdivision design codes often require WSD and green infrastructure to be incorporated into design at the beginning of the process. Incentives for good practice provided in these plans include hierarchy of rules / activity classification, financial development incentives, bonuses and rebates. These new subdivision requirements include the integration of green infrastructure for stormwater management control into design as a mandatory requirement, and there is strong encouragement or a requirement to include WSD and the management of stormwater at the source, as opposed to the discharge point.

There is a strong relationship between the age of the district plan and the level of good management practice, particularly in terms of maintaining and enhancing water quality in waterways, and the role of māna whenua in decision making. Māna whenua have more active and prominent roles in resource management decision making in new plans. This age trend is also very prominent between the age of district plan and level of good management practice in terms of development in flood hazard areas, maintaining and enhancing water quality in waterways and including development setbacks from waterways in provisions.

3.6 Combined Plans

Five combined plans were assessed in terms of stormwater management, one from a high growth area and four from medium growth areas. Combined plans have been developed by Auckland, Gisborne, Marlborough, Nelson and Tasman. The Nelson and Tasman combined plans do not include regional policy statements noting that these are from 1997 and 2001. The age of the unitary plans ranged from 2012 through to 2019.

Unitary plans where the regional policy statement, regional, coastal and district plans are combined have a very strong policy framework directing good stormwater management practices that are consistent with the urban water principles. There is a clear trend across the unitary plans, regardless of their age of a substantial recognition of the need for an integrated approach across land and water management, and the need for management and protection of waterways and ecosystems through catchment management. The combined nature of these plans provides for the ease of integration, as there are no challenges with the trickle-down and timing of development of provisions from the RPS level, to the regional and district plan level. They also have the advantage of having no institutional differences between the regional and district planning authorities as they are one.

The provisions direct good management practices consistent with the urban water principles, as they have good practice subdivision design guidelines and codes that incorporate water sensitive design at the land development and subdivision level. These guides are comprehensive and encourage or require a shift away from piped systems to controlling stormwater at the source.

The strong integration of management in unitary plans includes the cultural aspects of water and the role that māna whenua have in the resource management process. In almost every unitary plan, there is an adoption/integration of iwi management plans into provisions, and māna whenua have a strong role in decision making that is not also provided for at regional and district plans across some regions.

3.7 Overview of Assessment Findings

Overall, newer plans and provisions for stormwater management in New Zealand are heading in the right direction that will result in the implementation of good management practices.

There is still a long way to go in achieving an integrated approach to stormwater management. There are few plans which have a fully developed policy framework that takes an integrated approach to stormwater management, including both the role of māna whenua and the incorporation of water-sensitive design and mimicking of natural processes in design. There is a general relationship, especially seen in coastal and district plans, between the age of the plan and the level of good stormwater management in the provisions that aligns with the Urban Water Principles. Unitary plans provide ease of integration of provisions than those regions with separate plans for each authority.

Table 3-1: Overall summary of stocktake findings

	Summary		Summary
Regional Policy Statements	Newer plans are more likely to take an integrated approach to managing land use and water resources Stormwater management is usually addressed in general discharge objectives and policies, or those that manage the three waters Typical to use non-regulatory methods directed at councils and industry to develop and implement good management practices and codes	Regional Plans	Recognition that mitigation and remedying effects on water quality is not enough anymore. Obvious shift towards maintaining or enhancing the water quality of water bodies Large focus on pipe stormwater systems to manage stormwater Newer plans contain a more developed policy framework, regarding integrated management of land and water resources leading down to the catchment scale
Coastal Plans	Strong relationship between age of plan and level of good stormwater management practices Plans made operative or proposed from 2018 onwards all have a requirement for source control for stormwater management	Unitary Plans	Regardless of the plans age, substantial recognition of the need for an integrated approach across land and water management, and the need for management and protection of waterways and ecosystems through catchment management

	Summary
District Plans	Newer plans have a more mature policy framework with taking an integrated approach to managing land use and water resources
	Stormwater management is usually addressed in general discharge objectives and policies, or those that manage the three waters
	Typical to use non-regulatory methods directed at councils and industry to develop and implement good management practices and codes

3.8 Benchmarking

The purpose of this section is to present the concept of benchmarking policy provisions against an urban water framework.

Traditionally urban areas feature centralised infrastructure to meet water supply, public health and flood management needs as cities grew. However, this style of delivery often led to increased environmental and social issues. In a Water Sensitive City stormwater is regarded as a resource that can be managed to deliver a range of outcomes.

The Urban Water Management Transitions Framework represents six distinct developmental 'states' that urban areas typically move through or are expected to as they respond to the community's aspirations for urban water management, eg. increasingly liveability, resilience and sustainability. These states are indicated in Figure 3-3.

The framework was developed as a benchmarking tool for understanding a city's present water management approach and defining its short and long-term goals. The states are:

- Water supply most basic state, centralised system where water is cheap and limitless
- Sewered driven by desire for better public health and hygiene, assumes discarding effluent does not harm the environment
- Drained driven by need to protect homes and infrastructure from flooding
- Waterways takes into account environmental impacts of water extraction and waste processing, urban planning begins to integrate water, stormwater starts to be treated
- Water cycle water is conserved and comes from a diversity of sources, sustainability is well practiced
 Water sensitive – based on holistic and integrated water cycle management, water is managed in a way that protects the health of receiving waters, mitigates flood risk and creates public spaces.



Cumulative Socio-Political Drivers

Service Delivery Functions

Figure 3-3: Urban water management transitions framework showing the development states (after Brown, R., Farrelly, M & Lorobach, D (2013) Actors working the institutions in sustainability transitions: The case of Melbourne's stormwater management. Global Environmental Change, 23(4), 701-718.)

If the statutory RMA plans were to be assessed, solely from a policy perspective, as to where they sit on the framework, it is expected that over half would sit under the "drained" state where the focus is more on traditional approaches to stormwater as opposed to urban planning integrating water as an important consideration. This is a reflection of where plan development is at. As new plans are developed it is anticipated they will advance to the "waterways" state.

4 Plan Provisions

4.1 Introduction

A suite of high-level exemplar planning provisions that may be useful to regional and district councils for advancing good management practices in regional policy statements, regional plans, and district plans are provided in this section.

The section starts with providing commentary on what can be included in plans. The type and nature of the provisions are partly dependent on the roles and functions of regional councils and territorial authorities under the RMA and Local Government Act. An outline of the relevant national policy documents is also provided.

The sections on regional policy statements, regional plans and district plans present in table format the topic areas and types of provisions to advance good management practices. There are also examples of objective and policy wording provided. The examples are not intended to be comprehensive in that there may be other similar worded provisions that would achieve the same outcome. No rules are provided as these tend to depend on the overall rule structure of the council plan.

4.2 What Councils can include in Plans

4.2.1 Background

Urban development affects the natural water cycle within a catchment and consequently the quality of the natural and built environment. The effects may include:

- Flooding
- Loss of ecological health due to loss of habitat
- Reduced water quality
- Altered flows/ quantity

- Accelerated erosion and land instability
- Altering the natural water cycle
- Changes to existing stormwater infrastructure
- Impacts on recreation, human health, cultural and other values.

Land use and development need to be managed so that stormwater does not have unacceptable adverse effects on property, communities and their environments.

Councils responsibilities with regards to stormwater management are primarily described in the Local Government Act (LGA 2002) and the Resource Management Act (RMA 1991).

Managing the discharge of contaminants to the environment, activities related to rivers and the control of the use of land for the purpose of the maintenance and enhancement of water quality are a regional council function. Other activities often associated with stormwater that are 'controlled' through the RMA by regional councils include:

- Diversion of water temporary or permanent
- Damming of water
- Activities in the bed or banks of a watercourse such as outfall structures, culverts and stream restoration
- Activities along the margins of watercourses such as vegetation clearance and earthworks.

However, district plans can contribute to achieving improved water quality as a result of land use planning such as by managing the potential adverse effects of subdivision on the values of waterbodies (eg. construction effects, secondary flow paths) and recognising the value of natural systems in sustainable stormwater management and water sensitive design. In addition, as owners of reticulated networks they can manage stormwater on-site by requiring treatment before it enters reticulated networks and / or waterbodies.

4.2.2 Functions

The RMA sets out a framework for environmental management in New Zealand. It requires regional councils and territorial authorities to create plans that outline how resources in their areas will be managed. These plans may set out objectives and policies for urban water management as well as the adoption of green infrastructure like water sensitive design. The objectives and policies are enacted through rules and resource consent conditions.

The control of the discharge of contaminants to land or water is a function of regional councils.

Regional council functions are set out in s30 of the RMA. Of specific relevance to stormwater provisions is section 30(1)(c):

The control of the use of land for the purpose of-

(iii) The maintenance and enhancement of the quality of water in water bodies and coastal water

(iii) The maintenance of the quantity of water in water bodies and coastal water

(iiia) the maintenance and enhancement of ecosystems in water bodies and coastal water

(iv) The avoidance or mitigation of natural hazards.

and in s30(1)(f): the control of discharges of contaminants into or onto land, air, or water and discharges of water into water.

Integrated urban stormwater management s30(1)(e) and (fa) and s13 are also important regional council functions.

Related to this function are s68(7) and 69 of the RMA, which specifically refer to the inclusion of rules within a regional plan that can address and manage water quality (as well as minimum and maximum flows, ie. quantity). In addition, s70 addresses regional rules specific to the discharge of contaminants.

The power to include rules in a district plan is conferred by sections 75 and 76 of the RMA, which enable a territorial authority to include rules

in its plan for the purpose of carrying out its functions set out in s31 of the RMA. Section 31 functions of territorial authorities are:

 (a) the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district:

(aa) the establishment, implementation, and review of objectives, policies, and methods to ensure that there is sufficient development capacity in respect of housing and business land to meet the expected demands of the district:

(b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of—

(i) the avoidance or mitigation of natural hazards

(ii) ...

