

Te Awarua-o-Porirua Whaitua Implementation Programme

Te Awarua-o-Porirua Whaitua Committee, April 2019



Te Awarua-o-Porirua
Whaitua
Committee

Front cover: Image of Porirua Harbour looking south



Te Awarua-o-Porirua
Whaitua process is the
collaborative discussion
on the future of our
streams and rivers, the
water that connects us, the
land and our communities,
and how we manage
and protect our natural
resources.

Stu Farrant
Te Awarua-o-Porirua Whaitua Committee Chair

Foreword from Te Awarua-o-Porirua Whaitua Committee Chair

Like most areas of New Zealand, the communities within the Te Awarua-o-Porirua catchment have been defined by their intimate relationship with water.

Early Māori established kāinga (villages) to utilise the abundant mahinga kai (food harvested from the streams, estuary and land) and other resources, travel routes and to seek protection from invaders. Early European development rapidly spread along the catchment's streams and relied on the reclamation of tidal margins for rail and road links and the development of what later became Porirua's town centre and Elsdon. As the population grew, infrastructure was developed to drain stormwater and wastewater and protect the growing communities from flooding and waterborne diseases.

In more recent times, residential development has substantially changed landforms and resulted in streams being piped and surfaces paved, with increasing volumes of stormwater discharged to streams and Te Awarua-o-Porirua harbour. In the rural areas of the catchment, hills once cloaked in dense and ecologically rich forests were cleared for pastoral farming which now forms the ubiquitous backdrop to Pauatahanui Inlet and beyond. This removal of forests has exposed headwater streams and opened the landscape to livestock and exotic plants unfamiliar to pre-European New Zealand.

These changes were all made with the best intentions as communities grew to serve increasing populations. The changes were driven by the technologies and practices of the time and followed a similar path taken in other centres in New Zealand and overseas. Unfortunately, the result of this widespread

transformation of the catchment has been a steady decline in the quality of fresh and coastal waters and the health of ecosystems. Contaminants are flushed from urban and rural land and aging infrastructure struggles to serve the demands of a growing population, with overflows of wastewater a common occurrence during large rainfall events. These water quality issues, coupled with extensive infilling and reclamation, have resulted in the severance of communities from the once abundant waterways and food and other resources they provided. For Ngāti Toa, this severance includes the loss of the ability to harvest seafood to provide for whanau and visitors, affecting the capacity for manaakitanga (hospitality) and by extension, the iwi's sense of mana (prestige or authority).



Swimming and recreation are now limited in the catchment by poor water quality, particularly following rainfall events, even over relatively short periods. For most people these changes are an unwanted consequence of development, and an increasing chorus of alarm tells us that change is needed to protect and restore our waters and return 'te mauri o te wai' (the life force of waterways).

The Whaitua Committee for Te Awarua-Porirua was established to examine the issues faced in our catchment to understand the community's values and aspirations for the catchment and to develop options to address these issues. This process enabled the community voice to be central to decision-making, as Greater Wellington Regional Council aims to establish water quality objectives, limits and targets which meet the requirements of the National Policy Statement for Freshwater Management (NPSFM) and to provide a pathway towards improving the ability of our communities to engage, explore and interact with our fresh water and coastline. To do this, we had to digest a huge amount of information and seek advice from a wide range of experts, council personnel and our Ngāti Toa partners. This process has in itself been rewarding and has resulted in what we believe to be thorough and comprehensive recommendations to support healthier waterways in the future.

Our understanding of the causes and impacts of the degradation of water quality is increasingly supported by robust science which confirms what the community has known for some time. As national policy has responded to community and iwi alarm at freshwater quality across New Zealand, cities internationally have moved towards improved practice to mitigate the effects of historical issues, and to minimise the impacts of future land use. Water sensitive design principles are increasingly being adopted in urban and rural areas to manage and treat runoff and to manage land use to reduce impacts on fresh water. The opportunity for urban

and rural communities within the catchment to adopt innovative and more integrated thinking about water is immense and offers the potential for transformative change. Education and behaviour change at all levels of society can also support improvements as people understand their individual role in the water system. And finally, infrastructure upgrades will be critical to ensuring that the extensive wastewater and stormwater networks function as intended, but these works will come at a high cost. We considered a wide range of options and scenarios which have tested combinations of all of these opportunities and used these as the basis for recommendations, with the goal of turning around the historical decline in water quality.

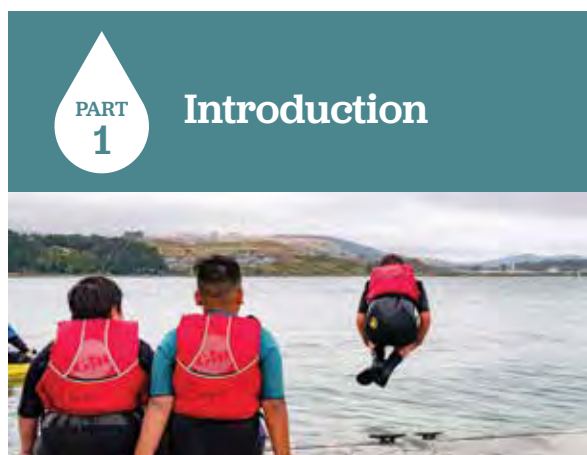
In future years, we look forward to seeing the sparkling waters of Te Awarua-o-Porirua brought back to life as the streams which nourish it are cleansed and protected. The whaitua process has been a long road to date and we are only at the beginning. It will be the future communities that most benefit most from changes that we make now, and it is this inter-generational vision which keeps us motivated.

Thank you for all the hard work put in by the highly committed and capable committee members, project team, technical support and members of the community who have contributed to this process to date.



Stu Farrant
Chair, Te Awarua-o-Porirua
Whaitua Committee

Contents



Foreword	i
Contents	iii
Abbreviated terms	vi
Executive Summary	vii
1 Background	3
1.1 How to read the WIP	3
1.2 Te Awarua-o-Porirua Whaitua Committee	4
1.3 Ngāti Toa Rangatira	5
1.3.1 Ngāti Toa Rangatira's role in the committee	6
1.4 The value of water	7
1.5 Te Awarua-o-Porirua Whaitua and the pressures on its water bodies	7
1.6 The National Policy Statement for Freshwater Management (NPSFM)	11
1.6.1 Greater Wellington Regional Council's implementation of the NPSFM	12
1.7 Development of Te Awarua-o-Porirua Whaitua Implementation Programme (WIP)	13
1.8 Significant change required	14

2 What the community values about Te Awarua-o-Porirua	17
3 Te Awarua-o-Porirua Water Management Units	19
4 Te Awarua-o-Porirua Objectives	22
4.1 Background	22
4.2 Pathogens	23
4.3 Toxicants	23
4.3.1 Ammonia	23
4.3.2 Nitrate	24
4.3.3 Zinc and copper	24
4.4 Ecological Objectives	25
4.4.1 Periphyton	25
4.4.2 Macroinvertebrate Community Index (MCI)	26
4.4.3 Native fish	27
4.4.4 Macroalgae	27
4.5 Sedimentation rate and muddiness	28
4.6 Habitat	29
4.7 Summary of Objectives	30
4.8 Narrative habitat objectives	33
4.9 Achieving community and Ngāti Toa Rangatira aspirations	33



Limits, policies and other methods



5	Discharge limits and targets	37	7.5	Further investigations and monitoring	52
5.1	Limits and targets for <i>E. coli</i>	38	7.6	Citizen science	53
5.2	Limits and targets for Ammonia	38	7.7	Compliance and enforcement	53
5.3	Limits and targets for Total Nitrogen and Total Phosphorus	39	8	Urban development	54
5.4	Limits and targets for Zinc and Copper	39	8.1	Background	54
5.5	Limits and targets for sediment	40	8.1.1	Key issues and drivers	54
5.6	Step-down limits to meet targets	41	8.1.2	Policy package for urban development	54
5.7	Criteria for Dissolved Inorganic Nitrogen and Dissolved Reactive Phosphorus	42	8.2	Integrated planning to achieve multiple objectives	55
6	Stream form and function	43	8.3	Water quality and in-stream flow effects of new urban development	58
6.1	Development of an aquatic ecosystem and habitat action plan	43	8.3.1	Greenfield development areas	58
6.2	Improved management of riparian margins	45	8.3.2	Water-sensitive urban design	59
6.3	Improving stream form and function	46	8.3.3	Flow variability	60
7	Whaitua-wide responses	49	8.4	Stormwater discharges	63
7.1	Support for catchment groups	49	8.5	Reducing the contaminant load from existing urban areas	64
7.2	Raising the profile of water and improving 'water literacy'	50	8.5.1	Stormwater mitigations and redevelopment within the existing urban areas	64
7.3	Encouraging innovation and continuous improvement	51	8.5.2	Existing urban development and land use activities	65
7.4	Agencies need to lead by example	52	8.5.3	Vehicular sources	67

9	Wastewater discharges	68	13	List of recommendations	88
9.1	Background	68	14	Appendices	100
9.1.1	Issues and drivers	68	14.1	Appendix 1: Public engagement activities to develop values	100
9.1.2	The wastewater system	68	14.2	Appendix 2: Additional attribute tables to develop freshwater and coastal water objectives for Te Awarua-o-Porirua Whaitua	101
9.1.3	Wastewater in urban areas	70	14.2	Appendix 3: Summary of current state and freshwater and coastal water objectives for Te Awarua-o-Porirua Whaitua	108
9.2	Wastewater networks	71			
9.2.1	Improvements to wastewater treatment plant and network	71			
9.2.2	Improvements to the private wastewater network	73			
10	Earthworks and forestry	75			
10.1	Background	75			
10.2	Earthworks	75			
10.3	Forestry	77			
11	Rural topics	78			
11.1	Management of erosion prone land	78			
11.2	Cultivation, break-feeding, vegetation clearance	80			
11.3	Stock access to waterways	80			
11.4	Wastewater in rural areas	82			
12	Water abstraction	83			
12.1	Background	83			
12.1.1	Issues and drivers	83			
12.1.2	Demand for taking water	83			
12.2	Water quantity management units	85			
12.3	Water quantity limits	85			
12.4	Permitted activities	86			
12.5	Resource Consents	87			

Abbreviated terms

Abbreviated terms	
ARI	Average recurrence interval
DIN	Dissolved Inorganic Nitrogen
DRP	Dissolved Reactive Phosphorus
<i>E. coli</i>	<i>Escherichia coli</i>
FMU	Freshwater Management Unit
Greater Wellington	Greater Wellington Regional Council
Harbour Strategy	Porirua Harbour and Catchment Strategy and Action Plan
LIM	Land Information Memorandum
LUC	Land Use Classification
MALF	Mean annual low flow
MCI	Macroinvertebrate Community Index
MfE	Ministry for the Environment
NESPF	National Environmental Standard for Plantation Forestry
NOF	National Objective Framework
NPSFM	National Policy Statement for Freshwater Management
PCC	Porirua City Council
PNRP	Proposed Natural Resources Plan for the Wellington Region
RMA	Resource Management Act 1991
the Committee	Te Awarua-o-Porirua Whaitua Committee
the Whaitua	Te Awarua-o-Porirua Whaitua
WCC	Wellington City Council
Wellington Water	Wellington Water Limited
WIP	Te Awarua-o-Porirua Whaitua Implementation Programme
WMU	Water Management Unit (includes coastal and harbour units)

Executive Summary

This document, Te Awarua-o-Porirua Whaitua Implementation Programme (WIP), is the culmination of careful deliberation, consultation and analysis over the last four years, led by the Te Awarua-o-Porirua Whaitua Committee (the Committee).

The Committee was established in December 2014 by Greater Wellington Regional Council (Greater Wellington) in response to the National Policy Statement for Freshwater Management (NPSFM) to provide advice and direction on how to manage land and water within Porirua and Northern Wellington's catchments. The Committee is comprised of elected members from Greater Wellington, Porirua City Council (PCC) and Wellington City Council (WCC), as well as representatives of Ngāti Toa Rangatira¹ and other representatives from the community with an interest and/or expertise in fresh water. The Committee worked with council officials, scientific and technical experts, Ngāti Toa Rangatira and local communities to develop the WIP, which identifies the key issues within Te Awarua-o-Porirua Whaitua (refer Figure 1, Map of the Whaitua), sets objectives and limits, and makes a series of recommendations aimed at achieving these objectives.

The Committee identified a range of pressures on water throughout Te Awarua-o-Porirua. The most significant issues are:

- inadequately performing stormwater and wastewater networks, which, along with an expanding area of impervious surfaces, puts pressure on waterways in times of high rainfall and contributes to sediment and contaminants flowing into streams and the harbour. These contaminants put people at risk of illness when swimming or gathering shellfish or other foods
- erosion in rural parts of the Whaitua which contributes significantly to sediment in streams and the harbour
- modification of stream channels and mouths and the harbour itself, resulting in the loss of habitat for freshwater and marine species, as well as birds.

The Committee has made 75 recommendations, comprised of both regulatory and non-regulatory measures which aim to achieve the objectives the Committee has set for the Whaitua. The responsibility for implementing the bulk of these recommendations lies with Greater Wellington, Porirua City Council, Wellington City Council and Wellington Water, in partnership with Ngāti Toa Rangatira and the wider community.

The recommendations involve:

- amending the existing policy and rule framework – within the proposed Natural Resources Plan for the Wellington Region (PNRP), relevant district plans, or in associated strategies or guidance. One recommendation relates to developing a new stand-alone action plan for aquatic ecosystems and habitats
- aligning planning across the district and regional level to achieve the objectives of the WIP

¹ Ngāti Toa Rangatira refers to the people from the Ngāti Toa tribe of the Kawhia area, who migrated south in the early 19th century, led by their Rangatira, including chiefs Te Rauparaha, Te Rangihaeata and Nohorua.

- identifying opportunities and taking measures to restore freshwater quality and environments, and to address pressures on the Whaitua’s waterbodies. Specific areas of focus include:
 - riparian protection, natural form and character of waterways and ecosystem health
 - stormwater and wastewater infrastructure (including onsite systems)
 - urban development practices
 - silt and sediment control
 - stock exclusion
 - water takes (abstraction)
- leveraging partnerships with industry, rural landowners, community groups and the public through awareness-raising, encouraging innovation, encouraging citizen science and the establishment of additional catchment care groups
- advocacy to central government to change the regulatory framework at a national level (in relation to chemical cleaning products and high zinc and copper-yielding materials used in building and vehicles)
- a further focus, which is cutting across all issues, is an improvement in monitoring, compliance and enforcement (by Greater Wellington, PCC and WCC, as the regulatory authorities).

It is anticipated that these recommendations will be implemented over time to achieve the WIP objectives by 2040.







Introduction



Background

The whitua process is a new way for a regional council to look at water management as it puts the community in the driving seat for decision making. This community-led, collaborative approach aims to ensure that the future state of Te Awarua-o-Porirua's streams and harbour meet the aspirations of those most closely connected with them.

This Whitua² Implementation Programme (WIP) is a non-statutory report developed by Te Awarua-o-Porirua Whitua Committee (the Committee) providing advice and direction on how best to manage land and water within Porirua and northern Wellington's catchments. Developed through discussions with Ngāti Toa Rangatira, local communities, local authority officers and scientific experts, the WIP identifies specific issues facing Te Awarua-o-Porirua Whitua, sets objectives and limits, and provides strategies to address issues to meet community aspirations.

The recommendations in this WIP are intended to be implemented by Greater Wellington working with Ngāti Toa Rangatira, partner organisations and the community. Some recommendations will become part of a plan change for Te Awarua-o-Porirua Whitua within the proposed Natural Resources Plan for the Wellington Region (PNRP). Other recommendations will be implemented through changes to strategic and operational planning undertaken by Greater Wellington, and will affect the way resources are allocated in the future.

Some recommendations apply to Porirua and Wellington City Councils³ (PCC and WCC respectively), and Wellington Water Limited⁴ (commonly known as 'Wellington Water'), and as such, a coordinated response from all agencies will be necessary. These agencies, together with Greater Wellington and Ngāti Toa Rangatira, are key partners in the Te Awarua-o-Porirua Harbour and Catchment Strategy and Action Plan (the Harbour Strategy). The Harbour Strategy will be updated to clarify how these agencies intend to deliver the implementation of the non-regulatory components of this WIP.

1.1 How to read the WIP

Part 1 (Sections 1.2 – 1.8) introduces the Committee, its role and the consensus decision-making process used. It reflects on the history of Ngāti Toa Rangatira as mana whenua and their role within the whitua process. It discusses the value of water at a national level before describing the local context, state and pressures associated with Te Awarua-o-Porirua. It provides the context for the development of this WIP and covers the overarching legislative framework.

2 Whitua are sub-regions of Greater Wellington. There are five whitua within the Greater Wellington Region.

3 The majority of the Whitua falls within the boundaries of WCC and PCC. At the fringes of Whitua there are very small areas of land that fall within the Hutt City Council, Upper Hutt City Council and Kāpiti Coast District Council boundaries. The recommendations in this WIP apply equally to this land which is predominantly rural and therefore the relevant recommendations tend to be directed at Greater Wellington.

4 Wellington Water Limited was established in 2014 and is jointly owned by the Hutt, Porirua, Upper Hutt and Wellington City Councils, and Greater Wellington Regional Council. Its role is to manage the drinking water, wastewater and stormwater services of the councils.

Part 2 (Sections 2 – 4) describes the communities' values in relation to the freshwater and harbour within Te Awarua-o-Porirua Whaitua, discusses how the Whaitua has been geographically and spatially delineated, and sets out the objectives developed by the Committee to support and sustain these values.

Part 3 (Sections 5 – 12) outlines the limits, policies and methods to achieve the objectives.

A companion document has been prepared by Ngāti Toa Rangatira which should be read in conjunction with this WIP. See Section 1.3.1 for further detail and context.⁵

1.2 Te Awarua-o-Porirua Whaitua Committee

The Committee (refer Table 1) is an advisory body established in December 2014 by Greater Wellington in response to the NPSFM. It brings together representatives of the community with mana whenua and elected members from Greater Wellington, PCC and WCC.

The Committee is responsible for developing a WIP that sets freshwater and coastal water objectives and outlines regulatory and non-regulatory methods for integrated land and water management within the Te Awarua-o-Porirua Whaitua boundary, including measures to implement the NPSFM. The Committee met once every six weeks from December 2014 until November 2017, with meeting frequency increasing to once every three weeks between March and December 2018.

Table 1: Te Awarua-o-Porirua Whaitua Committee members (2014-2019). A number of representative changes occurred during this period.

Name	Representation	Period on Committee
Cr Barbara Donaldson	Wellington Regional Council	Dec 2014 - 2019
Cr Bronwyn Kropp	Porirua City Council	Dec 2014 – Oct 2016
Cr Dale Williams	Porirua City Council	Nov 2016 - 2019
Cr David Lee	Wellington City Council	June 2015 - 2019
Cr Malcom Sparrow	Wellington City Council	Dec 2014 – June 2015
Diane Strugnell	Community	Dec 2014 - 2019
Hikitia Ropata	Te Upoko Taiao (Natural Resources Plan Committee)	May 2017 - 2019
Jennie Smeaton	Community	Dec 2014 - May 2018
John Gibbs	Community	Dec 2014 - 2019
Dr John McKoy	Community	Dec 2014 - 2019
Larissa Toelupe	Community	Dec 2014 - 2019
Naomi Solomon	Te Upoko Taiao (Natural Resources Plan Committee)	Dec 2014 – April 2017
Richard Cook	Community	Dec 2014 – Dec 2018
Sharli-Jo Solomon	Ngāti Toa Rangatira representative	Dec 2014 - May 2018
Stu Farrant (Chair)	Community	Dec 2014 - 2019
Warrick Lyons	Community	Dec 2014 - 2019

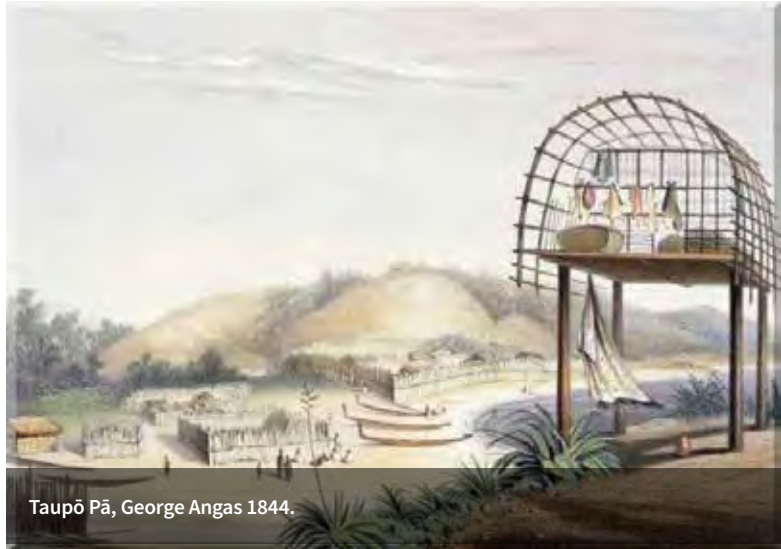
5 <http://www.gw.govt.nz/assets/Whaitua/NgatiToaTAoPWhaituaStatement.pdf>

1.3 Ngāti Toa Rangatira

Mai i Miria-te-kakara ki Whitireia,
Whakawhiti te moana Raukawa ki
Wairau, ki Whakatū,
Te Waka Tainui.

Ko Whitireia te maunga
Ko Raukawa te moana
Ko Tainui te waka
Ko Ngāti Toarangatira te iwi
Ko Te Rauparaha te tangata.

Whitireia is the mountain
Raukawa (Cook Strait) is the sea
Tainui is the waka
Ngāti Toarangatira is the tribe
Te Rauparaha is the person.



Toa Rangatira, the ancestor who gave his name to Ngāti Toa, resided at Kāwhia on the west coast of Waikato-Tainui rohe around the 17th century. Ngāti Toa occupied the coastline from Aotea to Huikomako, about 100 km south of Kāwhia. In 1819, the great leader, Te Rauparaha, led a scouting expedition to the Cook Strait to find a new home for his people. From a well-known lookout point at Omere near Cape Terawhiti, Te Rauparaha noticed a trading ship passing through the Cook Strait. Recognising the strategic importance of the Strait as a major trading route, Te Rauparaha led Ngāti Toa in a historic resettlement campaign from Kāwhia.

From the time Ngāti Toa first settled in the Porirua area in the early 1820s, the Porirua Harbour has occupied a central place in the livelihood and identity of Ngāti Toa as a people. Not only was it a source of abundant food, it was also important strategically and was therefore closely controlled by the chiefs of Ngāti Toa. Te Rauparaha is reputed to have told Governor Grey that whoever held Paremata and Porirua Harbour controlled the northern approaches to Wellington and this advice was reflected in the Crown's military strategy to control the area.

By 1840 Ngāti Toa Rangatira was established as the pre-eminent iwi dominating the Kāpiti, Wellington, and Te Tau Ihu (northern South Island) regions. Ngāti Toa held a maritime monopoly in the Cook Strait involving a de facto military, and political and economic power in the region that was acknowledged by other Māori and European settlers.

Following the detention of Te Rauparaha by the Crown in 1846, Takapuwāhia, located on the western side of Porirua Harbour, became the most important Ngāti Toa kāinga (village) for Ngāti Toa. It has been the primary base for Ngāti Toa ever since, encompassing marae (communal place) and whareniui (meeting house) established at Takapuwhia and Hongoeka. Paremata, at the entrance to the eastern arm of Porirua Harbour, was another important area of settlement. Paremata Pā was constructed in the 1830s and was the residence of Nohorua, the older brother of Te Rauparaha. Whitireia, on the southern side of the entrance to Porirua Harbour, is another important area of occupation and includes many significant sites including urupā, kāinga, pā, middens, pits, terraces, and tauranga waka (landing and anchorage sites).

Porirua Harbour was the primary source of food for the settlements located around it. The tuangi (or New Zealand cockle, *Austrovenus stutchburyi*) could be gathered in abundance from the mud flats and was the most highly prized of all shellfish in the area. A sand bank located in the eastern arm of the harbour (named Ngā Whatu o Topeora after Te Rauparaha's niece) was an important mahinga kai and site of a storehouse. Kōura (freshwater crayfish), pāua, and kina (sea urchin) were all in abundance along the coast, and tuangi, mussels, and a wide variety of fish were all found in the harbour. However, development of road, rail and reclamations destroyed many of these mahinga kai sites, particularly in the Onepoto Arm.

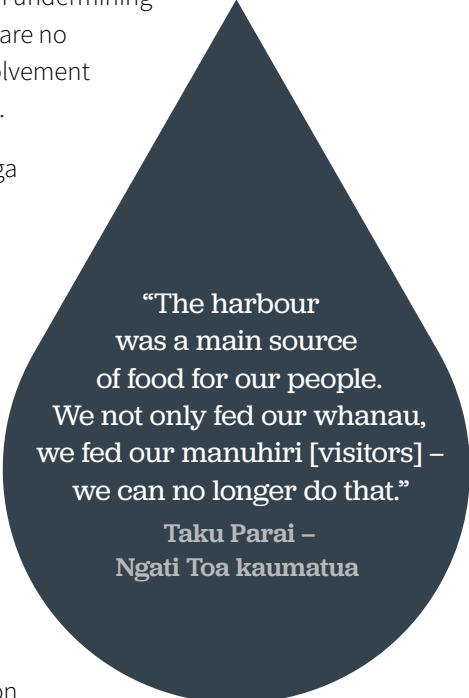
From the mid-nineteenth-century, the iwi's control over the harbour and surrounding land was challenged by the Crown and European settlers. However, its key role in restoring the health of the catchment is now widely recognised.

1.3.1 Ngāti Toa Rangatira's role in the committee

Ngāti Toa is a foundation member of Te Awarua-o-Porirua Whaitua Committee. Ngāti Toa are the kaitiaki of Te Awarua-o-Porirua, a role that was recognised by the Crown in Ngāti Toa's Treaty settlement legislation. The purpose of this acknowledgment is to enhance the ability of Ngāti Toa to exercise its role as kaitiaki, and to provide for more effective iwi participation in resource management processes. Section 7(a) of the Resource Management Act 1991 (RMA) also requires decision makers to 'have particular regard to kaitiakitanga'.

Over the decades, the Iwi has been frustrated by the effects of intensified land use around the harbour, reclamations to the harbour's edge and contamination of its waters (from sediment, stormwater and raw sewage prior to the treatment plant being built). Ngāti Toa's cultural impact assessment for the Transmission Gully roading project documents the cumulative effect of these activities in undermining the health of the harbour to the point where the people of Ngāti Toa are no longer able to harvest kaimoana as their ancestors did. The iwi's involvement in the Whaitua was therefore fundamental to the process at all levels.

Notable in the process was Ngāti Toa's assertion of tino rangatiratanga (self-determination, sovereignty, or autonomy). The abstention of its iwi representatives from the Committee process for a period of time provided Ngāti Toa the opportunity to carefully review and articulate their views in relation to potential cultural effects and their recommendations for the Te Awarua-o-Porirua Whaitua chapter of the PNRP. This is important in the context of the iwi's resource planning and also provided for in the settlement legislation, which empowers the iwi to exercise its role as kaitiaki in a manner that is agreeable to it. For the Committee, recognising and accepting this as part of Ngāti Toa's process ensured that the final document remained authentic to Ngāti Toa and for the Committee. This reflects the mana of everyone on the Committee, and is a true example of an outcome that is mana-enhancing for all. To that end, Ngāti Toa have developed a companion document which records their vision and aspirations for the Whaitua as kaitiaki.⁶



**“The harbour
was a main source
of food for our people.
We not only fed our whanau,
we fed our manuhiri [visitors] –
we can no longer do that.”**
**Taku Parai –
Ngāti Toa kaumatua**

6 <http://www.gw.govt.nz/assets/Whaitua/NgatiToaTAoPWhaituaStatement.pdf>

1.4 The value of water

Our Fresh Water 2017 provides a national picture of the state of New Zealand's freshwater environment. It states that fresh water supports almost every aspect of life.⁷ We use fresh water for drinking, for producing goods and services, and for recreation. Māori tribal identity is linked to both fresh and coastal waters, with each water body having its own mauri (life force). *Ki uta ki tai* (from the mountains to the sea) captures the movement of water through the landscape and the many interactions it has on its journey. *Ki uta ki tai* acknowledges the connections between the atmosphere, surface water, groundwater, land use, water quality, water quantity, and the coast. It also recognises the connections between people and communities, people and land, and people and water. This holds true not only at a national level but also at a regional and local level.

Throughout New Zealand, water quality and ecosystem health have declined significantly over recent decades. The Land and Water Forum⁸ stated that New Zealand has made good progress in clearing up point source pollution over the last twenty years, but monitoring shows that our water quality is declining in many places, particularly in lowland water bodies.⁹ Also, urban waterways remain highly polluted, including on account of sewage leakages, stormwater run-off and discharges from industrial factories. Declining water quality impacts on biodiversity, aquatic ecosystems and instream uses such as swimming and food harvesting. It can also affect human and animal health.

1.5 Te Awarua-o-Porirua Whaitua and the pressures on its water bodies

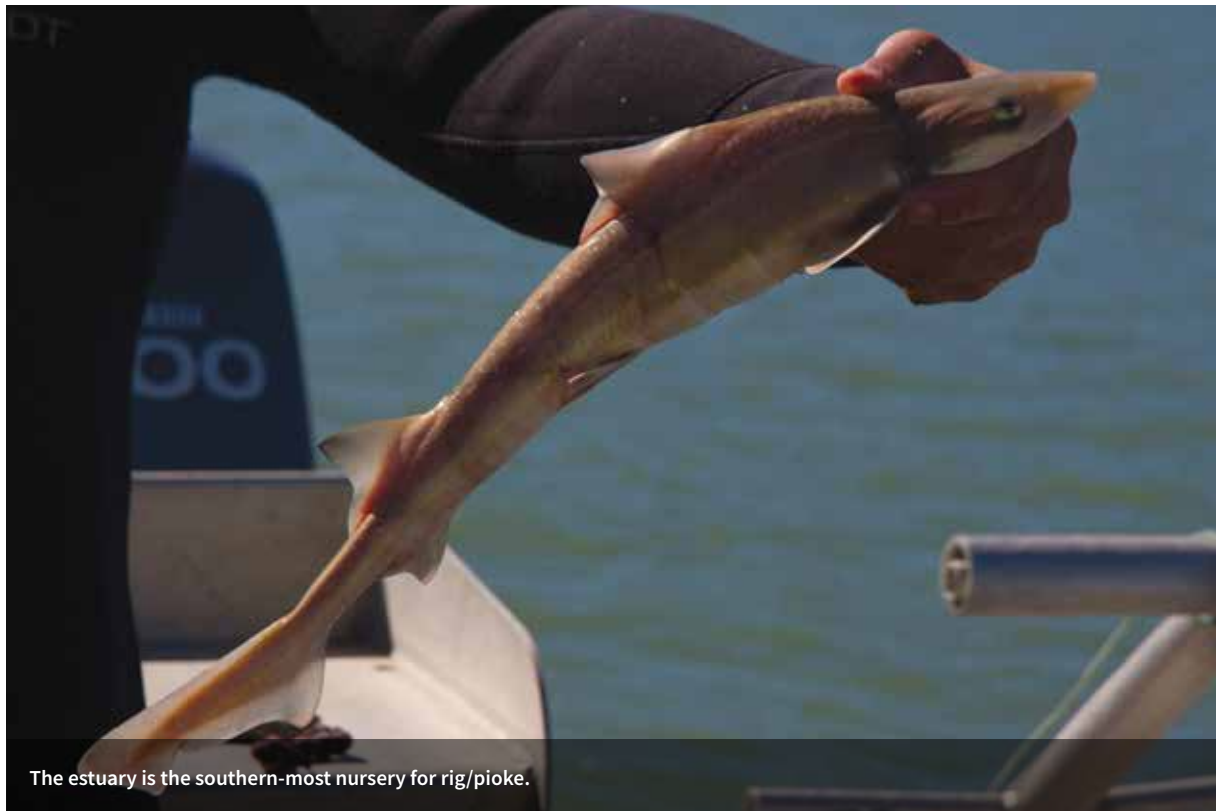
There are over 275km of streams in Te Awarua-o-Porirua Whaitua – most of which flow into the two arms of the Porirua Harbour. The largest streams are the Porirua (including Kenepuru Stream), Pauatahanui and Horokiri. The majority of the urban area is located in the Onepoto Arm catchment, with other areas located along the fringes of the Pauatahanui Arm and within the Titahi Bay, Pukerua Bay and Taupō Stream catchments. These urban areas provide for a mix of residential, commercial and industrial land uses.

Te Awarua-o-Porirua Harbour is the largest estuary in the lower North Island and proportionately has the largest subtidal area (60%) of any estuary in New Zealand. It contains a nationally significant wildlife management reserve (Pauatahanui). The estuary has high ecological values - it supports high concentrations of shellfish, such as tuangi, as well as some of the last remaining seagrass beds in the region which form an important habitat and nursery for fish.

7 Ministry for the Environment & StatsNZ (2017) New Zealand's Environmental Reporting Series: Our fresh water 2017. Retrieved from www.mfe.govt.nz and www.stats.govt.nz

8 Land and Water Forum (2010). Report of the Land and Water Forum: A Fresh Start for Fresh Water <http://www.hortnz.co.nz/assets/Uploads/First-Report-of-the-Land-and-Water-Forum.pdf>

9 Land and Water Forum (2010). Report of the Land and Water Forum: A Fresh Start for Fresh Water <http://www.hortnz.co.nz/assets/Uploads/First-Report-of-the-Land-and-Water-Forum.pdf>



The estuary is the southern-most nursery for rig/pioko.

However, the harbour also has the highest density of adjacent roading of any harbour or estuary in New Zealand and has a comparatively small opening to the sea, making it vulnerable to many pressures.

The harbour edge and its surrounding catchments were once forested in dense lowland podocarp forest and hardwood forest (including kohekohe, tawa, titoki, kahikatea, tōtara, rāta, miro and rimu) prior to European settlement. The felling and burning of this forest to make way for farmland and settlements has contributed to an increased sediment load in streams and in the harbour.

Today, many people perceive the harbour and streams as dirty and undesirable places to be. This perception and disconnection diminish people's sense of responsibility for sustaining and caring for the wellbeing of Porirua's waterways and estuary. Many people no longer see or know where streams come from or go to, and access to them and many parts of the harbour is difficult. Moreover, signs warning people not to swim or collect food create a further sense of disconnection from people's sense of place. Degradation of water bodies may also have financial and social implications because it compels people to travel to alternative swimming/food sources or to purchase food that could otherwise have been collected. Water pollution also exposes people to unnecessary health risks, because, despite the health warnings, they may choose to swim and collect food from the harbour and streams.

The species of native fish and other freshwater fauna originally found in the streams are under stress; some are no longer present or are in decline. Suitable habitat has decreased, the stream channels along which fish move to feed or spawn have become more difficult to navigate due to barriers and other impediments, water quality has become increasingly degraded and toxic in several cases, and introduced and invasive aquatic and riparian species compete for space and food. These pressures all combine to reduce species' resilience to future changes in the environment such as climatic conditions.

There are multiple pressures on water bodies throughout Te Awarua-o-Porirua – some historical and others new. In urban areas, extensive areas of impervious surfaces created by roofs, roads, parking lots and driveways increase water volumes and flow peaks when it rains, flooding streams and causing streambank erosion. Many of the lower urban reaches of streams have been modified, channeled, straightened, piped and/or concreted, and offer limited habitat for aquatic life. Stream mouths have been modified by reclamation, earthworks and the building of the railway line and state highways, resulting in the loss of important spawning, nursery and feeding grounds for freshwater and marine life as well as birds.

Stormwater management in Porirua and North Wellington has used traditional design and engineering approaches with little emphasis on reducing the effects on the variable flow of streams or the volume, rate and frequency of stormwater runoff discharges.

Stormwater issues have been exacerbated not only by the incidence of localised heavy downpours but also the increased intensification of urban development (infill and high rise). The wastewater network is old and does not have adequate capacity for the current population, let alone the projected growth of Porirua and Wellington cities. It is also compromised by inflows from the stormwater network through incorrect connections or in many places the poor condition of both the stormwater and wastewater pipes. This all contributes to increased instances of wastewater overflows.

Issues in the rural areas of Porirua are also significant, particularly the contribution of sediment into streams and the harbour as a result of land erosion. Much of this erosion is related to historical forest clearance, but is exacerbated by unsustainable farming practices such as the grazing of stock on very steep sloping land. Stock access to waterways increases pathogen loads in streams and the harbour and the associated trampling of streambanks further adds to the sediment load as well as affecting habitat and natural character of streams.

Some of these pressures continue to grow today as the region's population increases and new areas are developed for housing. Under the National Policy Statement for Urban Development Capacity (NPSUDC), local councils are required to enable sufficient development capacity for housing and business. Providing for this growth is acknowledged by the Committee, as long as it is achieved within environmental limits required under the NPSFM. The impacts of future urban development can be reduced (but not eliminated) through environmentally-sensitive approaches to land development (including for example, the inclusion of rain gardens or wetlands to absorb stormwater), and the adoption of the best possible infrastructure, wastewater and stormwater management practices.



Paremata bridge built in 1885



The catchment has changed over time and pressures on the harbour have increased.

1.6 The National Policy Statement for Freshwater Management (NPSFM)

The RMA is the principle resource management legislation in New Zealand; its purpose is the sustainable management of natural and physical resources such as land, air and water. It also encourages integrated management of those resources as well as public participation in decision-making processes. Under the RMA, regional councils must 'give effect to' objectives and policies in a national policy statement.