(iii) the maintenance of indigenous biological diversity

District plan rules, established under s31 of the RMA, are the typical means to avoid or manage development within flood plains and flood prone areas and require developments to meet the requirements established through an applicable catchment management plan and / or network discharge consent. Requirements generally only apply to new development given existing use rights under s10 of the RMA. Existing use rights allow existing land use practices to continue and prevents councils from requiring improvements in current practices during redevelopment unless there is a significant change in land use and existing use rights no longer apply. This is unlike regional rules where as a result of a rule in a regional plan becoming operative, in certain situations existing activities may need to seek resource consents to be able to continue.

On the face of it, the management of the guality and guantity of water falls within the jurisdiction of regional councils - regulation of discharges of contaminants to land and water is a regional council function and district plans cannot contain discharge rules. However, case law has confirmed there may be circumstances where the functions of regional and territorial authorities overlap. Regional and district councils have overlapping land use and natural hazard functions under s30 and s31. For example, if stormwater flows uncontrolled from developed sites to a reticulated network without for example, attenuation, it could cause capacity issues and flood an urban area and therefore can be controlled. There are also often overlaps in managing effects of earthworks during construction to ensure construction stormwater discharges are minimised / managed. In addition, territorial authorities as can contribute to achieving water guality standards through their actions or how they enforce requirements on others discharging into their reticulated network.

4.2.3 National Policy Statements

Councils are required to give effect to any National Policy Statement (NPS) through their RMA plans. Of particular relevance to stormwater management are:

- National Policy Statement for Freshwater Management, 2014 (amended 2017) (NPS-FM)
- National Policy Statement for Urban Development Capacity, 2016 (NPS-UDC)
- New Zealand Coastal Policy Statement, 2010 (NZCPS).

There is currently no National Environmental Standard (NES) or proposed NES for stormwater however there is a proposed NES for Freshwater².

The **NPS-FM** directs councils to improve the management of freshwater. It seeks to maintain or improve the overall quality of freshwater within a region, including improving water bodies that have been degraded, and to safeguard the life-supporting capacity,

ecosystem processes and indigenous species including their associated ecosystems of freshwater, in sustainably managing the use and development of land, and of discharges of contaminants. It is very directive towards regional councils and regional plans. In particular, requiring that regional plans clearly specify values, objectives and measurable objectives / target attribute states for freshwater management units.

Where freshwater bodies do not meet limits, councils are required to adopt targets and methods to achieve the limits over time. Importantly, the NPS-FM also requires the integrated management of land use, development and freshwater; and involvement of iwi and hapu in decision making.

There is a draft NPS-FM that is proposed as a full replacement of the NPS-FM 2014 (as amended 2017). It is part of a package of proposed freshwater regulations set out in "Action for healthy waterways: a discussion document on national direction for our essential freshwater". A greater level of direction is proposed in the Draft NPS-FM including a proposal that policy statements and plans include a provision to ensure that, when considering an application for a consent, adverse effects on any stream are managed by applying the effects management hierarchy and to ensure that the infilling of river or stream beds is avoided, unless there are no other practicable alternative methods of providing for the activity.

The objectives and policies from the NPS-FM 2014 that are considered relevant to stormwater management are included in Appendix C.

The NPS-UDC directs local authorities to provide sufficient development capacity in their resource management plans, supported by infrastructure, to meet demand for housing and business space. Development capacity refers to the amount of development allowed by zoning and regulations in plans that is supported by infrastructure. This development can be 'outwards' (on greenfield sites) and / or

² Consultation on the proposed NES Freshwater closed in October 2019.

'upwards' (by intensifying existing urban environments). The objectives and high-level policies of the policy statement apply to all local authorities. But some policies apply only to all local authorities that have part, or all, of either a medium-growth urban area or high-growth urban area within their district or region.

In 2019 the Government consulted on a proposed National Policy Statement for Urban Development (NPS-UD). The NPS-UD will replace the NPS-UDC. The new NPS-UD will build on many of the existing requirements for greater development capacity and will broaden its focus and add significant new content. Of relevance to stormwater, the draft includes an objective for long-term planning to integrate land use and infrastructure, for councils to engage with iwi and infrastructure providers.

The objectives and policies from the NPS-UDC that are considered relevant to stormwater management are included in Appendix C.

The NZCPS provides direction for managing the effects of land use and discharges on the coastal environment. It seeks to maintain or improve coastal water quality where it is having significant adverse effects on ecosystems and habitats or on existing uses. It specifically identifies a range of mechanisms to manage discharges into freshwater and sedimentation, including reducing contaminant loads and stormwater flows at source through design and controls on land use activities. In addition, it requires councils to provide for the integrated management of natural and physical resources and the management of land use activities.

The objectives and policies from the NZCPS that are considered relevant to stormwater management are included in Appendix C.

4.2.4 Other Matters

The LGA mandates territorial local authorities (TLAs) to meet the current and future needs of communities for good quality local infrastructure, including stormwater network services. It requires Councils to prepare a Long Term Plan (LTP) and an Infrastructure Strategy that embody what stormwater services will be provided and how stormwater assets will be managed. A Stormwater Activity Management Plan (AMP) provides among other details, specific operational information on levels of service, capital works, operating and maintenance costs. The Infrastructure Strategy and AMP are developed as part of the LTP process. The LGA also empowers TLAs to make and enforce stormwater bylaws for the purpose of managing land drainage.

Other documents such as Iwi Management Plans and non-statutory strategies also provide context and advice on stormwater management. Iwi / hapū management plans are planning documents that are:

- Recognised by an iwi authority
- Relevant to the resource management issues of the region / district / rohe
- Lodged with the relevant local authority.

They must be considered when preparing or changing regional policy statements and regional and district plans.

Figure 4-1 shows the LGA and the RMA as the two central pieces of legislation governing stormwater management. Radiated from the central points are specific plans and policies that give effect to the legislation at the regional / local level.



Figure 4-1: The Policy and Planning Framework (Source: Timaru District Stormwater Strategy). Note this is one Councils example of how matters are connected, and that Stormwater Strategies are not required documents.

4.3 Policy Approach

A management approach that is hierarchical is recommended so that the primary focus is on reducing and minimising the generation of adverse effects with remedying and mitigation as avenues available in certain circumstances but subject to clear conditions / standards. This includes a comprehensive WSD design approach. While there are some overlaps in this approach between regional and district plans, the key components are in Table 4-1³ while Table 4-2 provides a high level summary of stormwater good management practices based on regional and territorial authority responsibilities.

Implementing this approach within a policy framework also requires a focus on:

- Using intensification and managing redevelopment as an opportunity to incrementally reduce existing adverse effects through on-site control of stormwater contaminants and flows, land use planning, sustainable development, restoration of natural systems, and appropriate infrastructure capital works solutions
- Focusing on existing stormwater management issues such as network capacity, aging infrastructure, flooding, stormwater quality and stream, ecological and natural values in areas identified as priorities for intensification.

Table 4-1: Recommended management approach

Manag	ement Approach	Implementation	
Water sensitive design	Avoid development in most sensitive or high value areas	Direct location of new growth areas - provides mechanism for avoiding areas where development may not be appropriate due to likely effects on valued freshwater environments	
	Avoid / minimise generation of stormwater effects	Manage design / layout of development, incorporation of natural elements so that development delivers WSD and quality infrastructure along with minimising the creation of new adverse effects	
	Targeted minimisation of adverse effects	Mange at source / on-site flow and quality management devices	
	Broad scale minimisation of adverse effects	Communal / sub-catchment scale mitigation	
Mitigation	Direct mitigation of adverse effects	Local mitigation of receiving environments	
	Indirect / off set mitigation of adverse effects	Wider mitigation / enhancement of receiving environments	

³ Auckland Council, Urban stormwater – section 32 evaluation for the Proposed Auckland Unitary Plan

Regional Policy Statement	Regional Plans	District Plans
 Integration of the management of the natural and physical resources of the region – taking a whole of catchment approach from the mountain to the sea Establish a management framework for freshwater and coastal environments Manage land to support cultural, freshwater and coastal values Identify the outstanding, valuable sensitive waterbodies and receiving environments – include schedules, maps Set objectives and policies for water bodies and receiving environments Set the framework for management of natural hazard risk⁴ 	 Identify the outstanding, valuable sensitive waterbodies and receiving environments – include schedules, maps Set measurable objectives and policies for water quality, flows and water levels, and aquatic habitat appropriate to the management purposes identified Include the effects management hierarchy for stream piping, reclamation and filling Discharge rules and standards Water take, use damming & diversion rules Reduce the risk of and effects from natural hazards, including those arising from climate change 	 Integration between regional and territorial authorities on the management of land use - land use controls in regional and district plans need to be integrated to achieve water quality, quantity and habitat outcomes Subdivision and Development - stormwater controls fall within the ambit of Council's functions where it is clear the stormwater effects being managed, are a result of, or are directly linked to, a land use activity Managing stormwater before it enters a Council reticulated network where directly linked to the regulation of a land use activity, eg. requirements relating to attenuation and treatment of stormwater before it enters the council reticulated network Control redevelopment of a site where there are no existing use rights and when the land use is changing Set out how risks are to be managed including from stormwater flooding and climate change Set objectives and policies, and methods to avoid inappropriate new subdivision, use and development

Table 4-2: High level overview of stormwater good management practices based on regional and territorial authority responsibilities

⁴ Regional Council and district and city councils share responsibility for writing objectives, policies and other methods for the control of the use of land (other than in the coastal marine area and the beds of lakes and rivers) for the avoidance or mitigation of natural hazards

4.4 Regional Policy Statement Provisions- Exemplars

Regional Policy Statements (RPS) provide an overview of the resource management issues of the region, and policies and methods to achieve integrated management of the natural and physical resources. They set the overall strategic direction for the region, while the regional plans and coastal plans incorporate more specific policy provisions and methods for stormwater discharge consents. District plans are required to give effect to RPS and regional plans. The RPS should generally seek to:

- Identify the high value / sensitive coastal areas and freshwater bodies and receiving environments (this can be done using schedules) and cultural values
- Integrate development and freshwater and coastal systems (including stormwater)
- Establish a management framework for freshwater and coastal waters
- Provide for regionally significant infrastructure.