In terms of freshwater, central government's objectives are set out in the NPSFM 2014 (amended in 2017). This instrument provides direction for local and regional councils, sets mandatory minimum freshwater standards, and includes a requirement to maintain or improve water quality. The NPSFM also has a requirement to have regard to the connections between freshwater bodies and coastal waters.

The NPSFM requires that freshwater objectives – the desired outcomes for a water body – be set in regional plans. These objectives must be clear – at an adequate level of detail and on a sufficient spatial scale – and the management regime for the achievement of these objectives must be apparent to all involved.

In order to do this, freshwater management units (FMUs) must be created, and objectives and limits (the maximum amount of resource use available which allows an objective to be met), for each FMU set out in regional plans. FMUs are water management areas that identify and spatially delineate water bodies and the surrounding land that drains to those water bodies. The activities that affect land and water within these FMUs need to be managed in order to meet the freshwater objectives and limits.

The overall state of rivers, streams and lakes in an FMU must not deteriorate beyond their existing state (i.e., quality must be maintained). Where the existing state is below a national bottom line, a freshwater objective must be set at the bottom line or higher and a management regime put in place to achieve this. However, the community may decide that the objective for a particular water body should be to improve the overall state of water bodies in an FMU and set objectives to achieve this.

Once FMUs and objectives are identified, a limit (the maximum amount of resource available for use while allowing for a freshwater objective to be met) is required to be set to meet those objectives. For example, a limit could be the total amount of water that can be taken out of an FMU, or the total amount of contaminants that can be discharged into it that allows the freshwater objective to be met.¹⁰ The NPSFM also uses the term 'targets'. This term is used when a freshwater objective is set and a limit identified but that objective is currently not met and the limit is already exceeded, also known as 'over allocation'. An example of over-allocation might be when too much water is allowed to be taken from a river meaning that the flow left in the river no longer allows for ecosystems to function. Where over-allocation occurs, the NPSFM requires that targets with specified timeframes are set to reach the objective. Having time-bound targets is a critical part of meeting objectives, particularly if the costs of change to the management regime are high.

All water bodies in New Zealand must meet two high-level freshwater objectives:

- to safeguard the life-supporting capacity, ecosystem processes and indigenous species of those waterbodies, including their associated ecosystems
- to safeguard the health of people and communities, as affected by contact with those waterbodies.

This means that 'business as usual' is not an option. New water quality and quantity limits and approaches must be applied to maintain and improve water resources.

¹⁰ For water quality, a limit is based on the assimilative capacity of the water body, or the amount of a contaminant a waterbody can deal with without adverse effects on the values that a community has for the waterbody.

1.6.1 Greater Wellington Regional Council's implementation of the NPSFM


Greater Wellington is implementing the NPSFM via changes to the PNRP and through the five whitua community-led planning processes. Ruamāhanga was the first Whitua progressed, and Te Awarua-o-Porirua is the second.

Planning at the whitua scale helps to:

- identify solutions which respond directly to specific community values or concerns
- take into consideration existing and future capacity and capability of local communities to deliver solutions
- deploy a more transparent system to support collective decision-making and accountability, and
- manage water in a way that is appropriate within the local context, which benefits from local knowledge, as well as aligning with environmental and economic conditions.

The PNRP also contains objectives for the management of fresh water, coastal water and ecosystem health at a regional scale, which are relevant to Te Awarua-o-Porirua Whitua. The objectives in this WIP must also achieve the PNRP objectives where they relate to the state of water bodies. In particular the PNRP objectives direct that:

- mauri (the 'life force' of the waterbody) is sustained and enhanced
- aquatic ecosystem health and mahinga kai are safeguarded
- fresh and coastal water is suitable for contact recreation and Māori customary use
- the health needs of people are provided for
- the natural character of water bodies is preserved and protected
- ecosystems and habitats with significant biodiversity values are protected and restored
- passage of indigenous fish and koura (freshwater crayfish) is provided for and restored.



“The community led nature of this process has been invaluable for pursuing meaningful, local solutions.”

**Barbara Donaldson –
Greater Wellington
Regional Councillor**

1.7 Development of Te Awarua-o-Porirua Whaitua Implementation Programme

The Whaitua Committee worked for four years to develop this WIP with careful consideration of the views and knowledge of many different people in the community, whānau, industry, technical advisors, council officials and government agencies throughout the duration of the process. The Committee is extraordinarily grateful for the contributions and advice provided over this time.

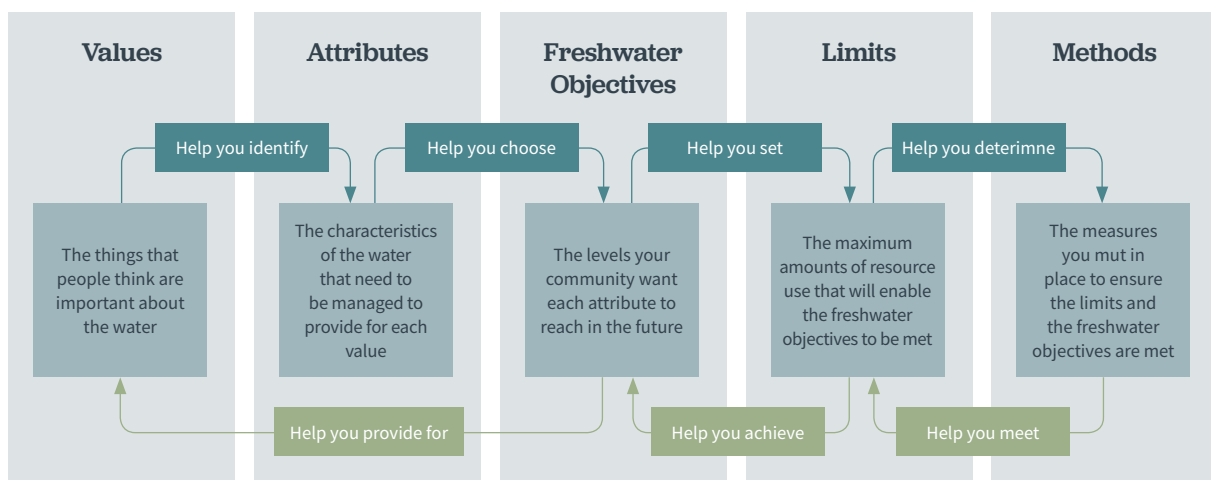
The Committee also drew on information from a range of disciplines including environmental and social sciences, economics, and mātauranga Māori to support the local knowledge it had access to. The Committee aimed to adhere to the various requirements within the RMA while recognising that, as a non-statutory committee, it was not legally bound to comply with all requirements of the RMA. Although comprehensive analysis under section 32 of the RMA was not undertaken, the Committee did consider a range of alternatives, tested scenarios, and compared the merits of these through various lenses, including cultural and economic, at key stages of the process.¹¹

An integrated catchment and harbour water quality model was developed to help inform and guide the Committee’s decisions. The purpose of the model was to accurately represent current or ‘baseline’ hydrological and water quality conditions in the Whaitua, and to enable the exploration of likely environmental and economic outcomes of alternative management approaches involving land-use change, contaminant source control and implementation of stormwater treatment devices. This helped the Committee build a picture of what the impacts and benefits might be of aiming for a particular objective.

The land-use changes and mitigations explored by the Committee were limited to those currently known. However, the Committee recognises that opportunities such as new technology, better management practices, and land-use planning can and will have an impact on reducing the time and cost required to achieve the WIP objectives.

The process used by the Committee to develop the content of this WIP drew on Ministry for the Environment’s guidance for implementing the NPSFM (see Figure 1).

Figure 1. Process for developing limits and methods to achieve freshwater objectives
(Source: Ministry for the Environment)



¹¹ Section 32 requires an evaluation to accompany a policy statement, plan, plan change, regulation, or standard, which assesses: the appropriateness of objectives in achieving the purpose of the RMA; and the appropriateness of the policies and methods (provisions) in achieving the objectives in terms of their efficiency and effectiveness.

The objectives, limits and associated recommendations developed by the Committee collectively contribute to supporting the community values. In making decisions on objectives and deciding whether water quality should be maintained or improved, the Committee considered how to provide for a wide range of iwi, community and national values. For Te Awarua-o-Porirua Whaitua, the objectives are to maintain water quality in some places and improve water quality in others (refer Section 4 and Tables 3 and 4).

When considering timeframes, the Committee considered the impacts on groups and individuals, as well as the degree of effort (including resources) needed to make improvements. For some attributes, such as the Macroinvertebrate Community Index (MCI) which is influenced by many things (e.g., habitat, contaminants, temperature, flows levels, and sediment), assessing change and its causes will be difficult and may require significant investment – it may take a longer time-frame to observe measurable improvements.

1.8 Significant change required

Substantial effort has gone into improving and protecting Porirua’s streams and harbour in recent years. The Harbour Strategy, which both regional and local councils, Ngāti Toa Rangatira and stakeholders adopted in 2012, articulated the desire of the community to restore the harbour and streams to full health. In the Harbour Strategy, the question was asked ‘Can Porirua Harbour be saved?’, and the overwhelming scientific evidence from extensive research was ‘Yes!’

The Harbour Strategy will be updated to reflect the WIP recommendations and will be a key document guiding implementation, outlining how Greater Wellington, PCC, WCC and Wellington Water will be responsible for implementing the WIP recommendations.

Other key documents and programmes aimed at achieving improvements include:

- a current review of the Porirua District Plan which includes protection of the harbour as a key performance indicator
- an assessment of the implications of developments, such as the proposed urban development project in Stebbings Valley by WCC
- development of a business case by Wellington Water to implement change that will enable the community to recreate safely
- numerous community-led stream and harbour clean-up and restoration projects throughout the catchment.

In its deliberations, the Committee recognised these efforts as well as community aspirations for further improvements. Despite the current efforts, however, a significant step change is needed; continuing with current practices will lead to an unacceptable cost being borne by the environment and future generations. This WIP can be viewed as a road map which calls for a catchment-wide, all-of-community response.





Values and objectives



What the community values about Te Awarua-o-Porirua

To develop future-state objectives for the streams and harbour of Te Awarua-o-Porirua, the Committee first needed to understand what the community valued about them. The Committee held a number of community engagement activities¹² (in 2016) to get to the heart of local thinking. The Committee held hui and had stalls at festivals and other events and asked people the following questions:

1. What's important to you about the streams, the harbour and coast around here?
2. How do you and your friends, family and whānau use the streams, harbour and coast around here?
3. How would you like our streams, the harbour and coast to be in the future?

The 'Wordle' below captures the values put forward at these community events.



The rich and varied information and ideas provided by the community was incorporated into a set of value statements which were refined to ensure each value was both descriptive enough to be clearly understood, and broad enough to capture the full expression of ideas. A further value was adopted to reflect Ngāti Toa Rangatira as mana whenua and kaitiaki.

¹² A list of public engagement activities held to help develop the values. These are recorded in Appendix 1.

The values for Te Awarua-o-Porirua Whaitua which underpin this WIP are outlined in the following image:



YOU'VE SPOKEN, WE'VE HEARD

From Pukerua Bay to Newlands,
and everywhere in between.

Together we value...

- Kai kete \ Food basket**
The harbour, streams and coast can be used to gather and catch kaimoana and mahinga kai for food
- Hauora kaiao \ Ecological health**
The harbour, streams and coast are clean and brimming with life and have diverse and healthy ecosystems
- Ka taea e te tangata \ Accessibility and recreation**
The harbour, streams and coast are safe and accessible for people to enjoy and undertake recreational activities
- Te ara wairua o te wai \ The pathway of the spirit of the water**
The harbour, streams and coast flow naturally and with energy, attracting people to connect with them
- Whanaketanga tauwhiro o te whenua \ Sustainable development of land**
Land is developed, used and managed sustainably, recognising its effect on water quality and quantity
- Ohaoha o te wai \ Economic uses of water and waterways as a resource**
The use of water and waterways provides for economic opportunities and benefits
- Ko Te Awarua-o-Porirua he taonga tuku iho a Ngāti Toa Rangatira**
Te Awarua-o-Porirua is an ancestral treasure of Ngāti Toa Rangatira



Te Awarua-o-Porirua Water Management Units

The NPSFM requires regional councils to develop freshwater objectives and set freshwater quality and quantity limits for each freshwater management unit. In Te Awarua-o-Porirua the Committee were tasked with developing both fresh water and coastal water objectives given the high value of the harbour. Therefore, the Committee adopted the terminology 'Water Management Units' (WMUs) to recognise the management units identified for both fresh and coastal water. Where these units are in the fresh water environment they are freshwater management units (FMU) as described in the NPSFM.

In Te Awarua-o-Porirua Whaitua there are five freshwater WMUs and three coastal WMUs for setting objectives. These are described in Table 2 and shown on Figure 2.

The coastal WMUs are based on each arm of the harbour (Onepoto and Pauatahanui) and the open coastal area that abuts the Tasman Sea.

The freshwater WMUs reflect the following similarities in:

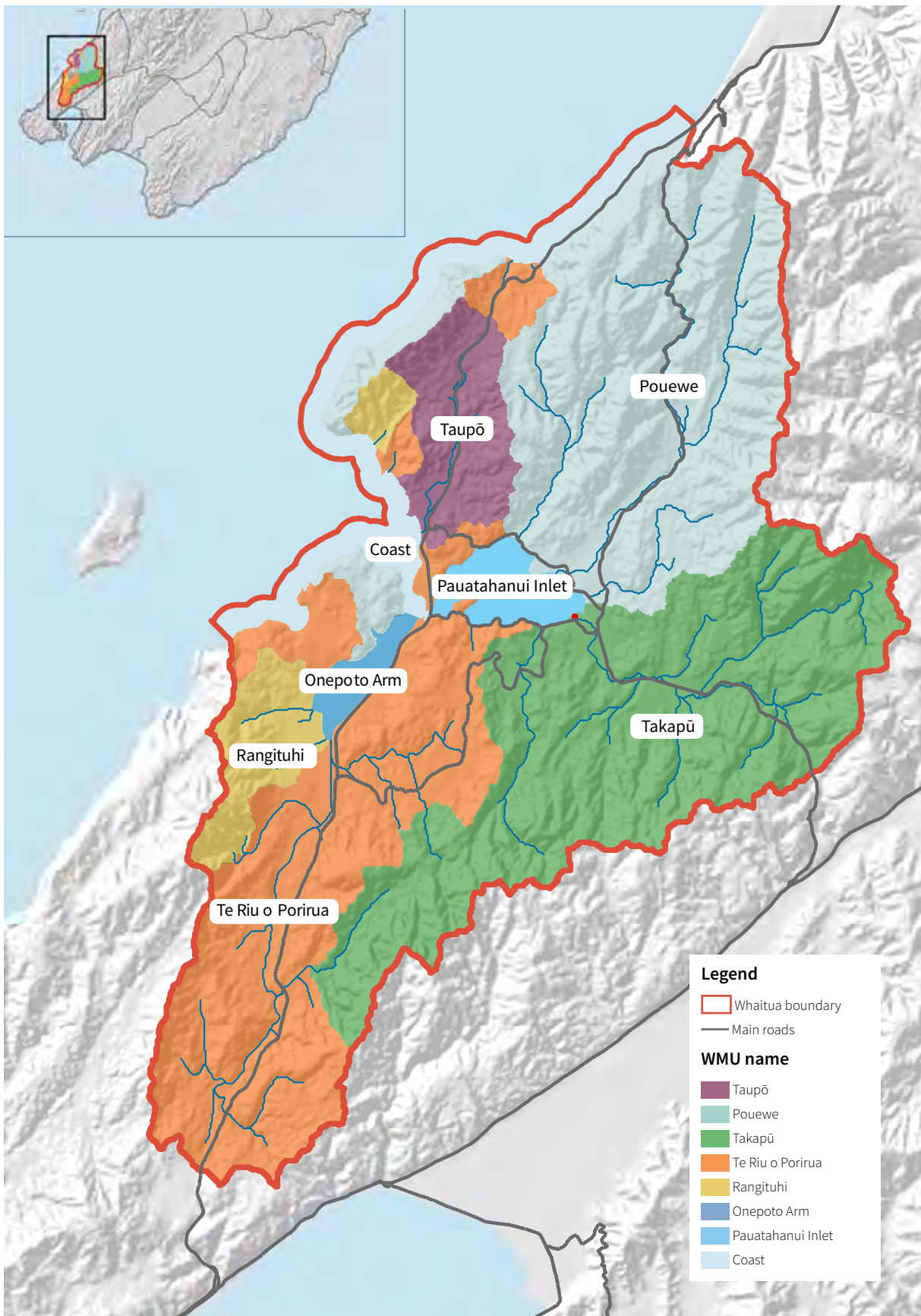
- values and objectives in catchments
- land uses in catchments
- water quality in or between catchments
- management responses that are required within a WMU.

In some cases contaminant load limits and targets are set for the freshwater WMU's (e.g. *E. coli* and ammonia), while others are set for the coastal WMU's (e.g. sediment, metals). A description of the loads, limits and targets for each WMU can be found in Section 5.

Table 2. Freshwater and coastal water management units (WMUs) within Te Awarua-o-Porirua Whaitua

	WMU Name	WMU Description
Freshwater	Taupō	<p>Taupō Stream catchment.</p> <p>A distinct WMU due to the ecological value of Taupō Swamp and the significance of this area to Ngāti Toa Rangatira.</p>
	Rangituhi	<p>The streams on the south-western side of the Onepoto Arm, including the Hukarito, Urukahika and Mahinawa streams. Also includes the headwaters/catchment above Hongoeka marae.</p> <p>Particularly significant to Ngāti Toa Rangatira given the streams' proximity to Takapuwahia and Hongoeka marae.</p> <p>The upper reaches have very good water quality and habitat to maintain.</p> <p>The lower reaches of some of these streams are piped and have poor water quality and will require significant effort to support the high values associated with them.</p>
	Pouewe	<p>Predominantly rural catchments draining directly to the sea or to the northern side of Pauatahanui Inlet, including the streams in Whitireia Park, the Kakaho, Motukaraka and Horokiri Streams and Ration Creek.</p> <p>There is greater opportunity to provide for recreational and ecological values in relation to these streams than in other rural catchments in the Whaitua.</p>
	Takapū	<p>Predominantly rural catchments on the south-eastern side of Pauatahanui Inlet, including Pauatahanui Stream, Duck Creek and the rural headwater tributaries and catchments of the Porirua Stream, including the upper Kenepuru and Takapu Streams.</p> <p>The lower part of Duck Creek is mostly urban but the high ecological and cultural values and objectives associated with Duck Creek align more with this WMU than the Te Riu o Porirua WMU.</p>
	Te Riu o Porirua	<p>Predominantly urban catchments, including those draining to Pukerua Bay and Titahi Bay, streams along the southwestern side of Pauatahanui Inlet and the Porirua Stream (including lower Kenepuru) catchment.</p> <p>Streams in these areas are generally subject to flow, habitat and contaminant-related stresses from urban development.</p>
Coast	Pauatahanui Inlet	<p>The Pauatahanui Inlet of Te Awarua-o-Porirua Harbour. This is the receiving environment for the Pouewe and Takapū WMUs and part of the Te Riu o Porirua WMU.</p> <p>In some cases the objectives for this WMU are set for intertidal and/or sub-tidal areas to recognise differences in the conditions of these two environment types.</p>
	Onepoto Arm	<p>The Onepoto Arm of Te Awarua-o-Porirua Harbour. This is the receiving environment for part of the Te Riu o Porirua and Rangituhi WMUs.</p> <p>In some cases the objectives for the WMU will be set for intertidal and/or sub-tidal areas to recognise differences in the conditions of these two environment types.</p>
	Coast	<p>The open western coast of the Whaitua, including the entrance to the harbour and the outer harbour. This is the receiving environment for the Taupō WMU and part of the Pouewe, Rangituhi and Te Riu o Porirua WMUs.</p>

Figure 2. Map of Te Awarua-o-Porirua Water Management Units





Te Awarua-o-Porirua Objectives

4.1 Background

The objectives describe the environmental outcomes sought for all the waterways and/or coastal water within each WMU and the timeframe in which they need to be achieved. Objectives can be set at a variety of scales and levels of detail and can be described narratively or numerically. A numeric objective can be expressed as either a range or a single figure, while a narrative objective may describe a desired outcome or an acceptable degree of change.

The Committee has identified objectives for freshwater, the harbour and the coast in order to deliver on the values of the Whaitua. The Committee formulated these objectives informed by many strands of knowledge, including input from Ngāti Toa Rangatira, expert assessment, knowledge and experience gained through both professional and personal capacities, and through engaging with the Te Awarua-o-Porirua communities.

Objectives are expressed in Tables 3 and 4 using the attribute states A to D (and A to E for *E. coli*) for attributes¹³ described in the National Objectives Framework (NOF) of the NPSFM.¹⁴ Where an attribute is not in the NOF (e.g., zinc and copper and coastal macroalgae), a state has been developed by experts to align with the NOF attribute state system.¹⁵

The fresh and coastal water objectives have been set to provide for the values of Te Awarua-o-Porirua Whaitua, which include the compulsory national values using the following indicators *Escherichia coli* (*E. coli*), enterococci, ammonia, nitrite, zinc, copper, periphyton, MCI, native fish, macroalgae, sediment and habitat. Some of the objectives are proxies for a broader range of contaminants – for example, zinc and copper are proxies for the range of contaminants found in urban catchments.

Objectives for all these attributes are detailed in Section 4.7 in Tables 3 and 4, while an explanation of each is provided in the following sub-sections.

13 An attribute is a measurable characteristic of freshwater, including physical, chemical and biological properties, which supports a particular value.

14 The NPSFM includes a National Objectives Framework (NOF) which identifies two mandatory 'national values' relating to ecosystem health and human health for recreation and a set of optional values (things that the community want fresh water in their region to be used for, such as swimming, crops and stock watering). The NPSFM sets a number of bottom lines for key attributes for these mandatory values, and directs how councils are to go about setting objectives for the state of water bodies and related limits on takes and discharges. There are some defined biophysical attributes (e.g. *E. coli*, periphyton, nitrate toxicity) for all rivers and lakes. Other values that must be considered include natural form and character, mahinga kai, fishing, irrigation and food production, animal drinking water, wāhi tapu, (sacred places), water supply, commercial and industrial use, transport and tauranga waka (historical places of anchorage).

15 Tables describing the banding system for attributes not in the NOF can be found in Appendix 2.

4.2 Pathogens

E. coli and enterococci are bacteria that indicate the presence of faecal material in water and therefore the possible presence of pathogens (ie, disease-causing bacteria, viruses and protozoa). These may present a risk to human health when people come into contact with them. *E. coli* concentrations are an indicator of the risk to human health in fresh water. Enterococci can survive in salt water and therefore an indicator of the risk to human health in salt water.

Current state

Current state monitoring and modelling information shows high concentrations of *E. coli* and enterococci across the Whaitua. All the freshwater WMUs are in the E attribute state for *E. coli* and the Onepoto Arm and Pauatahanui Inlet WMUs are in the D attribute state for enterococci. Therefore they are all below the national bottom line and require improvement to at least C attribute state. The one exception is the Coast WMU which is in the B attribute state for enterococci. Improvement is difficult due to the significant multiple urban and rural sources of *E. coli* contamination and the small size of the Whaitua sub-catchments with a lack of large vegetated headwater catchments to provide clean water flows capable of diluting contaminated water sources.

Objective state

Objectives for *E. coli* and enterococci have been set in the A, B or C attribute state (Table 3 for *E. coli* and Table 4 of enterococci) in order to be considered suitable for primary contact (i.e. swimming or other water recreation involving full immersion), and to meet statutory requirements and community aspirations. Reducing *E. coli* and enterococci also contributes to providing for other values such as mahinga kai and Māori customary use.

Significant improvements in urban development and rural land use practices across all WMUs will need to occur to achieve these objectives. In a number of catchments, scenario modelling showed that the objectives for pathogens could not be met through the modelled mitigations. The Committee determined however that, despite this challenge, these objectives should stand in light of NPSFM requirements and community expectations. This means that more effort will be required to meet the objectives than the level of effort assumed in the scenarios that were modelled.

4.3 Toxicants

Toxicants are substances that in certain concentrations can injure or kill animals and plants. The effects to aquatic species can be lethal or sub-lethal. Sub-lethal refers to such effects as the reduction of growth rates or reproductive success. Both effects can occur as a result of short-term exposure (over hours or days) or long-term exposure (over weeks, months or years).

4.3.1 Ammonia

Ammonia is a toxicant in freshwater that can cause lethal or sub-lethal effects for aquatic species.

Current state

Ammonia levels throughout the Whaitua are below levels likely to cause toxicant effects most of the time, but in urban areas reach peak concentrations that can have an effect on some species. These short-term peaks occur in catchments which have wastewater overflows.

Objective state

The objectives set for ammonia (Table 3) require a reduction in ammonia levels in the Te Riu o Porirua WMU and the maintenance of current levels in the other WMUs. Addressing wastewater overflows in the Te Riu o Porirua WMU will help achieve the required reductions.

4.3.2 Nitrate

Nitrate is a toxicant in freshwater that can cause lethal or sub-lethal effects to aquatic species. In many cases, nitrate concentrations need to be managed at considerably lower than toxic levels to avoid excessive periphyton and macroalgae growth.

Current state

Nitrate is below levels likely to cause toxicant effects in the Whaitua, but urban areas reach peak concentrations that can have an effect on the most sensitive aquatic species.

Objective state

The objective set for nitrate (Table 3) requires a reduction in nitrate levels in the Te Riu o Porirua WMU, primarily through the management of wastewater overflows. Nitrate levels need to be maintained within an A attribute state in all other WMUs.

4.3.3 Zinc and copper

Metals can have toxicant effects on aquatic life in both a dissolved state and when attached to sediment particles. Zinc and copper have been adopted throughout the WIP as proxies for the suite of other urban contaminants (e.g. polycyclic aromatic hydrocarbons, other toxic metals (such as cadmium and chromium), detergents/surfactants and other chemicals). Copper is approximately 5 to 10 times more toxic to aquatic life than zinc, but occurs in lower concentrations.



One source of metals entering the stormwater network and streams is from old and unpainted roofs.

Current State

Zinc and copper are at low levels in fresh water throughout most of the rural areas in the Whaitua. Peak concentrations are at a level that could cause toxicant effects in the Te Riu o Porirua WMU and parts of other WMUs where there is a high concentration of roading.

Overall, the harbour is considered to be in ‘moderate’ health for metals, with Onepoto Arm having higher levels than Pauatahanui Arm. There are ‘hotspot’ areas in the harbour where metals (attached to sediments) have accumulated, particularly at the southern end of Onepoto Arm. Subtidal sediments show levels of metals above ANZECC and Auckland Regional Council ‘early warning’ guidelines.¹⁶

Objective state

The objectives set are to maintain zinc and copper at current levels across most of the Whaitua, including the Onepoto Arm and Pauathauui Inlet WMUs, and reduce peak levels in the Te Riu o Porirua WMU (Tables 3 and 4).

The coastal water objectives require a reduction in total zinc and copper load to match the reduction in sediment load sought for those WMUs. This is in order to ensure that zinc and copper concentrations in harbour sediment do not increase as a result of the reduced dilution provided by lower sediment loads (see Section 4.5).

New developments will need to minimise additional loads of zinc and copper, and improvements to existing stormwater management practice and control of sources (building and vehicles) will need to occur to reduce the peak levels and amount of metals accumulating in the harbour sediment.

4.4 Ecological Objectives

Ecological objectives describe the desired outcomes for ecological health in the streams and harbour and help ensure the WIP addresses the range of issues that affect ecological health. Ecosystem health varies in response to changes in water quality, flow, habitat and the morphology or form of the stream or estuary caused by a number of stressors including accumulation of contaminants, clearance of riparian vegetation and changing weather patterns.

4.4.1 Periphyton

Periphyton is algae/slime that attaches to hard surfaces such as rocks and tree roots in freshwater environments. It is an important food source for invertebrates and some fish, and can absorb contaminants from water (e.g. nitrate, ammonia, phosphorus and metals). However, too much of it can limit the habitat of macroinvertebrates (e.g. insects, snails and worms), affect the ability of fish to find food, and cause harmful water quality effects such as daily fluctuations in dissolved oxygen and pH (acidity).

Periphyton blooms can also be visually unappealing and can make access to streams difficult (slippery).

Current state

Periphyton is typically in the C attribute state across most of the Whaitua, with the exception of the predominantly forest-covered upper catchments of the Rangituhi streams. Factors that promote periphyton blooms are elevated levels of phosphorus (which is a nutrient that promotes plant growth) and lack of shade (where there is minimal or no riparian vegetation) which can increase water temperature and the amount of light reaching streams. Nitrogen, the other key nutrient for plant growth, is not generally at levels causing excessive periphyton growth in this Whaitua.

Objective state

The objective set is to reduce levels of periphyton across the Whaitua (Table 3). Increased stream shading and reduced in-stream nutrients, particularly phosphorus, will be needed to help reduce periphyton levels.

¹⁶ ANZECC. 2000. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand

4.4.2 Macroinvertebrate Community Index (MCI)

Freshwater invertebrates (e.g. snails, worms and insects) are an important part of the freshwater ecosystem; they feed on algae (helping to keep it at healthy levels) and are an important source of food for fish and birds. Many aquatic invertebrates metamorphose into winged insects as part of their lifecycle, and also play an important part in terrestrial ecosystems. The MCI is a score based on the presence or absence of a range of freshwater invertebrates with different tolerances for pollution. A high MCI score indicates a relatively unpolluted stream with good habitat for diverse and sensitive macroinvertebrates, while a low score indicates polluted water and poor or limited habitat, with a low presence of pollution-sensitive species.

Current State

MCI is typically in the C or B attribute state in most places across the Whaitua. This indicates limited to moderate habitat disturbance, pollution and changes from the expected conditions.

Factors that affect the MCI score in the Whaitua include:

- stream reaches without shading, leading to increased water temperature and light intensity and reduced habitat
- increased flows and more frequent stream bed-disturbing flows, particularly in urban catchments
- increased sediment
- changes to stream-bed and streambank habitat
- increased toxicants including ammonia, zinc and copper.

Objective state

The objective set is to improve the MCI index (i.e. higher scores) in all WMUs, with the exception of the Te Riu o Porirua WMU, where the objective is to maintain the MCI index at current levels (Table 3). The improvements will require increased stream shading and habitat, and reduction in sediment load throughout the Whaitua.



4.4.3 Native fish

Diverse and abundant native freshwater fish populations indicate good ecosystem health.

Current state

Many streams in the Whaitua have excellent diversity of fish species, including at-risk species such as giant kokopu, inanga, longfin eel and redfin bully. Most freshwater WMUs are in the B or C attribute state, reflecting that native freshwater fish populations are under stress or in decline in the Whaitua. Many of the factors that affect MCI also apply to native fish, along with obstructed passage from the sea (including piped sections and physical barriers) throughout the catchment.

Objective state

The objective set is to improve native fish diversity and populations across the Whaitua (Table 3). These improvements will require increased stream shading, habitat and fish passage, and reduction in sediment load throughout the Whaitua, along with improvements to water quality and stream flows in the Te Riu o Porirua WMU.



Tuna, a taonga species, Horokiri Stream in Battle Hill Farm Forest Park.

4.4.4 Macroalgae

Macroalgal species are a ubiquitous and important feature of estuaries, as they provide food, shelter and nursery habitat for aquatic fauna as well as removing excess nutrients from the water. In this way, macroalgae contribute to the high productivity and biodiversity of estuaries. Some level of macroalgae cover is valuable to the ecology of the harbour. However, frequent, extensive and persistent macroalgae blooms have a range of adverse effects, including:

- reducing light for desirable species
- smothering shellfish beds and other desirable species
- reducing waves and currents, causing mud to accumulate
- depleting sediment oxygen and increasing odour as a consequence of decaying macroalgae accumulating on shorelines.

Current state

In the harbour, the red macroalga (*Gracilaria sp.*) and the green macroalga (*Ulva sp.*) dominate the intertidal area. Macroalgae are persistent in the harbour with moderate coverage and low biomass, suggesting that they do not pose an ecological nuisance at current levels. Macroalgae have been assessed as B attribute state in both arms of the harbour. However, seasonal blooms of macroalgae are aesthetically unappealing to some people.

Objective state

The objective is to maintain macroalgae in the harbour at current levels (Table 4). This will require sediment and nutrient inputs (e.g. nitrogen) to remain the same or to be reduced.

4.5 Sedimentation rate and muddiness

Sediment discharged into rivers, streams and harbours can negatively impact a range of values, including ecosystem health and the way people use water for recreational, cultural and spiritual purposes. Sediment affects ecosystem function in rivers and streams by:

- reducing light penetrating the water, affecting the ability of plants to grow
- impacting the health of fish by abrading skin and gills and making predators and prey difficult to see
- filling the interstitial spaces (spaces between rocks and pebbles, etc.) in stream beds, making these spaces less suitable for macroinvertebrate communities to survive and thrive.

In estuaries and harbours, sediment:

- alters and degrades habitat and the composition of ecological communities by smothering invertebrates, shellfish and seagrass
- changes the depth of water and flow patterns
- reduces clarity
- changes the feel of substrate underfoot.



Sediment enters the harbour from a variety of sources and places affecting ecosystem health.

Current state

Sedimentation rates in the harbour vary from year to year depending on the number of storm events in the Whaitua. Modelled information indicates that current sedimentation rates are about 4.7mm annually for the Pauatahanui Inlet and 4.1mm annually for the Onepoto Arm.

Objective state

The objective set is to reduce the sedimentation rate in both arms of Te Awarua-o-Porirua and to reduce muddiness in intertidal areas (Table 4).

Achieving this objective will require a significant reduction in sediment inflows throughout the Whaitua, but is achievable. Even with a reduction in sediment inflows from the wider catchment, the level of overall improvement in sediment levels will be constrained by existing high levels of sediment in the harbour and the harbour's limited flushing capacity. Similarly, high levels of existing mud will constrain the potential for improvement in the overall level of mud in the harbour, even where incoming sediment is reduced.

The sediment reductions required to achieve these objectives for the coastal WMUs are also expected to reduce sediment in fresh water WMUs and help improve ecological health.

4.6 Habitat

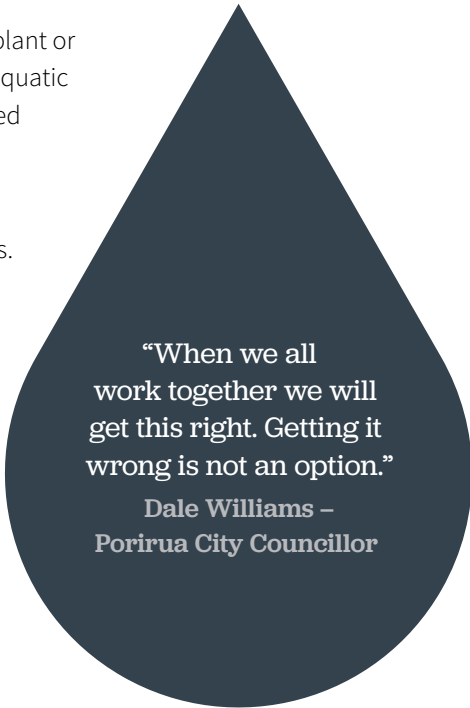
Habitat is the living and non-living environment in which an animal, plant or other organism lives. Poor habitat is a major contributor to reduced aquatic species diversity, poor health of the species population, and decreased population sizes.

The amount of available habitat, and the quality of that habitat, can affect stream water quality and ecosystem health in a number of ways. Riparian vegetation is a key factor determining the quality of stream habitat.

A lack of riparian vegetation can:

- result in less stream shading and increased water temperature
- reduce fish spawning habitat
- cause streambank erosion resulting in increased sedimentation of waterways and affect the functioning of aquatic species in a number of ways, as outlined in Section 4.5.

In addition, fast water flows and lack of riffles and pools can impact life stages of aquatic species and species diversity.



**“When we all
work together we will
get this right. Getting it
wrong is not an option.”**

**Dale Williams –
Porirua City Councillor**

Current state

Stream habitats have been heavily modified in the Whaitua. In urban areas habitat has been cleared and streams modified (e.g. piped, straightened) for urban development and transport links. This has reduced spawning habitat, created barriers to fish passage and reduced physical diversity of streambank and stream-bed habitat. In rural areas, the forest and vegetation that once grew beside streams has been largely removed for pastoral farming.

Objective state

The committee seeks to return stream habitat to a more natural state to promote mahinga kai and ecosystem health (increased levels of MCI and native fish populations and diversity, and reduced levels of nuisance periphyton). Unlike the foregoing objectives, which are expressed using the attribute state banding system, the habitat objectives are expressed in narrative form (section 4.8). Achieving these objectives will require restoration of the natural form and flows of streams, restoration of streambanks and their vegetation, daylighting of streams and removal of barriers to fish passage.

4.7 Summary of Objectives

Table 3 summarises the current and objective states for freshwater attributes for the freshwater WMUs and Table 4 summarises the current state and objective states for attributes relating to coastal water. The numeric objectives for each attribute and WMU can be found in Appendix 3.

Recommendation 1

Greater Wellington amends the PNRP to include the objectives set out in Table 3 and 4 (including the numeric objectives in Appendix 3) and the narrative objectives in Section 4.8.