Provisions for RPS to advance good management practices are provided in Table 4-3.

Aspect **Objective / Policy Provisions** Examples Cultural values Protect the mauri of natural systems The mauri of water, land, and [...] resources is safeguarded and where it is degraded, where appropriate, it is enhanced Tangata whenua / māna Enable tangata whenua / māna whenua to maintain over time. whenua involvement and enhance their traditional relationship with the natural environment When [preparing a change, variation or review of a district or regional plan, the following matters shall be recognised Manage adverse effects on cultural values and provided for: / considering proposals] that may Consideration for cultural values, including the effect adversely affect any matter of significance to Māori of stormwater on mahinga kai and ngā momo wai recognise and provide for avoiding, remedying or (types of water, specifically mixing of waters and the mitigating adverse effects on: impact of 'uncleansed' stormwater discharges to (a) the exercise of kaitiakitanga; natural waterways) (b) mauri, particularly in relation to fresh and coastal waters; (c) mahinga kai and areas of natural resources used for customary purposes; (d) places, sites and areas with significant spiritual or cultural historic heritage value to tangata whenua.

Table 4-3: Regional Policy Statement provisions to advance good management practices

Aspect	Objective / Policy Provisions	Examples
		The mauri of, and the relationship of Mana Whenua with, natural and physical resources including freshwater, land, coastal resources, and are enhanced overall.
		To enhance involvement of tangata whenua in resource management decision-making by improving opportunities for iwi authority representatives to participate in local authority decision-making.
		Mana Whenua values, mātauranga and tikanga are properly reflected and accorded sufficient weight in resource management decision-making.
		Ensure iwi and hapū resource management plans are taken into account in resource management decision making processes.
Integrate the management	Ensure that significant development and	Take a whole of catchment approach that recognises the
of subdivision, use and development and freshwater systems	redevelopment is accompanied by integrated water and land use planning as the development provides the opportunity to minimise adverse effects and reduce existing effects	inter-relationship between land and water, and support environmental enhancement initiatives to restore and enhance:
		(a) coastal features, ecosystems and habitats;
	Future planning is done to predict future demand	(b) aquatic ecosystems and habitats;
	Require regional and district plans to adopt a catchment based approach and specifically ensure catchment management plans form part of any structure planning process	(c) indigenous ecosystems and habitats.
		Integrate the management of subdivision, use and development and freshwater systems by:
		(a) ensuring water supply, stormwater and wastewater
	Progressively reduce existing adverse effects where those systems or waters are degraded	growth or intensification;
	Avoid development where adverse effects on	(b) ensuring catchment management plans form part of the structure planning process;
	mitigated	(c) controlling the use of land and discharges to minimise the adverse effects of runoff on freshwater systems and progressively reduce existing adverse effects where those systems or water are degraded;

Aspect	Objective / Policy Provisions	Examples
	Require territorial authorities to manage the effects of subdivision, use and development (including redevelopment) by:	(d) avoiding development where it will significantly increase adverse effects on freshwater systems, unless these adverse effects can be adequately mitigated.
	 Require territorial authorities to manage the effects of subdivision, use and development (including redevelopment) by: Promoting best practice stormwater management for urban areas, including the need for stormwater catchment plans for greenfield development Managing contaminant loadings (including sediment) entering stormwater networks District plan zoning for new urban development (and redevelopment) and subdivision consent decisions to be supported by information which identifies how stormwater will be managed having regard to a whole of catchment management approach and WSD. 	 (d) avoiding development where it will significantly increase adverse effects on freshwater systems, unless these adverse effects can be adequately mitigated. When assessing the effect of subdivision, use and development on [values / environment] particular regard shall be given to: (a) <i>Include schedule of areas</i> When considering [an application for a resource consent, notice of requirement, or a change, variation or review of a district plan], the adverse effects of stormwater run-off from subdivision and development shall be reduced by having particular regard to: (a) limiting the area of new impervious surfaces in the stormwater catchment; (b) using water permeable surfaces to reduce the volume of stormwater leaving a site; (c) restricting zinc or copper roofing materials, or requiring their effects to be mitigated; (d) collecting water from roofs for domestic or garden use while protecting public health; (e) using soakpits for the disposal of stormwater; (f) using in situ treatment devices; (i) using in situ treatment devices;
		the velocity and quantity of stormwater discharges; and (j) using educational signs, as conditions on resource consents, that promote the values of water bodies and methods to protect them from the effects of stormwater discharges.

Aspect	Objective / Policy Provisions	Examples
Water Quality (fresh and marine waters)	Control the use of land and discharges to minimise the adverse effects of runoff on freshwater systems	Regional plans shall include policies, rules and/or methods that:
	 Manage stormwater by: Minimising the generation and discharge of contaminants Minimising adverse effects on freshwater and coastal water Managing the capacity of stormwater 	 (a) require that water quality, flows and water levels, and the habitat of [surface water bodies / coastal] are to be managed for the purpose of safeguarding ecosystem health; and (b) manage water bodies for other purposes identified in regional plans.
networks	networks	Regional plans shall include policies, rules and/or methods that protect aquatic ecosystem health by minimising ecotoxic and other contaminants in stormwater that discharges into water, or onto or into land that may enter water, from new subdivision and development. Regional plans shall include policies, rules and/or methods
		that: (a) promote the retention of in-stream habitat diversity by
		retaining natural features;
		(b) promote the retention of natural flow regimes
		habitat;
		(d) discourage the reclamation, piping, straightening or concrete lining of rivers
		Regional plans shall include policies, rules and/or methods that maintain or enhance the [eg. cultural, recreational] values of rivers and lakes, including those with significant values listed in Schedule [].
		Manage adverse effects, including cumulative effects, from land based activities in the [] environment on water quality by:

Aspect	Objective / Policy Provisions	Examples
		(a) Requiring that subdivision, use and development does not result in a significant contribution to sedimentation in the coastal marine area or water bodies;
		(b) Minimising the creation of impervious surface areas;
		(c) Minimising contaminants in stormwater that discharges into water or on to land that may enter water, including discharges to existing and new stormwater infrastructure;
		(d) Adopting water-sensitive design and management principles;
		(e) Adopting on-site management techniques that will improve the quality of stormwater and/or wastewater prior to discharge.
		Manage stormwater by:
		(a) requiring subdivision, use and development to:
		(i) minimise the generation and discharge of contaminants; and
		(ii) minimise adverse effects on freshwater and coastal water and the capacity of the stormwater network;
		(b) controlling the diversion and discharge of stormwater outside of areas serviced by a public stormwater network.
Regional significant infrastructure	Enable the development, operation, maintenance and upgrading of infrastructure while managing adverse effects on the quality of the environment	District and regional plans shall include policies and rules that protect regionally significant infrastructure from incompatible new subdivision, use and development occurring under, over, or adjacent to the infrastructure.
Natural hazards / Climate change	Regional and district plans shall, recognise and provide for the projected effects of climate change	Regional and district plans shall: (a) identify areas at high risk from natural hazards; and (b) include polices and rules to avoid inappropriate subdivision and development in those areas.
		Identify natural hazards and the locations where those natural hazards could affect people, property and lifeline

Aspect	Objective / Policy Provisions	Examples
		utilities by mapping hazard susceptibility areas for [<i>list appropriate types of natural hazards</i>].
		When considering [], the risk and consequences of natural hazards on people, communities, their property and infrastructure shall be minimised, and/or in determining whether an activity is inappropriate particular regard shall be given to:
		(a) the frequency and magnitude of the range of natural hazards that may adversely affect the proposal or development, including residual risk;
		(b) the potential for climate change and sea level rise to increase the frequency or magnitude of a hazard event;
		(c) avoiding inappropriate subdivision and development in areas at high risk from natural hazards.
		Incorporate the effects of climate change in natural hazard risk assessment.

4.5 Regional Plans - Exemplars

Regional plans and regional coastal plans contain the regulatory and non-regulatory provisions for managing activities such as damming and diverting water, structures in the coastal marine area and beds of lakes and rivers, earthworks and vegetation clearance, disturbance of the common and coastal marine area and beds of lakes and rivers and discharges to fresh water and coastal water. These activities often occur as part of urban development and stormwater management.

Regional plans should generally seek to:

- Work in partnership with māna whenua and the community
- Manage resources in a coordinated way, ie. through integrated catchment management which as a first step requires identification of values and associated outcomes at the catchment scale
- Manage natural hazards
- Water quality: detail how freshwater is to be managed including the values and quality of discharges this involves the setting of measurable quantity and quality limits

- Set an effects management hierarchy
- Provide for regionally significant infrastructure.

Some regional plans include specific provisions to manage adverse effects of stormwater discharges through reticulated network consents. Reticulated network consents are typically held by territorial authorities with stormwater management plans as the key method to manage the stormwater system including the quality of discharges. Exemplars for reticulated network consents have not been provided below as a separate Ministry project are considering these.

Note that while rules are not provided here, regional rules apply to existing activities once the plan becomes operative unlike district rules where they have existing use rights. This means there is the ability to require existing developments to be upgraded (eg. address stormwater quality) even when they are not redeveloping.

Provisions for regional plans to advance good management practices are provided in Table 4-4.

Table 4-4: Regional Plan and Coastal Plan provisions to advance good management practices

Aspect	Objective / Policy Provisions	Examples
Cultural values Tangata whenua / māna	Air, land, fresh water bodies and the coastal marine area are managed as integrated and connected resources; ki uta ki tai - mountains to the sea.	Land and water are managed as integrated natural resources to recognise and enable culture, traditions, customary uses and relationships with land and water.
whenda myölverhent	Protect the mauri of freshwater and coastal waters	The mauri of freshwater is maintained or progressively
	Enable tangata whenua to maintain and enhance their traditional relationship with the natural environment -	improved over time to enable traditional and cultural use of this resource by Mana Whenua.
	customary use, mahinga kai, protecting sites	Kaitiakitanga is recognised and mana whenua actively
	Manage adverse effects on cultural values	participate in planning and decision-making in relation
	Consideration for cultural values, including the effect of stormwater on mahinga kai and ngā momo wai (types of	physical resources.

Aspect	Objective / Policy Provisions	Examples
	water, specifically mixing of waters and the impact of 'uncleansed' stormwater discharges to natural waterways)	
	Use of maps and/or schedules to identify values associated with freshwater bodies and coastal waters in the region	
Integrated catchment management	Use regional land use controls for both development and redevelopment - New land use generated by growth and development and the associated local, regional, and national infrastructure to service that growth should be integrated and planned alongside one another to avoid either constraints being imposed on necessary growth and development by the lack of supporting infrastructure to avoid unsustainable demands being placed on infrastructure to meet new growth Ensure that development and redevelopment is accompanied by integrated water and land use planning as this development provides the opportunity to minimise adverse effects and reduce existing effects Integration of stormwater at catchment level and of stormwater networks where appropriate	 Water management applies the ethic of ki uta ki tai – from the mountains to the sea – and land and water are managed as integrated natural resources recognising the connectivity between surface water and groundwater, and between fresh water, land and the coast. Freshwater, and land use and development shall be managed, in catchments in an integrated and sustainable way to avoid, remedy, or mitigate adverse effects, including cumulative effects. Land, and water resources fresh water bodies and the coastal marine area will be managed recognising ki uta ki tai by using the principles of integrated catchment management. These principles include: (a) decision-making using the catchment as the spatial unit, (b) applying an adaptive management approach to take into account the dynamic nature and processes of catchments, (c) coordinated management, with decisions based on best available information and improvements in technology and science, (d) taking into account the connected nature of resources and natural processes within a catchment,

Aspect	Objective / Policy Provisions	Examples
		(e) recognising links between environmental, social, cultural and economic sustainability of the catchment.
Water quality (fresh and marine waters) Stormwater quality/volume management	Use of maps and/or schedules to identify values associated with freshwater bodies and coastal waters in the region	Discharges of contaminants to land and water or land will be minimised by adopting the following hierarchy: (a) avoiding the production of the contaminant;
	Identify key values of water bodies and coastal waters. Set measurable objectives and water quality and quantity limits	(b) reducing the volume amount of contaminants, including by reusing, recovering or recycling the contaminants;
	Adopt a hierarchical approach to managing adverse	(c) minimising the volume or amount of the discharge;
	 At source management: avoid effects through design and elimination of sources 	(d) discharging to land is promoted over discharging direct to water, including using land-based treatment, constructed wetlands or other system;
	 Manage/minimise: reduce adverse water quality and water quantity effects of discharges on receiving environments Mitigation: receiving environment mitigation recognising individual circumstances to be achieve through good management practice, implementing WSD, progressively improving existing infrastructure 	(e) In the case of surface water, results in a discharge that after reasonable mixing meets the receiving water standards in Schedule X or does not result in any further degradation in water quality in any receiving surface waterbody that does not meet the water quality standards in Schedule X.
		The adverse effects of stormwater discharges shall be minimised, including by:
	Adopt sustainable design approaches such as the incorporation of green infrastructure	Avoid as far as practicable, or otherwise minimise or mitigate, adverse effects of stormwater runoff from
	Improve the adverse quality and quantity effects of existing stormwater discharges over time	coastal water by
	Include treatment performance / water quality requirements for a range of contaminants, not just total suspended solids	(a) taking an integrated stormwater management approach;
		(b) using good management practice;
	Address cumulative effects across a catchment	(c) taking a source control and treatment train approach to new activities and land uses;
		(d) minimising or mitigating changes in hydrology, including loss of infiltration;

Aspect	Objective / Policy Provisions	Examples
		(e) implementing water sensitive urban design in new subdivision and development;
		(f) progressively improving existing stormwater, wastewater, road and other public infrastructure, including during routine maintenance and upgrade.
		Minimise or mitigate new adverse effects of stormwater runoff, and where practicable progressively reduce existing adverse effects of stormwater runoff, on freshwater systems, freshwater and coastal waters during intensification and redevelopment of existing urban areas by all of the following:
		(a) requiring measures to reduce contaminants,
		(b) requiring measures to reduce the discharge of gross stormwater pollutants;
		(c) requiring measures to be adopted to reduce the peak flow rate and the volume of stormwater flows;
		(d) taking an integrated stormwater management approach for large-scale and comprehensive redevelopment and intensification and encourage the restoration of freshwater systems where practicable;
		(e) ensuring intensification is supported by appropriate stormwater infrastructure, including natural assets that are utilised for stormwater conveyance and overland flow paths.
		The adverse quality and quantity effects of stormwater discharges from the stormwater networks and urban land uses are improved over time.
Managing land use impacts	Manage the stormwater volume not just peak flows Avoid or minimise scour and erosion of stream beds, banks and coastal margins	Land use, subdivision and development, including stormwater discharges, shall be managed so that runoff volumes and peak flows:

Aspect	Objective / Policy Provisions	Examples
	Do not increase or cause new or exacerbate existing risk to human health or safety, or increase or exacerbate the risk of inundation, erosion or damage to property or infrastructure	(a) avoid or minimise scour and erosion of stream beds, banks and coastal margins;
		(b) do not increase cause new or exacerbate existing risk to human health or safety, or increase exacerbate the risk of inundation, erosion or damage to property or infrastructure;
		including by retaining, as far as practicable, pre- development hydrological conditions hydrographs and overland flow paths in new subdivision and development.
Natural hazards / Climate change	Regard shall be given to the potential for climate change to threaten biodiversity, aquatic ecosystem health and mahinga kai, or to cause or exacerbate natural hazard events that could affect use and development - this includes stormwater	Particular regard shall be given to the potential for climate change to threaten biodiversity, aquatic ecosystem health and mahinga kai, or to cause or exacerbate natural hazard events over at least the next 100 years that could adversely affect use and development including:
		(a) coastal erosion and inundation (storm surge);
		(b) river and lake flooding and erosion, or aggradation, decreased minimum flows;
		(c) stormwater ponding and impeded drainage;
		(d) relative sea level rise, using the best available guidance reliable scientific data for the [] Region.
		Stormwater run-off volumes and peak flows are managed so that they do not cause or exacerbate the risk of inundation, erosion or damage to property or infrastructure downstream or risks to human safety.
Networks	Provide for regionally significant infrastructure while following an effects management hierarchy Manage the stormwater network on a comprehensive basis whereby discharges from local authority	Stormwater networks are managed to protect public health and safety and to prevent or minimise adverse effects of contaminants on freshwater and coastal water quality.
	stormwater devices are aggregated on a catchment or	

Aspect	Objective / Policy Provisions	Examples
	sub-catchment basis and authorised via a single 'global' / network consent Avoid wastewater contamination of stormwater from new wastewater networks or connections and	Any reticulated stormwater system for any urban area is managed in accordance with a stormwater management plan that addresses the following matters:
	progressively eliminate existing contamination	(a) the management of all discharges of stormwater into the stormwater system;
		(b) how any discharge of stormwater, treated or untreated, into water or onto land where it may enter water meets or will meet, the water quality outcomes and standards and limits for that waterbody set out in Table X, Schedule Y;
		(c) The management of the discharge of stormwater from sites involving the use, storage or disposal of hazardous substances;
		(d) Where the discharge is from an existing local authority network, demonstration of a commitment to progressively improve the quality of the discharge to meet condition (b) as soon as practicable but no later than [date].
Structures	Ensure discharge rates and volumes, and outlet structures are designed and managed to avoid, remedy or mitigate erosion and scour, natural values and amenity	When considering an application for a consent, adverse effects on any stream are managed by applying the effects management hierarchy. The construction or creation of new barriers to the passage of fish and koura species shall be avoided., except where this is required for the protection of indigenous fish and koura populations.

4.6 **District Plans - Exemplars**

Stormwater provisions are typically included across a number of chapters within district plans including:

- Infrastructure / Network Utilities
- Subdivision
- Land use zones
- Ecosystems and indigenous biodiversity, landscape, landforms and natural character
- Natural hazards

A clear link between sections of the plan that address the relevant provisions is required.

Most councils have a set or code of standards for development covering matters such as servicing and infrastructure standards. There is a critical role for these 'Code of Practice for Development and Subdivision codes'⁵. In addition, councils manage the acceptance of stormwater into their reticulated networks through stormwater bylaws and any network discharge consent they may hold from the regional council.

Provisions that may be useful to district councils for advancing good management practices in district plans are outlined in Table 4-5. The provisions are focused on the end development as opposed to construction related matters. Note structure plans and outline development plans are not considered in the examples below.

Table 4-5: District Plan pr	rovisions to advance good	l management practices
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Aspect	Objective / Policy Provisions	Examples
Cultural values Tangata whenua / māna whenua involvement	Protect the mauri of natural systems Enable tangata whenua to maintain and enhance their traditional relationship with the natural environment Manage adverse effects on cultural values Consideration for cultural values, including the effect of stormwater on mahinga kai and ngā momo wai (types of water, specifically mixing of waters and the impact of 'uncleansed' stormwater discharges to natural waterways)	Tangata whenua are able to exercise their customary responsibilities as mana whenua and kaitiaki in the protection and management of the natural environment. [] cultural values, including as to natural character, associated with water bodies, repo / wetlands, waipuna / springs and the coastal environment of the district are maintained or enhanced as part of the future development of the District - Ki Uta Ki Tai (from the mountains to the sea). Ensure that subdivision of a site that includes a significant natural feature or a feature of cultural significance includes measures to protect it from potential adverse effects of the future development of the land.

⁵ These have slightly different names depending on the Council but generally include subdivision and development principles and requirements. Some

District Plans also require developments to occur in accordance with green infrastructure guidelines like the Water Sensitive Design for Stormwater known as GDO4 in Auckland.