Table 3. Freshwater objectives and timeframes

	WMU name	Taupō	Rangitūhi	Pouewe	Takapū	Te Riu o Porirua
E. coli	CURRENT STATE	E	E	E	E	E
	OBJECTIVE	B	A	B	C	C
	TIMEFRAME*	2040	2040	2040	2040	2040
Ammonia	CURRENT STATE	A	A	A	A	C
	OBJECTIVE	A	A	A	A	A/C ¹⁷
	TIMEFRAME*	M	M	M	M	M
Nitrate	CURRENT STATE	A	A	A	A	B
	OBJECTIVE	A	A	A	A	A
	TIMEFRAME*	M	M	M	M	2040
Dissolved Zinc	CURRENT STATE	C	D	A	A	D
	OBJECTIVE	A	A	A	A	C
	TIMEFRAME*	2040	2040	M	M	2040
Dissolved Copper	CURRENT STATE	D	D	A	A	D
	OBJECTIVE	B	A	A	A	C
	TIMEFRAME*	2040	2040	M	M	2040
Periphyton	CURRENT STATE	C	A	C	C	C/B ¹⁸
	OBJECTIVE	B	A	B	B	B
	TIMEFRAME*	2040	M	2040	2040	2040
MCI	CURRENT STATE	C	C	C/B ¹⁹	C/B ²⁰	C
	OBJECTIVE	B	A	A	B	C
	TIMEFRAME*	2040	2040	2040	2040	M
Native fish	CURRENT STATE	C	C	B/A	B	C/B
	OBJECTIVE	B	A	A	A	B
	TIMEFRAME*	2040	2040	2040	2040	2040

Notes: The current state is an indication of the conditions across the WMU and aims to help illustrate the magnitude of change required to achieve each water quality objective in the WMU. It is not an authoritative statement on the conditions in every part of the WMU as there is likely to be fine scale variation within WMUs that cannot be captured at this broad scale.

*M – Maintain the current state

17 The attribute state for median ammonia is estimated to be A attribute state and the maximum is estimated to be C attribute state. The objective is to maintain the median in A attribute state and the maximum in C attribute state.

18 Expert evaluation of current state for periphyton in the Te Riu o Porirua WMU is between B and C attribute state.

19 Expert evaluation of current state for MCI in the Pouewe WMU is between B and C state attribute state.

20 Expert evaluation of current state for MCI in the Takapū WMU is between B and C state attribute state.

Table 4. Coastal water objectives and timeframes

WMU name		Onepoto Arm		Pauatahanui Inlet		Coast
		Intertidal	Subtidal	Intertidal	Subtidal	
Enterococci	CURRENT STATE	D		D		B
	OBJECTIVE	C		B		B
	TIMEFRAME*	2040		2040		M
Total zinc in sediment	CURRENT STATE	B	C	A	B	
	OBJECTIVE	B	C	A	B	
	TIMEFRAME*	M	M	M	M	
Total copper in sediment	CURRENT STATE	A	B	A	A	
	OBJECTIVE	A	B	A	A	
	TIMEFRAME*	M	M	M	M	
Macro algae	CURRENT STATE	B	N/A	B	N/A	
	OBJECTIVE	B	N/A	B	N/A	
	TIMEFRAME*	M	N/A	M	N/A	
Sedimentation rate	OBJECTIVE	Net average sedimentation rate is less than 1mm/year in Onepoto Arm (rolling average over the most recent 5 years of data)		Net average sedimentation rate is less than 2mm/year in Pauatahanui Inlet (rolling average over the most recent 5 years of data)		
	TIMEFRAME*	2040		2040		
Muddiness	OBJECTIVE	Sediment mud content will not exceed 20% in intertidal sediments/ no increase from current state	N/A	Sediment mud content will not exceed 20% in intertidal sediments/ no increase from current state	N/A	
	TIMEFRAME*	M	N/A	M	N/A	
Muddiness	OBJECTIVE	Spatial extent of soft mud will not exceed 15% of available intertidal area/no increase in soft mud area from current	N/A	Spatial extent of soft mud will not exceed 15% of available intertidal area/no increase in soft mud area from current	N/A	
	TIMEFRAME*	M	N/A	M	N/A	

*M – Maintain the current state

4.8 Narrative habitat objectives

Habitat is assessed using a range of factors, and therefore its objective state cannot be readily described using numerical measures. Below are a number of factors that together describe the objective state for habitat in the Whaitua:

- the mauri of water is enhanced by restoring ecological habitats, improving water quality and ensuring that healthy and abundant mahinga kai is readily available
- the natural stream flow variability in urbanising areas is maintained and the natural stream flow variability in existing urban areas is restored towards an unmodified state
- the habitat and natural character of streams in the Whaitua:
 - support healthy and diverse macroinvertebrate and native fish populations, and
 - help to control nuisance periphyton and macrophyte growth.
- streams are resilient to streambank erosion
- provision of adequate habitat space for the life-supporting capacity of indigenous fish and other aquatic life in streams, including at times of low flow.

4.9 Achieving community and Ngāti Toa Rangatira aspirations

When developing these objectives, the Committee considered the effort required to meet them within the 2040 timeframe. Substantial changes in practice will be required in both urban and rural areas to meet the objective states. This will take time and effort, and come at considerable cost. What was considered feasible was also based on current methods and technology available – it is possible that more ambitious objectives could be met as new methods and technology become available in the future.

However, in some cases, such as for *E. coli*, objectives have been set at levels that do not align with the aspirations of Ngāti Toa Rangatira or others in the community, who sought A or B attribute state objectives.

The Committee shares the aspirations of Ngāti Toa Rangatira and others in the community to improve the health of Te Awarua-o-Porirua streams, harbours and coast beyond the objectives set in this WIP, but seeks to do so over a longer timeframe. In these instances, the achievement of the 2040 objectives is recognised as the first measurable step to achieving these more ambitious objectives.

Some sites will require more effort than others to achieve the desired objectives. These include the streams that form part of the Rangituhi WMU which are highly valued by Ngāti Toa Rangatira due to their proximity to marae, for mahinga kai and wahi tapu. They are characterised by excellent water quality in the headwaters with poor water quality in the lower reaches. Significant effort in the lower reaches of these streams will be required to achieve the objectives within the 2040 timeframe.

There are also intertidal areas within the harbour where there are localised elevated concentrations of metals in the harbour sediments that do not meet the coastal water objectives. In order to meet the WIP objectives, additional effort will be required to reduce these contaminants in the source catchments.

Recommendation 2

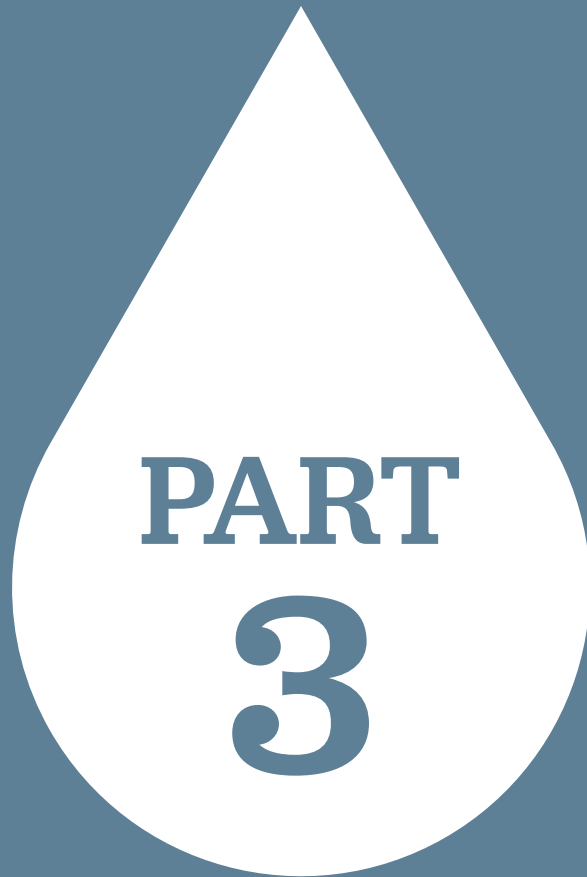
Greater Wellington undertakes a full review at the next regional plan review (in 10 years) on progress towards achieving the objectives in this WIP and the effectiveness of the management responses and makes changes as necessary to the PNRP to ensure progress is satisfactory.

Recommendation 3

Greater Wellington works with Ngāti Toa Rangatira, PCC and Wellington Water through various mechanisms (including the Harbour Strategy) to implement this WIP and prioritise actions within the Rangituhi WMU and the catchments that contribute to hotspot areas of elevated metal concentrations within the harbour. This work will comprise:

- identifying the catchments that contribute to the harbour hotspot areas
- identifying areas of piped stream in the lower reaches of the Rangituhi WMU that could be day-lighted
- targeting a pollution prevention programme (Recommendation 36) within these catchments.





Limits, policies and other methods

The recommendations for limits, policies and methods will work together, and contribute towards achieving more than one objective.



Discharge limits and targets

Limits and targets are part of the policy package for achieving the freshwater and coastal water objectives set out in this WIP. Policy A1 of the NPSFM requires limits to be set for each FMU to give effect to the objectives in the NPSFM and specifically to achieve the freshwater objectives. Limits are set in this WIP at the current load or concentration. Targets are set in this WIP as the maximum load or concentration that can be discharged in the future (by 2040) in order to meet the objective. This recognises the need to maintain or improve water quality. Refer to Section 1.6 for further detail on the requirements of the NPSFM.

The limits and targets are expressed in relation to the estimates of current concentration or loads following the methods used in the water quality modelling for this WIP.²¹ They are intended to represent relative changes from these estimates of current state rather than absolute thresholds for direct comparison with estimates following other methods.

In the Whaitua, fresh and coastal water objectives have been set where applicable for each WMU. The Committee recommends setting discharge load limits and/or targets for sediment, total zinc, total copper, total nitrogen and total phosphorus and concentration limits and/or targets for *E. coli* and ammonia. In the PNRP targets should be expressed as percentage reductions from the limit to allow for increased understanding of water quality through time (e.g. through progressive improvements made to models). Exceedance criteria have been set for dissolved inorganic nitrogen and dissolved reactive phosphorus to help achieve the periphyton objectives.

Discharge load limits and targets have been set at the harbour arm scale (i.e. the catchments for the Onepoto Arm WMU and the Pauatahanui Inlet WMU). The concentration limits and targets have been set for each of the freshwater WMUs.

Policy A1 of the NPSFM also requires that over-allocation (meaning where an objective or limit is not being met) be avoided. A number of water bodies do not currently meet their objectives and, in some cases, do not meet national bottom lines set in the NPSFM. Where discharges and land-use activities contribute to those objectives not being met, there are policies and methods to reduce over-allocation over time.

²¹ Further information on the methodology for load/limit estimates can be found in the Jacobs reports <http://www.gw.govt.nz/technical-reports-4/>

5.1 Limits and targets for *E. coli*

The Committee recommends setting *E. coli* limits and targets in all freshwater WMUs as set out in Table 14 (Appendix 3) to help achieve the pathogen objectives in both freshwater and coastal WMUs.

The level of *E. coli* in a waterbody at a given time is what indicates the risk of people contracting an infection. Therefore, the limits are based on the current state for each freshwater WMU and the targets are based on the objective state concentrations for each freshwater WMU.

The recommendations in Section 9 (Wastewater discharges) and Section 11 (Rural topics) will assist in achieving the *E. coli* limits and targets in this WIP.

Recommendation 4

Greater Wellington amends the policy and rule framework of the PNRP to set water quality limits and targets for *E. coli* for each freshwater WMU within Te Awarua-o-Porirua Whaitua, in accordance with the *E. coli* objectives set out in Table 14 (Appendix 3).

5.2 Limits and targets for Ammonia

The Committee recommends setting ammonia limits and targets in all freshwater WMUs to help achieve the ammonia objectives.

High levels of ammonia in a waterbody at any given time can be toxic to aquatic life. Therefore, the limits are based on the current state for each freshwater WMU and the targets are based on the objective state concentrations for each freshwater WMU. These limits and targets can be found in Table 15 (Appendix 3).

The recommendations in Section 9 (Wastewater discharges) will assist in achieving the limits and targets for ammonia in this WIP.

Recommendation 5

Greater Wellington amends the policy and rule framework of the PNRP to set water quality limits and targets for ammonia for each freshwater WMU within Te Awarua-o-Porirua Whaitua, in accordance with the ammonia objectives in Table 15 (Appendix 3).

5.3 Limits and targets for Total Nitrogen and Total Phosphorus

The Committee recommends setting limits for the load of total nitrogen and total phosphorus entering each harbour arm to support the achievement of the macroalgae objectives in the Onepoto Arm and Pauatahanui Inlet WMUs. Those objectives are seeking to maintain macroalgae at current levels, therefore the limits and targets are also recommended to maintain current nutrient loads entering those WMUs.

The recommendations in Section 8 (Urban development), Section 9 (Wastewater discharges) and Section 11 (Rural topics) will assist in achieving the limits for total phosphorus and total nitrogen in this WIP.

Table 5. Total Nitrogen load limits to be maintained

WMU	Current total nitrogen load	Total nitrogen load limit	Total nitrogen target
	Annual average (tonnes/yr)	Annual average (tonnes/yr)	% reduction from limit
Onepoto Arm	59	59	0
Pauatahanui Inlet	84	84	0

Table 6. Total Phosphorous load limits to be maintained

WMU	Current total phosphorus load	Total phosphorus load limit	Total phosphorus target
	Annual average (kg/yr)	Annual average (kg/yr)	% reduction from limit
Onepoto Arm	3,300	3,300	0
Pauatahanui Inlet	4,500	4,500	0

Recommendation 6

Greater Wellington amends the policy and rule framework of the PNRP to set total nitrogen and total phosphorus load limits entering the Onepoto Arm WMU and Pauatahanui Inlet WMU to maintain the current loads (as shown in Tables 5 and 6).

5.4 Limits and targets for Zinc and Copper

The Committee recommends setting a harbour arm-scale limit and target for total zinc and total copper to achieve the zinc and copper freshwater and coastal water objectives.

To achieve the zinc and copper objectives in the Onepoto Arm and Pauathaunui Inlet WMUs, a reduction in total zinc and copper load is required to match the reduction in sediment load sought for those WMUs. This is in order to ensure zinc and copper concentrations in harbour sediment do not increase as a result of the reduced dilution afforded by lower sediment loads. The sediment load reduction targets (Section 5.5) require a 40% reduction in total sediment. Therefore Tables 7 and 8 show the limit (the current load) of total zinc and copper entering each harbour arm and the 40% load reduction (target) required to meet the objective by 2040.

Setting total zinc and copper load targets entering each harbour arm is also likely to support the achievement of the in-stream dissolved zinc and copper objectives, provided that significant amounts of the load reduction occurs during peak flows and rainfall periods, particularly from streams in the Te Riu o Porirua, Taupō and Rangituhi WMUs. The Committee recognised that when combined with the policies and methods (i.e. policies that target the initial runoff of a rain event and source control), the total zinc and copper load limits and targets for each harbour arm would be able to achieve the freshwater objectives.

The recommendations in Section 8 (Urban development) will assist in achieving the limits for total zinc and total copper in this WIP.

Table 7. Total Zinc load limits and targets to be achieved by 2040 in Te Awarua-o-Porirua Whaitua

WMU	Current total zinc load	Total zinc limit	Total zinc target
	Annual average (kg/yr)	Annual average (kg/yr)	% reduction from limit
Onepoto Arm	2,650	2,650	40
Pauatahanui Inlet	580	580	40

Table 8. Total Copper load limits and targets to be achieved by 2040 in Te Awarua-o-Porirua Whaitua

WMU	Current total copper load	Total copper load limit	Total copper target
	Annual average (kg/yr)	Annual average (kg/yr)	% reduction from limit
Onepoto Arm	240	240	40
Pauatahanui Inlet	70	70	40

Recommendation 7

Greater Wellington amends the policy and rule framework of the PNRP to set total zinc and copper load limits and targets entering the Onepoto Arm WMU and Pauatahanui Inlet WMU, in accordance with Tables 7 and 8.

5.5 Limits and targets for sediment

The Committee recommends setting a harbour arm-scale limit and target for sediment to achieve the coastal water objectives for sedimentation rate and muddiness. Setting sediment targets entering each harbour arm is also likely to support the achievement of the freshwater ecological objectives.

The Committee considered setting catchment specific reduction targets, but recognised that uncertainties in the information available warranted caution against recommending targets at such a scale. The Committee instead decided on setting reduction targets at the harbour arm-scale. This does not preclude prioritising and identifying specific catchments based on their relative contribution to the total sediment load, or addressing particular erosion processes.

The recommendations in Section 10 (Earthworks and forestry) and Section 11 (Rural topics) will assist in achieving the limits and targets for sediment in this WIP.

Table 9. Total sediment load limits and targets to be achieved by 2040 in Te Awarua-o-Porirua Whaitua

WMU	Current total sediment load	Sediment limit	Sediment target
	Annual average (tonnes/yr)	Annual average (tonnes/yr)	% reduction from limit
Onepoto Arm	2,800	2,800	40
Pauatahanui Inlet	5,200	5,200	40

Recommendation 8

Greater Wellington amends the policy and rule framework of the PNRP to set sediment load limits and targets entering the Onepoto Arm WMU and Pauatahanui Inlet WMU, in accordance with Table 9.



Sampling of sediment in the harbours provides valuable information.

5.6 Step-down limits to meet targets

A concern raised by the Committee is that the 2040 timeframe may result in little or no action being taken until the 2040 date nears. This is of particular concern for *E. coli*. The Committee therefore recommends that the PNRP set a series of limits that decrease incrementally, reaching the final target by 2040. The Committee acknowledges that this introduces some complexity and potentially also some challenges, as the level of improvement over time is rarely linear and is influenced by numerous factors, including funding (e.g. for infrastructure projects) and the lag time between actions and improvements (e.g. planting of land to stabilise hill slope erosion).

Recommendation 9

Greater Wellington amends the policy and rule framework of the PNRP to include incrementally decreasing limits for each contaminant over time.

5.7 Criteria for Dissolved Inorganic Nitrogen and Dissolved Reactive Phosphorus

The Committee recommends setting concentration criteria for dissolved inorganic nitrogen (DIN) and dissolved reactive phosphorus (DRP) (as set out in Table 10) in all freshwater WMUs to help achieve the periphyton objectives.

Nutrient concentration criteria are one tool to help avoid large and frequent blooms of periphyton growth. The current levels of DIN and DRP are unlikely to be limiting the growth of periphyton and a reduction in these nutrients, particularly phosphorus, is required to help achieve the periphyton objectives. While these concentration criteria are higher than national guidelines to limit periphyton growth using nutrient limitation alone, the recommendations in Section 6 (Stream form and function) acknowledge that stream shading is an important part of achieving the periphyton objectives.

The recommendations in Section 8 (Urban development), Section 9 (Wastewater discharges) and Section 11 (Rural topics) will assist in achieving the nutrient concentration criteria for DIN and DRP in this WIP.