Aspect	Objective / Policy Provisions	Examples
		Avoid activities that will adversely affect sites of importance to tangata whenua.
		To recognise, and provide for, the Kaitiaki responsibilities of Tangata Whenua.
		Take account of the guarantee of rangitiratanga and its relationship with kawanatanga in resource management planning.
Infrastructure	Infrastructure is planned to service proposed subdivision and development and to connect with the wider infrastructure network in an integrated, efficient, coordinated and future- proofed manner	Subdivision, use and development will be avoided in areas where it: (a) is unable to be efficiently integrated with existing infrastructure, or be serviced by new infrastructure in an efficient and cost-effective manner.
Subdivision and Development	 Ensure that development and redevelopment is accompanied by integrated water and land use planning as this development provides the opportunity to minimise adverse effects and reduce existing effects Require efficient and sustainable stormwater control and disposal systems to be designed and installed at the time of subdivision / development covering: Reference to any approved stormwater discharge consent or network discharge consent WSD principles in accordance with Council's Development / Subdivision Standard⁶ Application of an integrated stormwater management approach to the planning and design of the development Protection of natural streams and maintaining the conveyance function of overland flow paths 	Subdivision is designed to avoid, remedy or mitigate adverse effects on the environment and occurs in a sequenced and coherent manner that: (a) responds positively to the site's physical characteristics and context; (b) is accessible, connected and integrated with the surrounding neighbourhoods; (c) contributes to the local character and sense of place (d) recognises the value of natural systems in sustainable stormwater management and water sensitive design; and (e) protects or enhances natural features and landforms, waterbodies, indigenous vegetation, historic heritage, sites of significance to tangata whenua, and/or identified features;

⁶ Guidance as to the range of tools to be used to achieve a WSD approach and outcomes during greenfield planning and subdivision provided by way of guidance and technical documents allows flexibility

 Maintain, or progressively improve, water quality Utilisation of stormwater management areas for multiple uses Mitigate the effects of development on-site Avoid any increase in sediment and/or contaminants entering waterbodies or downstream effects as a result of stormwater disposal (a) incorporates water sensitive and low impact design principles, that are sufficient for the amount and rate of anticipated runoff, in accordance with Council's <i>Understanding</i> (b) mitigates the effects of development on-site entering waterbodies or downstream effects as a result of stormwater disposal (a) incorporates water sensitive and low impact design principles, that are sufficient for the amount and rate of anticipated runoff, in accordance with Council's <i>Development and Subdivision Infrastructure</i> <i>Standard/Code</i>]. (b) mitigates the effects of development on-site using stormwater management areas to avoid inundation within the subdivision or on adjoining land, especially if sufficient infrastructure capacity is not available: (c) where feasible, utilises stormwater management areas for multiple uses, while ensuring they have a high quality interface with residential activities or commercial activities; (d) avoids and increase in sediment and/or contaminants entering waterbodies of dospose of stormwater disposal; (e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate maturanga Maori principles into the disposal method. Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a) 	Aspect	Objective / Policy Provisions	Examples
 Mitigate the effects of development on-site Avoid any increase in sediment and/or contaminants entering waterbodies or downstream effects as a result of stormwater disposal Require efficient and sustainable stormwater control and disposal systems to be designed and installed at the time of subdivision that: (a) incorporates water sensitive and low impact design principles, that are sufficient for the amount and rate of anticipated runoff, in accordance with Council's [Development and Subdivision Infrastructure Standard/Code]. (b) mitigates the effects of development on-site using stormwater management areas to avoid inundation within the subdivision or on adjoining land, especially if sufficient infrastructure capacity is not available; (c) where feasible, utilises stormwater management areas for multiple uses, while ensuring they have a high quality interface with residential activities or commercial activities; (d) avoids and increase in sediment and/or contaminants entering waterbodies or downstream effects as a result of stormwater disposal; (e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate måtauranga Māori principies into the disposal method. Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a) _ 		 Maintain, or progressively improve, water quality Utilisation of stormwater management areas for multiple uses 	(f) provides accessible and well-designed open space areas for various forms of recreation, including sport and active recreation, for the health and wellbeing of communities.
of stormwater disposal (a) incorporates water sensitive and low impact design principles, that are sufficient for the amount and rate of anticipated runoff, in accordance with Council's [Development and Subdivision Infrastructure Standard/Code]. (b) mitigates the effects of development on-site using stormwater management areas to avoid inundation within the subdivision or on adjoining land, especially if sufficient infrastructure capacity is not available; (c) where feasible, utilises stormwater management areas to avoid inundation within the subdivision or on adjoining land, especially if sufficient infrastructure capacity is not available; (d) avoids and increase in sediment and/or contaminants entering waterbodies or downstream effects as a result of stormwater disposal; (e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate matauranga Maori principles into the disposal method. Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by:		 Mitigate the effects of development on-site Avoid any increase in sediment and/or contaminants entering waterbodies or downstream effects as a result 	Require efficient and sustainable stormwater control and disposal systems to be designed and installed at the time of subdivision that:
 (b) mitigates the effects of development on-site using stormwater management areas to avoid inundation within the subdivision or on adjoining land, especially if sufficient infrastructure capacity is not available; (c) where feasible, utilises stormwater management areas for multiple uses, while ensuring they have a high quality interface with residential activities or commercial activities; (d) avoids and increase in sediment and/or contaminants entering waterobodies or downstream effects as a result of stormwater disposal; (e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate mātauranga Māori principles into the disposal method. Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a) 		of stormwater disposal	(a) incorporates water sensitive and low impact design principles, that are sufficient for the amount and rate of anticipated runoff, in accordance with Council's [Development and Subdivision Infrastructure Standard/Code].
 (c) where feasible, utilises stormwater management areas for multiple uses, while ensuring they have a high quality interface with residential activities or commercial activities; (d) avoids and increase in sediment and/or contaminants entering waterbodies or downstream effects as a result of stormwater disposal; (e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate mātauranga Māori principles into the disposal method. Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a) 			(b) mitigates the effects of development on-site using stormwater management areas to avoid inundation within the subdivision or on adjoining land, especially if sufficient infrastructure capacity is not available;
 (d) avoids and increase in sediment and/or contaminants entering waterbodies or downstream effects as a result of stormwater disposal; (e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate mātauranga Māori principles into the disposal method. Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a) 			(c) where feasible, utilises stormwater management areas for multiple uses, while ensuring they have a high quality interface with residential activities or commercial activities;
 (e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate mātauranga Māori principles into the disposal method. Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a) 			(d) avoids and increase in sediment and/or contaminants entering waterbodies or downstream effects as a result of stormwater disposal;
Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a)			(e) considers the outcomes of any consultation with tangata whenua where it is proposed to dispose of stormwater to a waterbody that has cultural, spiritual and/or historic values and interests or associations of importance to tangata whenua, including with respect to mitigation measures and opportunities to incorporate mātauranga Māori principles into the disposal method.
			Require greenfield subdivision design and layout to respond positively to and be integrated with the surrounding context, including by: (a)

Aspect	Objective / Policy Provisions	Examples
		(b) promoting sustainable stormwater management through water sensitive design solutions
		The adverse effects of stormwater runoff from subdivision and development, in particular cumulative effects, will be minimised. The following assessment criteria will be applied when considering resource consent applications for subdivision and development:
		(a) whether there is capacity in Council's existing infrastructure;
		(b) the extent to which the capacity and environmental values of watercourses or drains and the associated catchment areas will be compromised;
		(c) the extent to which development styles and stormwater management methods mimic natural, pre-development runoff patterns;
		(d) the extent to which riparian vegetation is protected and enhanced;
		(e) whether minimal vegetation loss in riparian areas associated with development is achieved;
		(f) the extent to which water quality is ensured to enhance and maintain aquatic ecosystem health;
		(g) the extent to which a healthy aquatic system is maintained, including maintenance of sufficient flows and avoidance of unnatural fluctuations in flows;
		(h) the extent to which degraded, piped or channelled streams are restored and realigned into a more natural pattern;
		(i) where practicable, the extent to which low impact design, including onsite disposal of stormwater, soft engineering or bioengineering solutions and swales within the legal road are used;

Aspect	Objective / Policy Provisions	Examples
		(j) the extent to which straightening and piping of streams is avoided; and
		(k) the extent to which the adverse effects of stormwater runoff, in particular cumulative effects, from subdivision and development will be minimised.
		Manage subdivision so that the natural landform and important landscape features such as:
		Stream, river, wetland and lake margins
		Significant landscapes and landforms
		Cultural and heritage features
		are protected, or sensitively incorporated into future subdivision design and future land use activities.
Stormwater flow and volume control	 Require stormwater hydrology mitigation where there are: New impervious areas Redeveloped impervious areas, or Entire sites where the area of development or redevelopment comprises more than [a set percent] of the site area Recognise that there may be limitations to the hydrology mitigation that can practicably be achieved in some circumstances, for example, space limitations Performance standards would then be set for permitted activities with different levels of non-compliance with standards as controlled and restricted discretionary activities or reference made to the requirements in design guides/codes 	Subdivision and development will be designed to ensure that the stormwater runoff from all new impermeable surfaces will be disposed of or stored on-site and released at a rate that does not exceed the peak stormwater runoff when compared to the pre-development situation. Subdivision and development within urban areas do not to increase flood risk from stormwater through hydraulic neutrality.
Stormwater treatment	Size and design in accordance with guidelines/codes	These components are more suited to activity / performance standards within development rules as opposed to objectives and policies
Overland flow path management	Be designed to incorporate overland flow paths on the site	

Aspect	Objective / Policy Provisions	Examples
	Development shall not obstruct overland and secondary flow paths	
Natural hazards	paths New subdivision / development should be avoided in areas where the risks from natural hazards to people, property and infrastructure are unacceptable and in all other undertaken in a manner the ensure the risks are appropriately mitigated	Avoid new subdivision, use and development, including new urban zonings, where the risk from a natural hazard is assessed as being unacceptable. Ensure that subdivision, use and development (including proposals for hazard mitigation works or hazard removal) do not transfer or create unacceptable natural hazard risk to other people, property, infrastructure or the natural environment. Manage significant risks from natural hazards by restricting subdivision that: (a) creates new or exacerbates existing natural hazards including coastal hazards, erosion, slippage, subsidence, falling debris or flooding; or (b) results in adverse effects on the stability of land and buildings; and (c) does not provide safe, flood free and stable building platforms at the time of subdivision. Support an adaptive pathway planning approach to managing the risks from natural hazards, including: (a) identification of the risks and consequences under a range of climate change scenarios; (b) identification of a range of viable adaptation options; and (c) development of adaptive pathways, with trigger points,

4.7 Non-Regulatory Approaches

Good management practices require a collaborative and co-ordinated approach. For developers, financial incentives are also an important driver for those seeking a return on investment.