Table 10. DIN and DRP concentration criteria to be achieved by 2040

WMU name	Dissolved inorganic nitrogen (DIN) (mg/L)	Dissolved reactive phosphorus (DRP) (mg/L)
	Median	Median
Taupō	0.6	0.01
Rangituhi	0.6	0.01
Pouewe	0.6	0.01
Takapū	0.6	0.01
Te Riu o Porirua	0.8	0.013

Recommendation 10

Greater Wellington amends the policy and rule framework of the PNRP to set nutrient concentration criteria for DIN and DRP concentrations for each freshwater WMU within Te Awarua-o-Porirua Whaitua, in accordance with Table 10.



Stream form and function

6.1 Development of an aquatic ecosystem and habitat action plan

Councils, landowners and community groups have put a lot of effort into improving aquatic habitats and water quality in the Whaitua. However, alignment and planning of restoration efforts has not been strategically targeted to areas where the greatest impact could be made. Furthermore, there is a lack of understanding by the public of the current state (baseline) of the Whaitua and thus the level of increased effort needed to achieve the objectives in this WIP.

As a matter of urgency, the Committee recommends that a comprehensive action plan for improving knowledge and management of the aquatic ecosystems and habitats in Te Awarua-o-Porirua be developed. This action plan should build on existing research, monitoring, and restoration programmes, those actions commenced under the Harbour Strategy, and integrate local and traditional knowledge.

The action plan could be developed in a three-step process, 1) baseline assessment of aquatic ecosystem health, 2) identification of factors affecting aquatic ecosystem health, and 3) an implementation plan with prioritisation of catchments for attention.

The action plan should be a living document, updated with new information as it becomes available, ensuring that opportunities to apply different approaches and new technologies are capitalised on. Consideration could be given on how best to monitor and report on progress in the action plan.

The action plan will help inform the development of other initiatives recommended in this WIP (e.g. those for riparian management and improving stream form and function) and help achieve the objectives for MCI, periphyton, native fish and habitat.

Recommendation 11

Together with Harbour Strategy partners PCC, WCC and Ngāti Toa Rangatira, Greater Wellington develops and implements an aquatic ecosystem and habitat action plan for Te Awarua-o-Porirua Whaitua to achieve the freshwater and coastal water objectives.

Greater Wellington amends the PNRP to include this action plan development as a method for achievement of the objectives.

The action plan could include, but not be limited to, the following components.

- 1) **Baseline assessment** of aquatic ecosystem health including identification, analysis and mapping of:
 - aquatic habitats, including wetland seep areas and streams (perennial, intermittent and ephemeral)
 - existing riparian vegetation and its protection (e.g. fenced areas) and
 - areas of ecological significance, including spawning areas.
- 2) **Identification of factors affecting ecosystem health** including:
 - locations with streambank erosion
 - stormwater outfalls and retaining structures
 - high-risk sediment source areas
 - fish passage barriers and
 - modified areas of water courses (e.g. straightened, piped, hard edged or bottomed streams).
- 3) **Implementation plan**, including:
 - prioritisation of catchments and interventions for greatest impact
 - criteria for re-vegetation and other measurable targets
 - targets and timeframes to protect and restore aquatic habitats and
 - a description of commitments by Greater Wellington, other relevant organisations and landowners.

When developing and implementing the action plan, Greater Wellington should:

- work with landowners, councils, sectors and community groups
- incorporate traditional and local knowledge
- ensure all riparian margins on Greater Wellington land are protected and planted (where practicable) as a matter of priority to showcase best practice
- align with existing programmes, including those in the revised Harbour Strategy and
- recognise, review and align with PNRP changes, including schedules identifying areas of significance.

This aquatic ecosystem and habitat action plan would ideally be integrated into the reviewed and revised actions of Harbour Strategy partners (Greater Wellington, PCC, WCC and Ngāti Toa Rangatira) in the updated Harbour Strategy.

6.2 Improved management of riparian margins

Management of riparian margins through restoration and protection of streambank vegetation helps mitigate the effects of land use. Benefits include:

- bank stabilisation and erosion/sediment control
- shading which reduces water temperature and the growth of nuisance weeds and algae
- reducing water flow rate
- reducing nutrients and pathogens entering streams
- providing food sources for instream species
- reducing stock damage to streambanks and streams
- restoring native habitats such as fish spawning sites.



Stream bank erosion can be mitigated through riparian planting.

While the riparian fencing and planting is in itself important, the ongoing management of riparian corridors (e.g. the maintenance of fences and pest control) is equally important. There will be implications for landowners (e.g. cost and maintenance) and councils need to expand their support through environmental plans, education and funding options.

A huge opportunity exists to protect and restore riparian margins during the planning and development phases of greenfield and brownfield developments. For example, new urban developments should be set back from streams, and activities within an identified riparian margin strip should be controlled for effects on water quality, habitat and channel form. Any new policies and rules should not prevent the installation of appropriate and beneficial structures such as streamside paths and stormwater treatment devices within riparian margins.

Recommendation 12

Greater Wellington, WCC and PCC amend the policy and rule framework in the PNRP and district plans to control the effects of urban development on riparian margins. The framework must require:

- setbacks from streams for any activity (excluding riparian restoration activities)
- restrictions on hard surfaces.

Recommendation 13

Greater Wellington work with WCC and PCC:

- to identify options to protect, restore and enhance riparian margins in greenfield and brownfield developments
- on a Whaitua-wide riparian protection, planting and maintenance programme by:
 - increasing funding (and awareness of existing funding) for riparian protection and restoration (including fencing, planting and maintenance)
 - building partnerships and supporting existing and new restoration projects
 - providing educational programmes and expert advice.

6.3 Improving stream form and function

Stream morphology is complex and a holistic integrated catchment approach to management should be applied to understand the issues and tailor solutions. For example, recommendations in later chapters regarding retirement of land in the steeper rural areas, mainly in the headwaters, is likely to get significant gains in reducing streambank erosion. Over time, as native forest and scrub regenerates and water runoff decreases, the need for interventions downstream may decrease.

Many of the streams in the Whaitua are heavily modified as a result of channel straightening and the construction of weirs and culverts, affecting fish passage, reducing riparian shading, and contributing to sedimentation, contamination and altered flows. The following recommendations will prevent further adverse modification of streams.

Consideration should be given to restoring sections of streams to their natural state where this is feasible, noting that restoring some streams will be challenging and in some cases not possible due to flood control priorities. Restoration can be achieved by removing barriers to fish passage (or mitigating them with devices such as fish ladders), improving habitat in the lower reaches of streams, and the daylighting of streams (the redirection of a stream into an above-ground channel). In rural areas, vegetation clearance increases runoff from pasture and leads to streambank erosion, slumps and blow-outs in high rainfall events. Some streams with very high sediment loss rates, such as Pauatahanui Stream, may require a range of tailored solutions, and landowners need to be encouraged to take action by being offered support and incentives.



Water quality in channelised streams like this can be improved by restoring natural form and function where feasible (Porirua Stream).

Recommendation 14

Greater Wellington amends the PNRP policy and rule framework to require, where necessary:

- protection and restoration of all aquatic ecosystems in the Te Awarua-o-Porirua Whaitua
- the avoidance of reclamation and/or drainage of beds of lakes, streams (including intermittent) and wetlands, with no exemption for special housing areas and urban growth areas.

Recommendation 15

Greater Wellington works with PCC, WCC and Wellington Water to identify opportunities to enhance the natural form, character, ecosystem health and capacity for mahinga kai of streams and the harbour, including:

- restoring modified streams, including hard-edged, hard-bottomed (e.g. concreted) or channelled sections, to provide physical diversity of banks and bed habitat
- restoring natural meander in straightened channels
- restoring piped or culverted reaches to a more natural state by daylighting streams
- protecting native aquatic species habitat
- protecting fish passage, including removal of tide valves from stream outlets or use of valves which enable fish passage and
- investigating fish passage barriers in piped streams and developing methods to enhance their ecological connectivity.

Recommendation 16

Greater Wellington works towards reducing streambank erosion by:

- investigating the causes of streambank erosion
- identifying land-use activities that contribute to streambank erosion
- exploring options for streambank protection and rehabilitation, including options to support and incentivise landowner action.



Whaitua-wide responses

7.1 Support for catchment groups

Catchment groups will play an important role in achieving the objectives, limits and targets in this WIP. Currently there are a limited number of catchment groups within the Whaitua.²² The Committee recommends that the number of catchment groups is increased and they are supported to set goals and deliver good outcomes for water quality.

Integrated catchment planning, a holistic approach to managing water and land use at a catchment scale, must be implemented. This will ensure risks and issues both upstream and downstream are identified and mitigated.

“Important to understand the values this harbour supported have been lost in the space of only a couple of generations... Unfortunately what we’ve done on the land has had a significant impact and that’s really changed the social fabric and the way people relate to both the harbour and the freshwater.”

Stu Farrant –
Chair Te Awarua-o-Porirua
Whaitua Committee

Recommendation 17

Greater Wellington works together with Ngāti toa Rangatira, PCC, WCC and other relevant stakeholders to help set up and/or support catchment and community groups to identify and implement optimal local solutions to achieve the objectives, limits and targets in this WIP.

²² Catchment groups are collaborative working groups, made up of local stakeholders that are established to address environmental issues within a specific catchment.

7.2 Raising the profile of water and improving ‘water literacy’

Achieving the objectives in this WIP will require the involvement and support of as many people as possible in the Whaitua. This means that the community’s connection to the streams and the harbour is improved, so that there is a clear understanding of the value the community place on these areas, the causes of degradation, and the shifts in practice required. The Committee recommends a range of mechanisms for an integrated education campaign to enhance community connection with water and to engender an all-of-community effort.

Recommendation 18

Greater Wellington, WCC, PCC and Wellington Water work together to raise water literacy, awareness of receiving freshwater and marine environments, and consumption and conservation practices. This work will be coordinated and delivered through various mechanisms (including the Harbour Strategy) and should include:

- PCC and WCC adding an ‘Environmental Water Zone’ to residential and commercial Land Information Memorandum (LIM) reports to link properties with receiving freshwater and marine environments
- naming streams from headwaters to the harbour, including piped sections and drains, and using these in stormwater network infrastructure and asset plans
- installing signs at all freshwater outlets into the harbour, including pipes, to indicate that they are streams
- Greater Wellington developing an online interactive mapping tool with a GIS layer identifying WMUs and associated streams, including headwaters.

7.3 Encouraging innovation and continuous improvement

The Wellington region is lagging behind other New Zealand and international cities in employing good practice across a range of land and water management practices.

An obvious example is the lack of water-sensitive urban design practices in urban developments. The implementation of this WIP is an opportunity for the Wellington region to catch up and develop new innovative practices and to be world-leading in integrated catchment management.

Recommendation 19

Innovation in land and water management practice in Te Awarua-o-Porirua Whaitua is encouraged and actively facilitated by Greater Wellington, PCC, WCC and Wellington Water, including by:

- regularly monitoring and reviewing progress towards achieving the freshwater and coastal water objectives as set out in this WIP and the updated Harbour Strategy and the effectiveness of the management responses
- adding a policy into the PNRP, to be considered in resource consent processes, that recognises the value of innovative practice in the achievement of the objectives of Te Awarua-o-Porirua Harbour Whaitua
- taking opportunities for ongoing plan changes and updates to guidance documents to provide for innovative practice
- avoiding resource consent conditions that would prevent trialling of alternative management approaches
- encouraging and providing opportunities for landowners and sector groups to develop innovative practice
- investing in research and development to identify and adopt innovative practice.

7.4 Agencies need to lead by example

This WIP requires major changes in how urban development is planned and undertaken, how rural land is managed, and how land-use activities and practices are undertaken. This will require individuals, communities and institutions to change and improve practices.

Greater Wellington, PCC, WCC and Wellington Water maximise the opportunities to showcase good water management practice to positively influence the nature and the rate of change required to achieve the objectives in this WIP.

Recommendation 20

Greater Wellington, PCC, WCC and Wellington Water maximise opportunities to demonstrate good management practice in respect of ecosystem health and water management, including by:

- demonstrating water-sensitive urban design practice on projects such as town centre redevelopments, transport hubs and buildings
- replacing copper brake pads in fleet vehicles with low copper or copper-free alternatives
- increasing targeted street sweeping in high traffic locations
- demonstrating and showcasing good practice land and ecosystem management on council land, including in Greater Wellington's regional parks
- promoting good practice by community and industry
- identifying opportunities to promote best practice water management messages through the media.

These opportunities will be identified and delivered through the various mechanisms, including the Harbour Strategy. They may also be included in other planning documents developed by Greater Wellington and the contributing agencies such as the Parks Network Plan.

7.5 Further investigations and monitoring

Monitoring should provide meaningful and readily understood data to encourage accountability and inform decision-making processes. It should provide the information needed to review the effectiveness of policies and management activities to inform an adaptive management approach. Monitoring plans must be practical and affordable, with monitoring sites selected for their ability to represent WMUs and their ability to measure progress towards meeting the objectives in this WIP.

In addition to monitoring, there is a need for targeted investigations where the causes of poor water quality are not well understood.

Recommendation 21

Greater Wellington undertakes an exercise to determine additional investigations and monitoring needed to better understand the causes and effects of poor water quality to inform future management.

7.6 Citizen science

The comprehensive monitoring of the water quality and assessment of the effectiveness of interventions will require more capacity than Greater Wellington has available. Involving the local community in monitoring water quality and stream health will provide valuable information to inform future management decisions. It will also empower the local community to become informed, involved and invested in good ecological outcomes.

Recommendation 22

Greater Wellington works with relevant agencies and groups to support citizen science initiatives that enable communities to assess stream health and evaluate management activities.

7.7 Compliance and enforcement

Local authorities will need to upgrade and align their compliance and enforcement practices to support the new regulatory approaches recommended in this WIP. A consistent and reliable approach should be taken to the enforcement of all water-related policies, bylaws and regulations.

New rules and regulations for existing land uses may need to include a transition period whereby land and business owners are given time to adapt, and incentives should be utilised to maximise uptake of new land and water management practices.

In the same way that citizen science initiatives can provide more information than council staff have the capacity to collect, the local community can also be upskilled to enable them to provide an effective watchdog role reporting non-compliance and pollution incidents.

Recommendation 23

Greater Wellington, PCC, WCC and Wellington Water reviews their compliance and enforcement practices to ensure:

- a consistent and reliable approach between institutions to the enforcement of all water-related policies, bylaws and regulations, creating a clear pathway for changing practice
- regulations are applied fairly and consistently
- sufficient resource is committed for compliance and enforcement activities, including the collection of financial fines for infringements
- local communities are provided with enough information to enable them to more effectively assist with reporting of non-compliance and pollution incidents to the council.



Urban development

8.1 Background

8.1.1 Key issues and drivers

Urban development impacts water quality and ecosystem health in a variety of ways. The modification of landform and increased level of impervious surfaces associated with traditional urban developments can impact landscape and natural character values and result in changes to the hydrology of catchments, creating more frequent high-intensity flushing flows and reducing base flows in streams. Urban land uses also generate a mix of contaminants that enter the streams and harbours directly or indirectly through the stormwater and wastewater networks. The existing wastewater and stormwater networks are also aging and in need of significant upgrades. New urban developments have the potential to put pressure on systems already stretched to capacity.

There are currently pressures to increase housing in the catchment and, in the past, this has generally been provided for through greenfield development. The Committee were keenly aware of the need to increase housing capacity and allow for the provision of a range of new housing types, including infill housing, large-scale brownfield redevelopments, targeted intensification in and around town and city centres, and greenfield developments.

Greenfield and infill developments inevitably result in an increase in the overall contaminant load and changes to in-stream peak flows. However, brownfield redevelopment sites offer opportunities to reduce the current impacts, thus potentially offsetting increases from greenfield and infill development. Put simply, greenfield development will always increase the contaminant load although this can be minimised. Contaminant load reductions can only come from changes of practice, infrastructure and land use within the existing urban areas.

8.1.2 Policy package for urban development

This WIP sets objectives and limits for zinc and copper as proxies for the suite of other urban contaminants. The policy package is intended to address a range of urban contaminants. Contaminant load reductions, as set out in Section 5 of this WIP, will require a substantial change in how urban land is developed and how land-use activities are undertaken. The urban development policy package tackles both existing and new land-use activities and developments. It seeks to ensure that:

- future urban development meets housing capacity needs, is well planned and achieves multiple social, cultural, economic and environmental objectives
- the residual contaminant load from all new developments is strictly controlled to minimise any increase in load from greenfield and infill developments and to maximise load reductions from brownfield redevelopments
- urban development is regulated for its effects on water quality, in-stream peak flows and ecological health, with an emphasis on national best practice in water-sensitive urban design and source control

- the extent of greenfield development areas is controlled to plan for and manage the resulting increase in contaminant load
- brownfield and infill developments are incentivised to reduce the reliance on greenfield developments and reduce the existing contaminant load through upgrading of building materials and infrastructure (both private and public)
- the contaminant load from existing land-use activities is reduced with a focus on areas that contribute a significant proportion of the contaminant load or those areas requiring a greater improvement, such as those identified in Recommendation 3.

The urban development policy package will assist in achieving the desired objectives for water quality, MCI, periphyton, native fish and habitat and will have additional benefits of reducing peak flows, contributing towards climate change mitigation and resilience, and providing social and cultural benefits for the community.

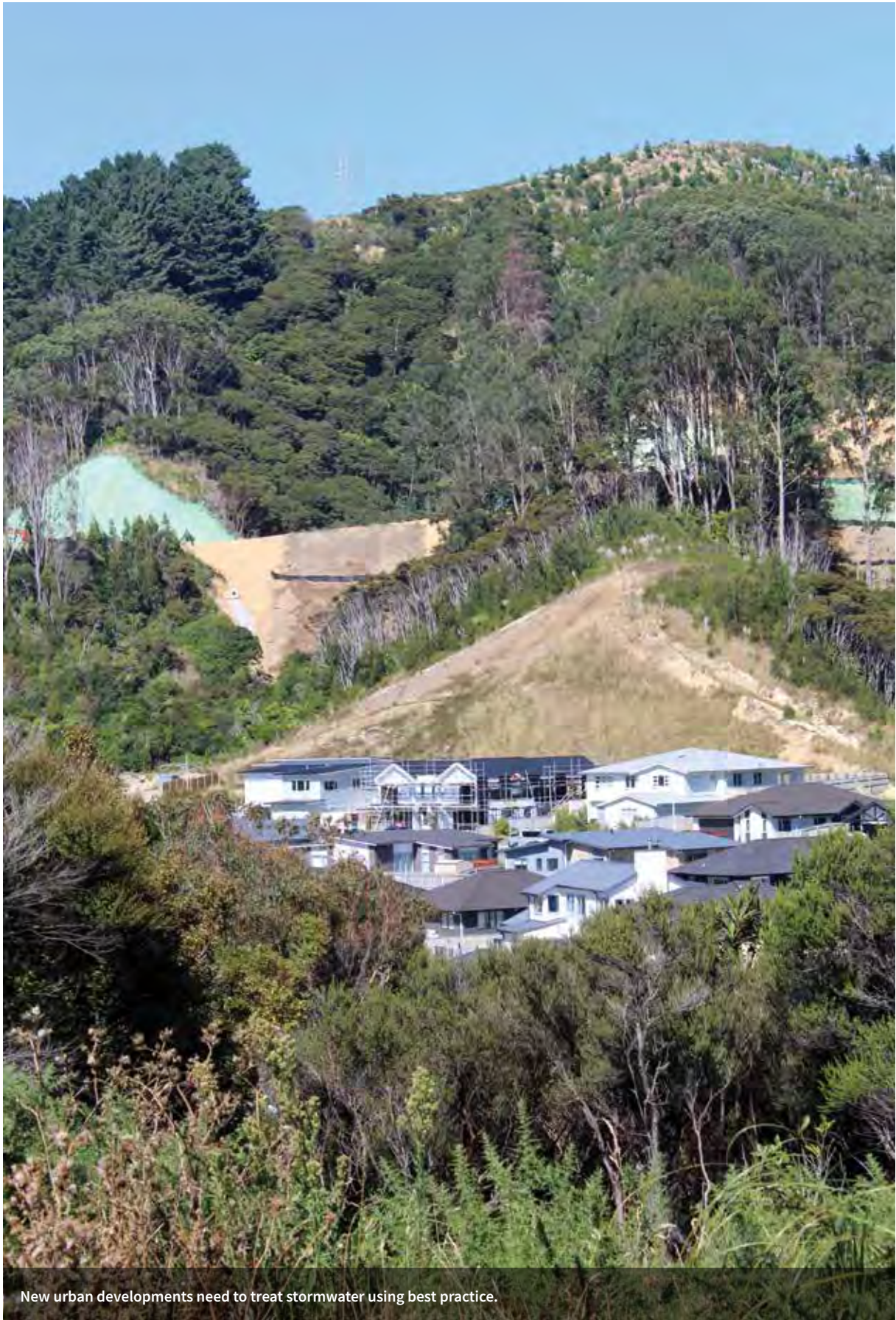
8.2 Integrated planning to achieve multiple objectives

Planning for successful urban areas is complex as there are numerous parties and interests involved. Urban developments are commonly undertaken by private developers and need to be economically viable. However, urban areas also need to achieve social, cultural, economic and environmental outcomes expected by iwi and the wider community and administered on their behalf by local authorities. Each agency (Greater Wellington, PCC, WCC and Wellington Water) plans for and manages urban development and its effects within the remit of their legislated functions, roles and responsibilities. At times these overlap, with more than one agency responsible. In the past there has not been adequate alignment between these different agencies and levels of planning and delivery (e.g. between regional plan, structure and district plans and the construction phase). However, this is beginning to change with the city councils and Greater Wellington working together with developers to plan for new urban developments. The Committee supports and encourages this change.

Local authorities share the responsibility for planning for urban growth and managing its associated social, cultural, economic and environmental effects. The responsibility for maintaining and improving water quality and ecosystem health does not solely fall on the regional council and likewise providing for urban growth is not solely the responsibility of the city councils and Wellington Water. Integrated planning aimed at changing land development practice can achieve the requirements of both the NPSUDC and the NPSFM.

The regional council and city councils have a role in the management of urban development under the RMA. This means that Greater Wellington, PCC, WCC and Wellington Water must work together to align policy direction and planning process to achieve shared social, cultural, economic and environmental objectives. The intention is to instigate and accelerate changes in land development practice by providing clear policy direction across the local authorities and avoiding complicated overlapping planning processes.

To align policy direction and planning processes across Greater Wellington, PCC and WCC the Committee recommends that Greater Wellington, PCC, WCC and Wellington Water, undertake a spatial planning exercise to develop a common vision for the future of Te Awarua-o-Porirua Whaitua which achieves both housing capacity requirements and water quality and ecosystem health requirements.



New urban developments need to treat stormwater using best practice.

Recommendation 24

Greater Wellington, WCC, PCC and Wellington Water look at options for spatial planning for the future development of Te-Awarua-o-Porirua Whaitua.

Recommendation 25

Greater Wellington, WCC, PCC and Wellington Water work to align urban growth planning within Te Awarua-o-Porirua Whaitua to achieve social, cultural, economic and environmental objectives that provide for the values of Ngāti Toa Rangatira and the community. Consideration must be given to the:

- National Policy Statement for Urban Development Capacity, including the results from the Wellington Housing and Business Capacity Assessment
- National Policy Statement for Freshwater Management, including the freshwater objectives, limits and targets for Te Awarua-o-Porirua Harbour and streams
- full cost of urban development, including construction and maintenance of infrastructure over its lifetime
- specific characteristics of Te Awarua-o-Porirua Whaitua, including the relationship with Ngāti Toa Rangatira, topography, demography, transport infrastructure and urban form.

Recommendation 26

Greater Wellington, PCC, WCC and Wellington Water work together to provide a clear cohesive policy direction and align and streamline planning processes. This work may include:

- amendments to the Regional Policy Statement for the Wellington Region to guide regional and district plan changes
- alignment of strategic plans, regional plans, district plans, and infrastructure plans and supporting documentation including water-sensitive urban design guidelines
- joint resource consent application processing
- joint plan change processing to add new urban areas to existing zoned areas
- distinction in respect of any jurisdictional overlap
- utilising the transfer of powers or delegated authority provisions in the RMA.

8.3 Water quality and in-stream flow effects of new urban development

Currently, the urban development effects on hydrology, water quality and ecosystem health that are managed by regional and district plans are those associated with the need to prevent and manage flood risk and with sediment from earthworks during the construction phase of developments. There is an absence of management under both the regional and district planning processes in respect of the ongoing effects of urban development on flow variability, water quality and ecosystem health as required by the RMA. This is a serious management omission. PCC is currently reviewing their district plan and the current draft district plan aligns well with the intentions of this WIP.

The following recommendations seek to control the location and extent of greenfield development areas and minimise the contaminant loads from all new urban development, thereby keeping any increases in contaminant loads and changes to in-stream flows to a minimum and maximising the possibility of sufficient offset reductions through brownfield redevelopment areas.

The Committee considered a formal offsetting scheme whereby new development must offset its adverse effects. However, a scheme of this nature would be technically and legally complicated with a risk that it would not achieve the desired outcome. The Committee concluded that the promotion of well managed brownfield and infill development should be sufficient to drive the offset improvements required.

8.3.1 Greenfield development areas

District Plans currently control the area of land available for greenfield development through a policy and rule framework that enables urban development within urban zoned areas such as residential and commercial areas and discourages urban developments in those areas not intended for urban development such as rural zoned areas. Periodically, plan changes are undertaken to rezone rural land to urban land to enable more greenfield development. The plan change process allows for the effects of the greenfield development area to be assessed.

There is no equivalent planning process for the consideration of greenfield development land at the regional level. The Committee recommends that the PNRP also manages the creation of greenfield development areas in respect of their impacts on water quality and quantity. The 'identified urban area' within the PNRP could include areas currently zoned urban and future areas proposed to be rezoned urban. Alignment with district planning is critical to the success of this direction.

Recommendation 27

Greater Wellington amends the PNRP to include a policy and rule framework that identifies the urban area and controls the location and extent of new urban development areas within Te-Awarua-o-Porirua. The framework must set a more stringent rule activity status for new urban development outside of the identified urban area.

8.3.2 Water-sensitive urban design

The Committee concluded that to instigate a change in land development practice a regulatory regime is required for all new developments, regardless of their scale and location, to minimise contaminant loads and changes in catchment hydrology. Requiring national good practice in water-sensitive urban design and setting a clear performance standard for new development is critical to minimising these effects.

Water-sensitive urban design is an interdisciplinary approach that applies to the planning, design and implementation phases of development, with the aim of minimising the adverse effects from urban development. It takes a comprehensive view of land developments integrating land use and water management. Water-sensitive urban design practice influences all stages of land development from high-level subdivision design and layout to more specific elements such as public stormwater treatment devices, rainwater tanks and roofing materials for individual dwellings. There is currently only limited consideration of water-sensitive urban design and stormwater management within the Wellington region. The city councils are starting to introduce the principles into their policy and planning.

Greenfield development will generate urban contaminants – irrespective of how well-designed, constructed and maintained. This may mean that some catchments or tributaries will experience an increased contaminant load. To achieve the required load reductions and maintain water quality within each WMU, the increases from greenfield developments must be minimised and offset through reductions in the load from existing urban areas.

Brownfield and infill developments offer significant opportunities to reduce the current contaminant load from existing urban areas. These reductions can be gained through:

- improved practice in water-sensitive urban design (reducing imperviousness);
- installation of rainwater tanks
- improvements in stormwater infrastructure (beyond subdivision scale) utilising measures such as wetlands and rain gardens; and
- replacement of old pipes and any associated cross connections and leaky pipes.

Recommendation 28

Greater Wellington, WCC and PCC amend the policy and rule framework in the PNRP and the district plans to control the effects of urban development on water quality and catchment hydrology. In particular the policy and rule framework must:

- require the design, construction and maintenance of developments to demonstrate good practice in water sensitive urban design
- specify that a certain percentage of the mean annual volume of the catchment be treated by an approved device(s) to achieve a certain percentage reduction in total zinc and copper, these being proxies for a suite of other contaminants
- manage the effects from both small infill developments and larger scale brownfield and greenfield developments through permitted activity conditions and the resource consenting process.

Recommendation 29


Greater Wellington, PCC, WCC and Wellington Water look for opportunities to initiate and incentivise the adoption of good practice in water-sensitive urban design, including through:

- development and implementation of an education programme for consultants, developers and council staff on the new policy direction and ways to meet requirements
- programmes that improve industry and council capability and capacity
- financial incentives
- recognition and acknowledgement of good practice through certification schemes and design competitions.

8.3.3 Flow variability

Conventional forms of urban development tend to increase the proportion of impervious surfaces leading to more runoff, higher and quicker peak flows, and lower baseflows. This generally results in more frequent flooding, more frequent small to medium-sized flow variability, stream erosion and consequently less abundant and diverse freshwater communities (e.g. invertebrates and fish). Piped networks for stormwater contribute to these effects by speeding up the delivery of stormwater to streams and straightened, enlarged and hardened channels deliver flow more quickly downstream.

Historically, urban development in the Whaitua has used traditional design and engineering approaches with little focus on reducing the effects described above. Future urban development within the Whaitua, if not carefully managed, can be expected to further alter the flow regime of receiving streams by increasing the volume, rate and frequency of stormwater runoff discharges. The degree of impact this has will depend on the characteristics of land development and the type of stormwater management practices that are adopted for developments.



“Good, better, best.
Never let it rest.
‘Til your good is better
and your better is best.”

St. Jerome

Diane Strugnell –
Community Representative
and Barbara Donaldson –
Greater Wellington Regional
Councillor

Climate change is likely to further exacerbate effects of urbanisation on mid-range flow variability and flooding. The amount of rain falling during heavy rainfall days (>99th percentile of daily rainfall) is likely to increase by 0–15% by 2040 and 5–25% by 2090, while the size of mean annual floods in streams is likely to increase by up to 40% by 2040 and up to 80% by 2090.²³

Modelling was used to simulate the benefits of various water management strategies for reducing the impacts of greenfield and infill urban development on catchment runoff, including rainwater and stormwater harvesting and reuse, bioretention (with infiltration), permeable paving and wetlands. The results demonstrated that adopting integrated water management practices within residential developments helps mitigate the impacts of urbanisation on runoff volume, flooding, and small to mid-range flow variability and its consequent effects on stream erosion and aquatic ecosystems. Adopting some of these practices, such as rainwater and stormwater harvesting, can also reduce demands on the mains water supply and would thus improve community resilience to temporary disruption of supply following earthquakes/drought, as well as improve resilience to the likely future effects of climate change.

The modelling showed that comprehensive adoption of water sensitive urban design principles and stormwater management was able to produce a runoff regime that approximated that of the pre-development condition. On this basis and having regard to the costs involved, the Committee considers that greenfield and infill urban development in the Whaitua should be required to employ available design practices to achieve a high level of hydrological neutrality comparable to the undeveloped condition.

23 GWRC 2017. Whaitua climate change projections <http://www.gw.govt.nz/assets/Climate-change-2/WhaituaClimateChangeprojections.pdf>

Recommendation 30

Greater Wellington, WCC and PCC amend the policy and rule framework in the PNRP and/ the district plans, to control hydrological impacts of urban development by ensuring that the design, construction and maintenance of new developments manage stormwater runoff to mitigate changes in runoff volumes and flow rates. This will be achieved through good practice in water-sensitive urban design. In particular the policy and rule framework must require the following from developers.

For greenfield development:

- the modelled mean annual runoff volume generated by the fully developed area must not exceed the mean annual runoff volume modelled from the site in an undeveloped (pastoral) state
- the modelled mean annual exceedance frequency of the 2-year Average Recurrence Interval (ARI) so-called ‘channel forming’ (or ‘bankfull’) flow for the point where the fully developed area discharges to a stream must not exceed the mean annual exceedance frequency modelled for the same site and flow event arising from the area in an undeveloped (pastoral) state.

For brownfield and infill development:

- the modelled mean annual runoff volume generated by the fully developed area must, when compared to the mean annual runoff volume modelled for the site prior to the brownfield or infill development, be reduced as far as practicable towards the mean annual runoff volume modelled for the site in an undeveloped state
- the modelled mean annual exceedance frequency of the 2-year ARI so-called ‘channel forming’ (or ‘bankfull’) flow for the point where the fully developed area discharges to a stream, or stormwater network, shall be reduced as far as practicable towards the mean annual exceedance frequency modelled for the same site and flow event in an undeveloped state. (See also implementation notes, below.)

Implementation notes for Recommendation 30

- Potential developers will be required to demonstrate compliance with the above hydrological limits through the process of obtaining resource consent.
- The policy and rule framework will include a permitted activity threshold for small brownfield and infill developments, above which a consent pathway is required to demonstrate compliance with the hydrological limits. The permitted activity provision will include conditions requiring prescriptive, demonstrable minimum standards of practice to be met for small activities to be permitted.
- Guidance will be provided on acceptable models for developers to use in their consent application to demonstrate compliance with limits. This will include guidance on acceptable assumptions around the meaning of ‘undeveloped state’. The same model must be used to assess the pre-, post- and undeveloped state for a given development application, in order to provide a robust assessment against the limits.
- For brownfield and infill developments, the practicability of the proposed reductions in mean annual runoff volume and mean annual exceedance frequency must be justified in the consent application for the proposed development.

8.4 Stormwater discharges

The impervious surfaces within urban areas generate stormwater runoff which includes a mix of contaminants. Stormwater is diverted to the streams and then out to sea through the stormwater network – a system of underground pipes. Water is carried quickly and efficiently to reduce flooding risk but unlike wastewater, stormwater does not get treated before being discharged into the environment (see Figure 3 in Section 9.1.1). There are some stormwater discharges from individual properties that discharge directly to streams or the coast. State highway networks and local authority stormwater networks contribute a significant proportion of the urban contaminant load to the harbour. There are also areas within the Whaitua where the stormwater network conveys a dry weather flow of contaminants which in some cases includes wastewater. This indicates land use activities are causing the discharge of contaminants direct to the stormwater network, which should not be occurring. The presence of wastewater indicates that there are cross connections with the wastewater network.

The PNRP currently includes a policy and rule framework for discharges from individual properties, state highway networks and local authority stormwater networks. The policy direction seeks to minimise the water quality and quantity effects associated with these discharges. The Committee recommends that this framework is amended to manage stormwater discharges within the limits and targets set out in this WIP to achieve the freshwater and coastal water objectives.

Recommendation 31

Greater Wellington amends the policy and rule framework in the PNRP to manage and progressively improve stormwater discharges to achieve the freshwater and coastal water objectives, limits and targets for Te Awarua-o-Porirua. In developing the amended framework Greater Wellington must:

- tailor the framework to the different scales and types of stormwater discharges such as for individual properties, state highways and local authority stormwater networks
- include a more stringent rule activity status for stormwater discharges that discharge into waterbodies where the current water quality is worse than the limit or target compared to those catchments where current water quality is better than the limit for a respective contaminant
- investigate the potential to increase the alignment of the resource consent requirements with the service planning function undertaken by Wellington Water
- include requirements for resource consent applications and stormwater management strategies to demonstrate how they will meet the freshwater and coastal water objectives, limits and targets in this WIP, including a staged approach to meet progressively reducing limits
- include policy direction to target 'priority' areas in both freshwater and coastal environments by prioritising improvements in the stormwater network.

8.5 Reducing the contaminant load from existing urban areas

Depending on the land-use activity, urban contaminants vary greatly in nature, volume and impact and therefore pose different risks to water quality and ecosystem health. The objectives and contaminant load reductions required by this WIP can only be achieved through changes within the existing urban footprint, either through redevelopment of brownfield sites, changes in land-use practices and/or upgrading existing stormwater and wastewater infrastructure.

8.5.1 Stormwater mitigations and redevelopment within the existing urban areas

The redevelopment of existing urban areas offers significant opportunities to reduce the current urban contaminant load into the harbour and to restore catchment hydrology as discussed in Section 8.3 above.

The opportunities presented through large-scale brownfield redevelopments go beyond the gains made through water-sensitive urban design practice in relation to the redevelopments. Gains can also be made through the upgrading of public wastewater and stormwater network infrastructure within or adjacent to the redevelopment sites, potentially leading to significant reductions in contaminant loads. In addition to water quality and ecosystem health benefits, these redevelopment opportunities offer positive social and community outcomes through increased housing capacity, connectivity and enhancement of open space areas.

The Committee determined that the councils and Wellington Water must incentivise redevelopment and maximise the opportunity provided by the redevelopment through well-coordinated infrastructure and development planning. An example of such an opportunity is the Housing New Zealand announcement to redevelop areas of Porirua, and the potential it provides for improving water quality and catchment hydrology in the surrounding streams and harbour.



Stormwater treatment device at new subdivision in Whitby.

Recommendation 32

Greater Wellington, PCC, WCC and Wellington Water identify opportunities and investigate methods for incentivising stormwater mitigations within the existing urban footprint and maximise the opportunities provided by infill and brownfields redevelopments. This could include:

- identifying potential brownfield redevelopment areas and supporting master planning at the outset to integrate water management with other development drivers
- identifying potential locations for stormwater mitigations
- providing public investment into upgrading existing stormwater infrastructure
- providing incentives to treat stormwater from the wider stormwater network within brownfield development sites
- exploring and promoting public-private partnerships and funding models to encourage redevelopment of brownfield sites.

8.5.2 Existing urban development and land use activities

All land-use activities contribute a contaminant load. Industrial and commercial land uses contribute a higher proportion of this load than residential urban uses. The main sources of contamination are roads with high traffic flows, and older unpainted and/or poorly maintained galvanised metal roofing on large-scale industrial buildings.