Non-regulatory approaches that should be considered are:

- Skills and knowledge: 'Advisory panels' to support applicants with WSD approaches during concept design; provide guidelines
- Collaboration and advocacy: Provide education; facilitate information sharing between applicants and regulators, develop networks to share information; and within Councils have organisational structures for collaborative policy development and asset planning
- Incentives: Specific consent processes for applications that include WSD eg. consent fast tracking, incentives for green infrastructure like tax reductions, rebates, or reductions / increases in Development Contributions
- Funding: Translate regional policies into Long Term Plan funding, eg. WSD grants programme for qualifying projects.

5 Barriers

5.1 Introduction

Understanding the strategic and institutional barriers to good stormwater management practices is critical to the successful implementation of the Urban Water Principles.

The content of this section is based primarily on the findings of a project funded by the Building Better Homes Towns and Cities National Science Challenge, 'Activating Water Sensitive Urban Design (WSD) for healthy, resilient communities' (Activating WSD). The project aims to deliver research and enhance capability to address critical current barriers to the uptake of WSD in New Zealand. It is the most comprehensive piece of work completed in New Zealand to date addressing the barriers to the successful implementation of good stormwater management practices. Although, there have been overseas experiences, the focus taken in this report has been on New Zealand to ensure a local flavour.

The Discovery Phase Report⁷ identified fifteen themes which relate to either the broad category of 'WSD value case' or 'WSD implementation' as follows:

WSD value case themes:

- 1 Knowledge of WSD concepts, vision and benefits
- 2 Precedents / evidence of WSD performance and outcomes
- 3 Economics
- 4 Innovation stance
- 5 Māori cultural benefits
- 6 Social, health and environmental co-benefits
- 7 Political will / social licence

WSD implementation themes:

- 8 Regulation, policy, planning, consenting and compliance
- 9 Design and construction
- 10 Maintenance
- 11 Project lifecycle
- 12 Funding and incentives
- 13 Organisational culture
- 14 Capacity, training and guidelines
- 15 Competing mandates

The report notes that the 15 themes are not all mutually exclusive; many of them are closely linked and / or have a degree of overlap. For example:

- Issues around maintenance of WSD devices can be related to cost considerations (linking themes 3 and 10)
- Issues around design can be related to a lack of guidance and local precedents (linking themes 2, 9 and 14)
- Issues around a reluctance to innovate can be related to organisational culture (linking themes 4 and 13).

The top three barrier themes most frequently referenced in the Activating WSD surveys and workshops (noting that only a small number of Maori practitioners, developers, landscape architects and roading engineers participated in the survey and workshops) were:

- Economics (theme 3)
- Regulation, policy, planning, consenting and compliance (theme 8)
- Capacity, training and guidelines (theme 14).

Communities - Discovery Phase: Results and Recommendations. Funded by the Building Better Homes, Towns and Cities National Science Challenge

 $^{^7}$ Moores, J., Batstone, C., Simcock, R. and Ira, S. (2018). Activating WSD for Healthy Resilient

5.2 Barriers

Using the 15 themes, Table 5-1 takes the barriers identified in the Discovery Phase Report along with additional commentary based on professional experience and review of the following documents:

- Feeney, C. and Lysnar, P. (2006). Roadblocks in the land development process and the uptake of low impact urban design and development. University of Auckland & Landcare Research Ltd LIUDD Research Programme
- Moores, J., Batstone, C., Simcock, R. and Ira, S. (2019). The 'More Than Water' WSD Assessment Tool, Activating WSD for Healthy Resilient Communities. Funded by the Building Better Homes, Towns and Cities National Science Challenge
- Olorunkiya, J., Fassman, E., & Wilkinson, S. (2010). Risk as a Fundamental Barrier to Adoption of Low Impact Design Technologies. Paper presented at The New Zealand Society for Sustainability Engineering and Science (NZSSES) -Transition to Sustainability, Auckland, New Zealand
- Southworth, V. (2019). Increasing the uptake of building-scale water sensitive urban design stormwater management options in Christchurch, New Zealand. A thesis submitted in fulfilment of the requirements for the Degree of Master of Water Resource Management at the University of Canterbury.

Theme	Barriers
1. Knowledge of WSD concepts, vision and benefits	 WSD concepts and wide-ranging benefits are not widely known among key groups that could be involved in its implementation, and across city communities in general There is a lack of clarity on what WSD is, including a misunderstanding that it is solely a set of stormwater treatment devices rather than a holistic design approach Lack of technical and hydrological catchment data to enable quantitative assessment of the hydrological benefits of WSD
2. Precedents / evidence of WSD performance and outcomes	 Lack of New Zealand / local examples of WSD delivering measurably better outcomes than conventional approaches No evidence from precedent implementation New Zealand exemplars Evidence not including information on costs, device performance and the full range of environmental, social and cultural benefits

Table 5-1: Barriers to the successful implementation of good stormwater management practices

Theme	Barriers			
3. Economics	 Perceived higher costs, lack of cost-benefit examples, lack of information and clear direction around maintenance costs Lack of reliable information on the full lifecycle costs of implementing WSD Knowledge gap in maintenance costs Lack of reliable methods and information for assessing the full range of direct and indirect benefits Cost and benefits not being assessed relative to those associated with conventional approaches Private property owners/developers do not want to bear the brunt of voluntary installation and maintenance that has marginal personal benefits. This is a barrier and makes it hard to motivate the uptake of WSD on private property as developers are led by the market demand Perceived reduction in lot yield and housing affordability 			
4. Innovation stance	 Institutional risk aversion to new methods Reluctance to implement WSD among all of the various sectors in the WSD value / supply chain (designers, local authority practitioners, developers) Lack of demonstration projects that can be used to progress knowledge and alleviate fear of failure and costs 			
5. Māori cultural benefits	 Business case failure to consider culturally-specific benefits of WSD The inclusion of cultural well-being as a WSD outcome tends to be tokenistic Lack of iwi resources to provide input and guidance on cultural issues 			
6. Social, health and environmental co-benefits	 Business case failure to consider amenity, health, climate adaptation and other co-benefits of WSD Omission of consideration of WSD's wider social, health and environmental benefits and the opportunity costs of failure to implement WSD 			
7. Political will / social licence	 Lack of political leadership and / or community-led demand mandating the adoption of new development approaches. 'Like for like' replacement of infrastructure still occurring A lack of leadership from central government. This means budgets for education and public awareness are limited A lack of cohesion / clarity in how regional and local governments enable and / or deliver WSD Fees can be politically sensitive, so options to charge stormwater fees are not favoured by councillors 			

Theme	Barriers
8. Regulation, policy, planning, consenting and compliance	 Ambiguity in regional and district plans, inflexible consenting processes preventing innovation Insufficient level of emphasis, transparency and consistency on WSD in council plans and consenting processes A lack of cohesion between regional and local government regulations The lack of clear policy direction and mandatory regulation to incorporate WSD into design including the use if building scale WSD Absence of mandatory national policy to the implementation of WSD in New Zealand. There needs to be mandatory national policy that leads the movement away from piping, and mandates retention and enhancement of streams/waterways⁸. A lack of WSD policies and programs at the local-scale with localised benefits to improve community support No inclusion of an obligation for developer contributions to improve the capacity of rivers in policy. A lack of understanding of the existing capacity of rivers is a barrier to implementing this Catchment management is not a widely utilised approach Fear of lengthening the process with a less understood method leading to taking the 'path of least resistance' from a planning and approvals point of view
9. Design and construction	 Poorly designed and built systems leading to substandard performance or inactivation or inevitable failure of WSD devices Lack of good examples of WSD design and construction as part of building the evidence base and building capacity Lack of design guidance that reflects the range of New Zealand's environments and both greenfield and brownfield settings and how to navigate challenging sites (e.g. high groundwater, poorly drained soils, steep slopes) A lack of design guidance that incorporates WSD into the design philosophy from the start of the design process Site owners / occupiers want tangible benefits from installation of stormwater devices. Devices that take up space are not perceived to offer benefits Fear of liability

⁸ Note: the government is proposing a new National Policy Statement for Freshwater and National Environment Standard for Freshwater that will address these matters

Theme	Barriers			
10. Maintenance	 Maintenance poorly understood and delivered including lack of compliance monitoring and asset rejuvenation Maintenance requirements are often poorly specified and hence appear as a burden, as a result of lack of a full lifecycle planning for WSD installations There is a paucity of reliable data on maintenance costs 			
11. Project lifecycle	 Poor integration / hand-over between design / construction / operations. Responsibility for asset ownership and management unclear and / or poorly delivered Lack of asset ownership resulting in device failure and a bad look for WSD 			
12. Funding and incentives	 Lack of funding and / or incentives leading to continued adoption of business-as-usual approaches for development and even more difficulty to implementing improvements / retrofitting A lack of regulatory or economic incentives promoting the uptake of WSD in New Zealand The implementation of WSD is held back by funding constraints, for instance for monitoring to enable WSD as unanticipated opportunities arise Disincentives such as charging stormwater fees are a labour-intensive data set to create and monitor, therefore expensive to instigate Technical capacity and funding can be an issue for smaller towns who are often trying to attract development but have issues over who pays for what 			
13. Organisational culture	 Poor collaboration between and within organisations, continuation of silo mentality in delivery of different functions WSD is hampered by jurisdictional issues between regional and local government Organisations fail to take an integrated, multi-disciplinary approach to WSD and can feature departments or individuals with entrenched (anti-WSD) perspectives on urban development and stormwater management Lack of WSD champions and support at the community level 			
14. Capacity, training and guidelines	 Lack of WSD expertise or education for upskilling relevant professions, including construction and maintenance contractors Limited capabilities and capacity of designers and engineers due to a lack of national training and certification schemes Key sectors in the WSD value chain, for instance council staff as well as construction and maintenance contractors, often lack the basic knowledge for successful implementation of WSD Lack of national definition, leadership and guidelines on WSD 			

Theme	Barriers
15. Competing mandates	 WSD trumped by infrastructural needs of other functions such as road safety and flood control Conflict with engineering code of practice requirements, particularly from a road design point of view Organisations often fail to take an integrated, multi-disciplinary approach to WSD Other considerations, both commercial (development yield) and public service (affordable housing, roading), often outweigh WSD

5.3 Policy and Consenting Perspective

Current RMA approaches support integrated planning, but there are no formal mechanisms to implement the outcomes in a co-ordinated way. The extent to which growth and redevelopment opportunities can be used to reduce the existing adverse effects of stormwater and associated environmental degradation is also limited by the current provisions of the legacy plans and statutory limitations (eg. existing use rights).

In general, the limitations of the current policy and consenting approach include:

- Inconsistent provisions in District Plans across a region
- Inconsistent application of existing provisions due to the different ages and stages of plans and plan changes and stormwater discharge consents
- Timing of plan development (RPS, regional plans and district plans) and notification can affect the ability to have an integrated approach
- Definitions and policies that are broad leave uncertainty or lack of clarity as to how WSD should be applied and how application of WSD will be assessed during consenting

- Developments are often subject to multiple rules and plan requirements that result in developers 'picking off' the order in which they apply resulting in a fragmented approach
- The consenting process can expose competing demands between, for example, managing flood risk versus providing stream protection
- A focus on end-of-pipe management and the associated inefficiencies, ineffectiveness and costs of managing adverse effects after they have been created in preference to preventing them from occurring in the first place
- A lack of consistent mechanisms to manage stormwater flows to maintain good and achieve higher stream health, quality and amenity
- A lack of mechanisms to reduce existing adverse effects in the context of contaminant trends and national direction
- A focus on total suspended solids removal as a surrogate 'Best Practicable Option' for contaminants when metals and other anthropogenic contaminants are more likely to be of concern in an urban environment
- On-going environmental degradation in the context of significant future growth while at the same time greater pressure on these resources for amenity and community needs

- Lack of clarity regarding desired outcomes, resulting in lengthy and expensive consent processes and sub-optimal solutions
- An RMA effects based approach does not work by itself particularly when there is an absence of Catchment Management Plans
- Leaving assessment of predictable environmental effects to be determined through the consent process on a case-by-case basis which results in uncertainty and cumulative effects (death by a thousand cuts).

The RMA allows the Minister for the Environment to prepare National Policy Statements – to guide local authorities on matters of national significance and National Environmental Standards, which have the force of regulation and are binding on local government.

At the time of undertaking the work for this report, the government had been consulting on the Draft NPS-FM⁹ as part of strengthening national direction on freshwater. Consultation also occurred in 2019 on a proposed National Policy Statement on Urban Development (NPS-UD) to replace the NPS-UDC to provide direction about when and how cities should plan for growth and how to do this well. The changing policy framework should have a positive effect on the implementation of good management practices including WSD.

If the draft NPS-FM becomes operative in its proposed form or even with minor amendments, Councils will need to give full effect ensuring:

- All aspects of water be managed to prevent decline
- Past damage to freshwater is to be reversed to a healthy state within a generation
- The role of Te Māna o te Wai is strengthened including a hierarchy of obligations to waterbodies first, then to essential needs of people and finally to other users

- Freshwater and land use and development in catchments is managed in an integrated way
- No further net loss of streams (this is specifically relevant to the piping of streams that can occur as part of land development).

Additionally, specific requirements that are proposed include:

In order to give effect to this National Policy Statement, local authorities that share jurisdiction over a catchment should cooperate in the integrated management of the effects on freshwater of land use and development.

Every regional council must insert the following method (or words to the same effect) into its regional policy statement: "District plans must include objectives, policies, and methods to avoid, remedy, or mitigate the cumulative adverse effects of land use on freshwater bodies, freshwater ecosystems, and sensitive receiving environments resulting from urban development."

Every territorial authority must include objectives, policies, and methods in its district plan at the next review of the plan to avoid, remedy, or mitigate the cumulative adverse effects of land use resulting from urban development on waterbodies and sensitive receiving environments.

There are specific risk management requirements for stormwater proposed that would require stormwater network operators to prepare a risk management plan (RMP) and to report annually on a set of nationally prescribed environmental performance measures. The RMP would need to include provision for projected future demand pressures such as urban growth and intensification. This change also signals a greater need for alignment and integration between regional plans and district plans.

⁹ Proposal for consultation dated September 2019. The current NPS-FM is dated 2014 (amended in 2017)

To achieve the outcomes sought in the draft NPS-FM good management practices that include WSD and green infrastructure will need to be adopted. The very recent regional and district plans already incorporate these requirements.

The National Objectives Framework (NOF) is part of the NPS-FM. It requires regional councils to include specific values / attributes for freshwater management units. Within the draft NPS-FW, there are now at least three and potentially four compulsory values. However, from a stormwater management perspective there are no heavy metal limits.

The requirements of the draft NPS-FM signals that a traditional piped "business as usual" approach will no longer be acceptable in New Zealand cities. However, the costs of infrastructure to avoid, remedy or mitigate the effect of urban contaminants on our receiving water bodies now needs to be considered.

Protecting urban freshwater ecosystems and providing for urban development sometimes has competing priorities. The requirement for no net loss of streams in the NPS-FM may reduce the amount of land available for some new developments which result in increased costs being passed on to property purchasers. Equally, retaining natural stream channels can reduce the need for expensive infrastructure and improve amenity. Therefore, it is important that the national direction on freshwater and urban development is well aligned. This has been recognised in the development of the draft NPS-UD and draft NPS-FM. To do this¹⁰:

• The NPS-UD provides a mechanism for local authorities to identify areas where development may not be appropriate because of the likely effects on highly valued freshwater environments

- Direction in the proposed NPS-FM and proposed NES is intended to recognise the importance of urban streams and encourage urban design that protects them, while also recognising that in some cases piping and reclamation may be unavoidable when providing for urban growth
- Proposals in the NPS-FM and the proposed Freshwater NES preventing further loss of urban streams may promote more compact urban form that recognises the natural values of urban waterways, and prioritises these values when planning
- Direction in the NPS-FM is intended to help city and district councils ensure decisions about managing freshwater in urban environments can be part of wider decisions about urban form.

While both NPS documents are in draft, the policy direction being provided at national level is in theory a significant step forward in protecting the value of waterways and in promoting integrated management thereby achieving good management practices. Timeframes for councils to respond to the draft NPS-FM are short which will present a challenge for many councils however, the short timeframe and plan change process should assist with older plans being updated to reflect good management practices.

¹⁰ From the Ministry for the Environment, September 2019, Action for healthy waterways - A discussion document on national direction for our essential freshwater and Planning

for successful cities - A discussion document on a proposed National Policy Statement on Urban Development, August 2019

6 Summary

The Government is reviewing the regulation and supply arrangement of drinking water, wastewater and stormwater (three waters) including provision of national direction and guidance to improve the health of urban water and promote good management practices.

As part of the stormwater review, this report covers:

- A stocktake of existing policy and plan provisions relating to stormwater management and assess how effective the provisions are in promoting good stormwater management that is consistent with the Urban Water Principles
- Provision of a suite of exemplar planning provisions that may be useful to regional and district councils for advancing good management practices
- Commentary on any observed or assessed barriers to implementation of good stormwater management practices.

A key component of the stocktake was the assessment of a range of plans throughout New Zealand assessed against a set of criteria developed from the Urban Water Principles. Overall, more recent plans and provisions for stormwater management in New Zealand are heading in the right direction to achieving good management practices. However, there is still a long way to go in achieving an integrated approach to stormwater management. There are few plans that have a fully developed policy framework that takes an integrated approach to stormwater management, including both the role of māna whenua and the incorporation of WSD and mimicking of natural processes. There is a general relationship, especially seen in coastal and district plans, between the age of the plan and the level of good stormwater management in the provisions that aligns with the Urban Water Principles. Unitary plans by their nature provide ease of integration of provisions than those regions with separate plans for each authority.

With respect to exemplar policy provisions, a management approach that is hierarchical is recommended so that the primary focus is on avoiding and reducing the generation of adverse effects associated with stormwater as opposed to mitigation. At the regional plan level, it is essential that resources are managed in an integrated way through integrated catchment management so that development and freshwater management are considered alongside each other and that there be a requirement to adopt a WSD approach. Regional plans also provide the appropriate mechanism to manage stormwater networks on a comprehensive basis whereby discharges from stormwater devices are aggregated on a catchment or sub-catchment basis and authorised via a single 'global' / network consent.

District / unitary plans should ensure that significant development and redevelopment is accompanied by integrated water and land use planning as this development provides the opportunity to minimise adverse effects and reduce existing effects. The plan should also include a requirement to follow good practice subdivision design guidelines and codes that incorporate water sensitive design at the land development and subdivision level. A comprehensive guide will require a shift away from piped systems for stormwater management to controlling stormwater at the source.

Understanding the strategic and institutional barriers to good stormwater management practices is critical to the successful implementation of the Urban Water Principles. Current RMA approaches support integrated planning, but there are currently no formal mechanisms to implement the outcomes in a co-ordinated way. The extent to which growth and redevelopment opportunities can be used to reduce the existing adverse effects of stormwater and associated environmental degradation is also limited by the current provisions of the legacy plans and statutory limitations. Key to moving away from business as usual and making progress is addressing:

- Economics: there is a need to understand the full lifecycle costs and characterising, evaluating and demonstrating the full benefits of WSD. There are recent / current WSD developments that provide opportunities for monitoring as case studies
- Regulation, policy, planning, consenting and compliance: clear provisions on how to incorporate good management practices
- Capacity building and training for those that work in the relevant sectors
- The integration of WSD and Te Ao Māori.

The national conversation on water quality that is currently occurring along with the potential for community-led demand to be an activating factor for WSD provides an opportunity for more innovative approaches to feature more strongly.

This report can be used to inform and guide development of stormwater policy to improve the health of urban water and promote good management practices.

Appendix A Urban Water Principles

Urban Water Principles

PAPATŪĀNUKU - "Our relationship with the land -papatūānuku - will pre-determine our relationship with water"

1. Protect and enhance ecosystem health of all receiving environments. Use integrated planning to ensure that decisions made upstream protect downstream receiving environments, such as streams, lakes, wetlands and terrestrial ecosystems, groundwater, estuaries, and the ocean.

2. Co-design with nature an integrated and regenerative approach to urban development. Use nature-based or green infrastructure engineering solutions where possible to mimic or work with processes found in the natural environment. Retain, restore and enhance existing elements of the natural drainage system, and integrate these elements into the urban landscape.

3. Address pressures on waterbodies close to source. Urban water ecosystems are under increased pressure from a wide range of pollutants, modified flow characteristics and altered channel form. These pressures can be either acute (such as a spill or pollution incident) or chronic, created by the cumulative effects of these pressures over time. Mitigating these pressures at or close to their source prevents degradation downstream.

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

4. Recognise and respect mana motuhake – the whakapapa and relationship that mana whenua have with water ecosystems in their rohe. Mana motuhake means the authority (mana) gained through self-determination and control over one's own destiny. Mana whenua communities have this authority in their customary 'rohe' or territory and have special cultural relationships with ecosystems in these areas. It is important to proactively engage mana whenua in designing urban environments within their rohe so that they can have a meaningful role in shaping the outcome. TĀNGATA - "Our environments are places of human occupation"

5. Identify and consider the community values for urban water and reflect them in decision-making. Communities often have strong aspirations and values for their urban spaces, including values for environmental sustainability, sense of place, and general amenity and liveability. Urban planning and design processes should create opportunities for communities to express their values and for decisionmakers to reflect these goals in their decisions.

6. Optimise environmental, social and cultural benefits when investing in buildings and infrastructure. When considering options for investment, prioritise options that provide multiple benefits. Investment decisions should take lifecycle costs of buildings and infrastructure into account and generate an enduring well-being gain.

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

7. Uphold and foster kaitiakitanga and custodianship of urban water ecosystems. Everyone has a responsibility to care for the health of our urban water bodies. Because of this, it is important that all community members can connect with these water bodies and are encouraged and empowered to take direct action to maintain and restore ecosystem health.

8. Collect and share information to promote common understanding of urban water issues, solutions and values. Meaningful and transparent data and information is necessary to improve both the design and use of our urban environments. Improving access to quality information can support integrated catchment planning and water sensitive design, while information for urban residents and businesses on current and emerging issues and solutions can foster positive behaviour change and the acceptance of new policy and technology. TIAKINA MŌ APŌPŌ - "In building future resilience, our connectedness with the environment is our strength".

9. Increase resilience to natural hazards and climate change. To improve the resilience of urban communities, we need to design water sensitive systems and landscapes which reflect the environmental characteristics of the area and are resilient to natural disasters and change.

10. **Conserve and reuse water resources**. Drinking water, wastewater and stormwater are each valuable resources and we should reduce their consumption and/or production and maximise their reuse. This includes increasing water-use efficiency by reducing potable water demand and maximising the use of greywater and stormwater.

Appendix B Plans Assessed

	Regional Policy Statement	Regiona	l Plan	Coastal Plan		District Plan
Auckland Council	Unitary Plan - Operative in Part - Sept 2016					
Gisborne District Council	Single combined plan - June 2017					
Marlborough District Council	Single Combined Plan - Proposed - notified May 2016					
Nelson City Council	Operative 1997			Combine	ed - Operat	ive 2006 + PCs 2012
Tasman District Council	Operative 2001			Operative + Operative PCs June 2019		
Northland Regional Council	Operative May 2016	Decision	s May 2019	May 2016		
Whangarei District Council						Operative 2007 + Operative PCs
Waikato Regional Council	Operative 2016	Operativ	e 2015	Operative 2015		
Hamilton City Council						Operative 2017
Waipa District Council						Operative 2016
Bay of Plenty Regional Council	Operative Dec 2018	Operative 2008		Operative 2018		
Tauranga City Council						Operative 2013 + Op PCs Sept 2018
Rotorua Lakes Council						Operative July 2016
Taranaki Regional Council	Operative 2010	Operative 2001		Proposed - Decision 2019	is Oct	
New Plymouth District Council						Proposed - notified Sept 2019
Hawkes Bay Regional Council	Operative 2006 + PCs 20	019	Operative 2014			
Napier City Council Manawatu Whanganui Regional Council						Operative 2011 +PCs
	Combined Plan - Operative 2018					
Palmerston North City Council						Operative 2000 + PCs 2019
Greater Wellington Regional Council	Operative 2013	Propos	ed - Decisions 2019	Proposed - Decisio	ons 2019	
Wellington City Council						Operative 2000
Porirua City Council Carterton & Masterton District Councils						Operative 1999
						Operative 2011
Kapiti Coast District Council						Proposed - Appeals 2018
Canterbury Regional Council	Operative 2013 + PCs	Operativ	e 2019	Operative 2005		
Christchurch City Council						Operative 2017 - no PCs
West Coast Regional Council	Proposed - Decisions 2018	Operativ	e - May 2014	Proposed - Notified	2016	

	Regional Policy Statement	Regional Plan	Coastal Plan	District Plan
Grey District Council				Operative - updated April 2014
Otago Regional Council Queenstown Lakes District Council	Partially Operative 2019	Operative + PCs July 2018	Operative 2012	Operative 2009 + PCs - June 2019
Dunedin City Council				Proposed - Decisions Nov 2018

Assessment not undertaken given age of plan

Appendix C National Policy Provisions

National Policy Statement for Freshwater Management

The provisions in the NPS-FM 2014 of particular relevance to stormwater management are:

Objective A1

To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water, in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A2

The overall quality of fresh water within a region is maintained or improved while:

a) protecting the quality of outstanding freshwater bodies;

b) protecting the significant values of wetlands and

c) improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.

Policy A1

By every regional council making or changing regional plans to the extent needed to ensure the plans:

- a) establish freshwater objectives and set freshwater quality limits for all bodies of fresh water in their regions to give effect to the objectives in this national policy statement, having regard to at least the following:
 - i. the reasonably foreseeable impacts of climate change
 - ii. the connection between water bodies;
- b) establish methods (including rules) to avoid over-allocation.

Objective C1

To improve integrated management of fresh water and the use and development of land in whole catchments, including the interactions between fresh water, land, associated ecosystems and the coastal environment.

Policy C1

By every regional council managing fresh water and land use and development in catchments in an integrated and sustainable way, so as to avoid, remedy or mitigate adverse effects, including cumulative effects.

Policy C2

By every regional council making or changing regional policy statements to the extent needed to provide for the integrated management of the effects of the use and development of land on fresh water, including encouraging the co-ordination and sequencing of regional and/or urban growth, land use and development and the provision of infrastructure

New Zealand Coastal Policy Statement 2010

The provisions in the NZCPS 2010 of particular relevance to stormwater management are:

Objective 1

To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land, by: ...maintaining coastal water quality, and enhancing it where it has deteriorated from what would otherwise be its natural condition, with significant adverse effects on ecology and habitat, because of discharges associated with human activity. To achieve this and other objectives, the NZCPS establishes a range of policies of which the most relevant are:

Policy 21 Enhancement of water quality

Where the quality of water in the coastal environment has deteriorated so that it is having a significant adverse effect on ecosystems, natural habitats, or water based recreational activities, or is restricting existing uses, such as aquaculture, shellfish gathering, and cultural activities, give priority to improving that quality by:

(a) identifying such areas of coastal water and water bodies and including them in plans;

(b) including provisions in plans to address improving water quality in the areas identified above;

(c) where practicable, restoring water quality to at least a state that can support such activities and ecosystems and natural habitats; ...

(d)

Policy 22 Sedimentation

(1) Assess and monitor sedimentation levels and impacts on the coastal environment.

(2) Require that subdivision, use, or development will not result in a significant increase in sedimentation in the coastal marine area, or other coastal water.

(4) Reduce sediment loadings in runoff and in stormwater systems through controls on land use activities.

Policy 23 Discharge of contaminants

(1) In managing discharges to water in the coastal environment, have particular regard to:

- a) the sensitivity of the receiving environment; (b) the nature of the contaminants to be discharged, the particular concentration of contaminants needed to achieve the required water quality in the receiving environment, and the risks if that concentration of contaminants is exceeded; and
- b) the capacity of the receiving environment to assimilate the contaminants; and:
- c) avoid significant adverse effects on ecosystems and habitats after reasonable mixing;
- d) use the smallest mixing zone necessary to achieve the required water quality in the receiving environment; and
- e) minimise adverse effects on the life-supporting capacity of water within a mixing zone.
- (2)
- (3)....

(4) In managing discharges of stormwater take steps to avoid adverse effects of stormwater discharge to water in the coastal environment, on a catchment by catchment basis, by:

- a) avoiding where practicable and otherwise remedying cross contamination of sewage and stormwater systems;
- reducing contaminant and sediment loadings in stormwater at source, through contaminant treatment and by controls on land use activities;
- c) promoting integrated management of catchments and stormwater networks; and
- d) promoting design options that reduce flows to stormwater reticulation systems at source.

National Policy Statement on Urban Development Capacity 2016

The provisions in the NPS-UDC 2016 of particular relevance to stormwater management are:

Objective Group D - Coordinated planning evidence and decisionmaking

OD1: Urban environments where land use, development, development infrastructure and other infrastructure are integrated with each other.

Policies - Outcomes for planning decisions

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PA2: Local authorities shall satisfy themselves that other infrastructure required to support urban development are likely to be available