A pollution prevention programme will be instrumental in changing behaviour and practice across the whole Te Riu o Porirua WMU through raising awareness and creating ownership of the issue and providing skills and information to address the issue. The Committee recommends a whole-of-catchment approach with a focus on specific areas such as those areas prioritised through Recommendation 3. The programme should also target specific activities and/or known issues that need to be addressed in order to mitigate pollution, including trade waste discharges and illegal stormwater connections.

Controlling contamination at source is critically important and, in relation to roofing, this could be achieved by painting and maintaining existing roofs or by replacing roofs with low zinc-yielding alternatives. The Committee recommends investigating and implementing options to progressively reduce contamination from zinc and copper building materials with a particular focus on large scale industrial and commercial roofing. The Committee was advised that at the current replacement rate for residential roofs, a significant proportion of residential roofs could be renewed with low-zinc alternatives over the next 20 years.

Recommendation 33

Greater Wellington, PCC, WCC and Wellington Water investigate and implement options to progressively upgrade or replace high zinc and copper-yielding building materials from existing urban areas.

This may include:

- developing and implementing an incentive scheme to paint or replace large-scale high zinc-yielding industrial and commercial roofs
- identifying and targeting high contaminant contributing areas
- prioritising catchments that contribute to the hotspot areas of degradation.

Recommendation 34

Greater Wellington advocates to central government that it initiate change at a national level to restrict the use of high zinc- and copper-yielding building materials.

Recommendation 35

PCC, WCC and Wellington Water work together in high-risk areas to increase and prioritise regular street sweeping and sump clearance and investigate other opportunities to capture and clear contaminants from stormwater drains.

Recommendation 36

Greater Wellington, PCC, WCC, Wellington Water and relevant industry groups develop and implement a pollution prevention programme. This will be outlined, delivered and monitored through various mechanisms, including the Harbour Strategy. The programme must:

- raise the awareness of the public about what they can do to reduce their impacts on harbour and stream health
- promote and incentivise industry good management practice targeting high-risk land-use activities that contribute relatively high levels of contamination
- identify and target priority areas for contaminant reduction based on the identification of catchments that contribute to localised hotspot areas
- investigate opportunities to enable change by streamlining regulatory processes and removing barriers to businesses and industry initiating change
- work with specific industries/suppliers to increase understanding around risks from exterior chemical cleaning products with an aim to reduce usage through point of sale warnings and changes in product care advice.

Recommendation 37

Greater Wellington investigates options to revise the controls on chemical cleaning products (such as '30 seconds' type cleaning products) and advocates to central government for better control of these products at a national level.

8.5.3 Vehicle sources

In urbanised areas, a significant source of metal contamination is motor vehicles, primarily zinc from tyre wear and copper from brake linings. Removing the contaminant at source is the most effective way of addressing this. This could be achieved through controls introduced at the national level regulating the use of these metals in tyres and brake pads. However, even if a decision is made to develop national-level regulation, this will take time. The Committee therefore considered ways in which Greater Wellington can initiate positive change at a regional level. For example, Greater Wellington, PCC, WCC and Wellington Water can raise awareness among the public and the motor vehicle industry of the impacts of copper brake pads on aquatic life as well as potential alternatives, with the overall aim of increasing the availability and uptake of copper-free or low-copper alternatives.

Recommendation 38

Greater Wellington advocates to central government that high zinc and copper yielding materials in vehicles be progressively replaced with lower yielding alternatives.

Recommendation 39

Greater Wellington, PCC and WCC raise the awareness of the public of the effects of copper brake pads and actively promote low-copper/copper-free alternatives.



Many roads in the catchment are located near streams and the harbour.



Wastewater discharges

9.1 Background

9.1.1 Issues and drivers

Significant improvements in the management of wastewater discharges from wastewater and stormwater networks in the Whaitua are needed to meet the freshwater objectives for *E. coli* and ammonia and the coastal water objectives for enterococci. Modelling indicates that a range of regulatory and non-regulatory actions across urban and rural areas are needed to achieve these improvements and this will require ongoing efforts from a range of agencies. As the nature of wastewater issues and sources of wastewater discharges vary between urban and rural areas, the required policy response is also quite different. Wastewater in rural areas is discussed in Section 11.4.

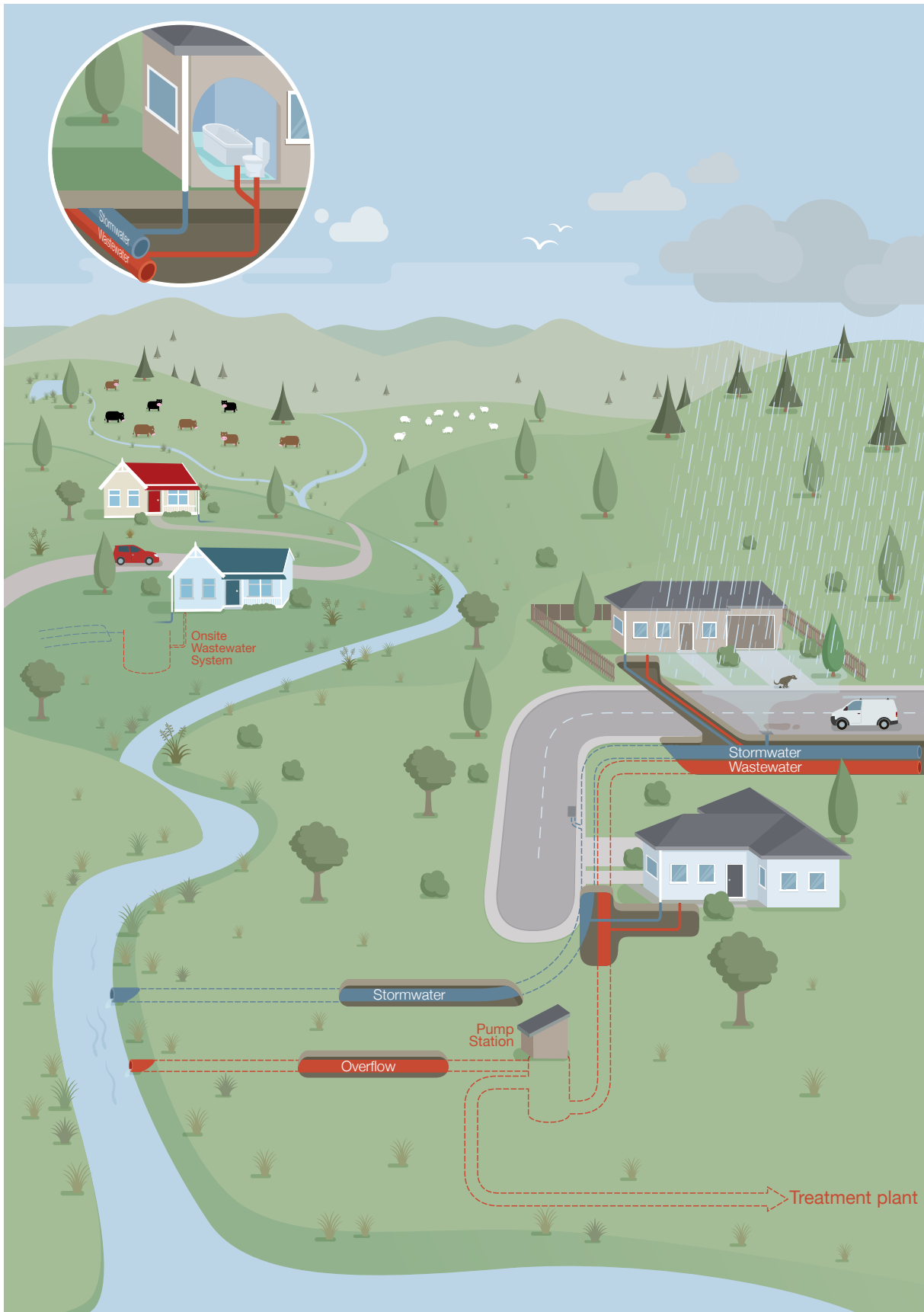
9.1.2 The wastewater system

Wastewater is discharged from every household, business and industry within the Whaitua. Most households and commercial properties are connected to the respective councils' wastewater network and wastewater is treated through the wastewater treatment plant before being discharged to sea at Titahi Bay.

The wastewater network includes private pipes (referred to as 'laterals') that take the wastewater from each individual property and connect to the council's wastewater mains network. At various points along the wastewater mains there are pump stations which keep the wastewater flowing to the treatment plant.

Currently, when it rains, rainwater finds its way into the wastewater network through broken laterals and mains or through faulty plumbing, such as a roof downpipe connected to a wastewater lateral (usually via gully traps) or a stormwater lateral connected to the wastewater network. Connections to the wrong network are known as cross connections and also have water quality implications because wastewater flows untreated into the stormwater network (stormwater is not treated), into waterways and out to sea. The additional water from leaking or cross-connected pipes can overwhelm the wastewater system when it rains, resulting in overflows from the network, often at pump stations. These untreated overflows generally discharge into streams or the harbour. Figure 3 shows a simplistic illustration of the stormwater and wastewater network.

Figure 3. Stormwater and wastewater network



9.1.3 Wastewater in urban areas

The wastewater network in the Whaitua traverses both the Wellington and Porirua districts. The network and treatment plant are operated and maintained as a single integrated network by Wellington Water on behalf of PCC and WCC.

Current issues with the network and treatment plant include:

- aging treatment plant and network prone to failures and with inadequate capacity to accommodate future growth
- frequent wet weather wastewater overflows from the network into freshwater and coastal water and wastewater overflows from the treatment plant into coastal water
- dry weather leakages from degraded and leaking pipes
- infiltration and inflow of stormwater into the wastewater network including through cross connections, exacerbating capacity issues and the frequency of overflow events.

While wet weather wastewater overflows have been identified as a key concern for the community, monitoring has shown consistently high *E. coli* levels throughout the year which indicates that dry weather leakages and discharges are also a key contributor to poor water quality in the Whaitua. Addressing these issues will require upgrades that extend beyond the public wastewater network to identify and address leaking laterals and wastewater pipes on private properties and cross connections across the network.

To manage *E. coli* from urban sources, the Committee recommends significant investment to upgrade the public wastewater network and to address issues with private laterals as a matter of priority. Achieving the improvements needed will require a significant shift in how the wastewater and stormwater networks are managed and additional funding and investment to compensate for historical underinvestment while also anticipating population growth. Regulatory options are also required to drive improved behaviour change and ensure wastewater discharges to freshwater and the harbour are progressively reduced.

The Committee is aware that the mitigations used in *E. coli* modelling have indicated that these measures alone may not be sufficient to achieve the Committee's freshwater objectives for *E. coli* in urban areas. This makes it clear that significant, ongoing mitigation actions and investment will be required in new and existing urban areas to achieve the *E. coli* objectives.



“It is only too easy to point a finger at farming for polluting our waterways. But, our urban sources of pollution are having the biggest impact on our water and growth is just going to add pressure.”

**David Lee –
Wellington City
Councillor**

9.2 Wastewater networks

9.2.1 Improvements to wastewater treatment plant and network

In urban areas, the biggest reductions in *E. coli* will come from wastewater network improvements, including reducing overflows, improving capacity, fixing leaking pipes and identifying and addressing laterals and cross connections on private properties. These upgrades will require significant investment, staged over a number of years. These upgrades will largely be undertaken by Wellington Water, but will require the collective effort of agencies and support from property owners and the wider community, given the substantial costs and effort involved.

Wellington Water is currently planning upgrades to the wastewater treatment plant and network as part of the process to renew the current discharge consents that are due to expire in 2020. Wellington Water has indicated that the focus of its consent renewal and investment programme has shifted from upgrading the treatment plant to investment in the overall network as this is where the biggest improvements can be made in terms of water quality and in achieving the requirements, under the NPSFM, for streams to be suitable for primary contact recreation.

While the Committee recognises the substantial amount of work that needs to be undertaken to improve the network, it also determined that it was untenable for the Whaitua's waterbodies and the harbour to be contaminated by wastewater. Ideally, the Committee wants changes and upgrades immediately, and a short timeframe to meet the *E. coli* and enterococci objectives. The Committee is concerned that by setting an objective timeframe of 2040, improvements could be delayed or 'put off' until closer to the deadline which would not reflect the urgency with which improvements must occur. However, given the degree of change and improvement that is required to achieve the objectives, the Committee opted for an approach that sets a timeframe for developing an action plan (including milestone timeframes) and periodic reviews by Greater Wellington to ensure the action plan is being implemented in a manner that will achieve the objectives by 2040.

While the Committee has set a C attribute state objective for *E. coli* and enterococci in the Te Riu o Porirua, Takapū, and Onepoto Arm WMUs respectively (with A and B attribute state objectives set in other WMUs - see Tables 3 and 4), it is also aware of the aspirations of Ngāti Toa Rangatira and the wider community to have an A attribute state objective throughout the Whaitua. The Committee has the same aspirations, but given the scale of change and improvements required by the Committee, it concluded that an A attribute state was not achievable or affordable in all WMU's in the short term. Once a C attribute state had been achieved, improvements should continue to progress towards meeting the A attribute state criteria throughout the Whaitua.

The current provisions of the PNRP include specific provisions to manage wastewater discharges, recognising that it is a significant cultural, human health and recreational issue in the region. The PNRP includes direction to:

- progressively reduce wastewater discharges to freshwater and avoid new wastewater discharges to freshwater
- minimise wastewater and stormwater interaction
- progressively improve the quality of wastewater discharges and reduce the quantity of discharges to freshwater and coastal water
- progressively reduce wastewater overflows from networks to freshwater and coastal water.

The policy direction in the PNRP is consistent with the management approach the Committee is seeking for wastewater discharges. However, there is an opportunity to strengthen this further to reflect the specific issues, objectives, targets and limits for wastewater in the Whaitua.

In light of the current under-performance of the wastewater network, the Committee has recommended that developers of any new subdivisions or other development projects manage their wastewater discharges with consideration of the wider wastewater network and do not exacerbate existing issues.

Recommendation 40

Greater Wellington amends the policy and rule framework in the PNRP as necessary to manage and progressively improve wastewater discharges in Te Awarua-o-Porirua Whaitua to achieve the freshwater and coastal water objectives, limits and targets in this WIP. The policy and rule framework must:

- require resource consent applications and wastewater management strategies to demonstrate how they will meet the freshwater and coastal water objectives, limits and targets in this WIP, including through a staged approach
- recognise and address the complexities of the wastewater network, including issues with capacity, overflows, leaks, and cross connections
- require assessment of the progress towards achieving the *E. coli* and enterococci objectives and amendments of programmes and strategies if expected progress is not achieved
- acknowledge the interrelationship of stormwater and wastewater.

Recommendation 41

Greater Wellington amends the policy and rule framework in the PNRP and PCC and WCC amend the relevant district plans as necessary to ensure that new urban development and redevelopment do not exacerbate issues with the wastewater network by providing adequate on-site storage, including requirements for applicants to demonstrate how wastewater generated by development will be managed.

Recommendation 42

Wellington Water develops and implements wastewater programmes, strategies and/or plans to improve the wastewater network to achieve the freshwater and coastal water objectives, limits and targets in this WIP. The development and implementation of these programmes, strategies and plans must:

- clearly set out the steps, actions and milestones to deliver the necessary improvements
- inform the investment strategies of the 2021-2031 Long Term Plans for Greater Wellington, PCC and WCC
- assess all wastewater management options and identify priority areas for actions
- provide an integrated assessment and management approach for all forms of wastewater discharges from the network and the associated effects on freshwater and coastal receiving environments
- address both dry weather wastewater discharges and wastewater network overflows
- adopt an integrated catchment approach that recognises the interconnected nature of the wastewater network and the receiving environments for these discharges
- align funding and investment with Greater Wellington, PCC and WCC for these actions and improvements to occur.

Recommendation 43

Greater Wellington, WCC and PCC work together to integrate and align regional plans, district plans and infrastructure service plans to achieve the freshwater and coastal water objectives, limits and targets in this WIP.

Recommendation 44

PCC and WCC align their policies on the licencing, monitoring and enforcement of trade waste discharges into the wastewater network.

9.2.2 Improvements to the private wastewater network

Substantial contributions to wastewater issues in the Whaitua are believed to come from the private wastewater and stormwater network, though the exact contribution these sources make is unquantified and will vary across the catchment. Issues can arise from cross connections and leaking pipes and laterals. Addressing issues with the private wastewater network is essential to achieving the freshwater and coastal water objectives but this will be a challenge given the costs involved for property owners and current uncertainty about the exact sources of contamination.

The Committee considered that, in addition to education, there will need to be a range of incentives and requirements in place for property owners and developers to address cross connections and leaking wastewater pipes on their properties. The most appropriate methods and incentives to address issues with the private wastewater network are not known at this stage. The recommendation provides some flexibility for PCC, WCC and Wellington Water to identify the best methods to incentivise property owners to address cross connections and lateral leaks on their properties while providing clear guidance on the range of measures the councils and Wellington Water should focus on to achieve a reduction in these problems (e.g. education, financial incentives, regulation). Initiatives could be modelled on successful projects elsewhere (e.g. Drainwise in Gisborne).

The announcement by the government of the redevelopment of Housing New Zealand houses in East Porirua provides a valuable opportunity to take steps to improve wastewater and stormwater networks in that area, including individual house connections.

Recommendation 45

PCC, WCC and Wellington Water work together to identify sub-catchments within the Whitua that have the most widespread issues with private laterals and cross connections, and prioritise these sub-catchments for improvement.

Recommendation 46

PCC, WCC and Wellington Water initiate a comprehensive work programme to identify and address issues with the private wastewater network within the Whitua, including:

- education and guidance for home and business-owners in relation to leaking laterals, cross-connections and the consequences of non-compliance
- promotion of redevelopment as an opportunity to address existing cross-connections and leaking laterals
- financial mechanisms and incentives, such as rates relief or targeted rates in priority sub-catchments, to assist property owners to get their pipes checked and fixed
- investigation and implementation of the best regulatory methods to address cross connections, e.g. through a by-law that requires the pipes to be checked and certified at the time of sale or through a warrant of fitness scheme.

Recommendation 47

Greater Wellington, PCC, WCC and Wellington Water target redevelopment and regeneration projects, such as those led by Housing New Zealand, as an opportunity to address existing wastewater and stormwater network issues through education, advocacy and regulation.

Recommendation 48

PCC and WCC building compliance officers undertake proactive, consistent compliance monitoring of connections in new builds and renovations to ensure there are no cross connections, including a system for recording which properties have been checked and assessed and when issues have been resolved.



Earthworks and forestry

10.1 Background

Earthworks, road construction and subdivision developments have the potential to increase sediment loads while the activity is taking place, especially if a significant rainfall event occurs when a large amount of earth is exposed. After works are completed and the site is stabilised, the risks of sediment loss are significantly reduced.

Sediment impacts from forestry operations tend to show a cyclical pattern in which sediment losses can be significant during and immediately following harvest and then diminish as the replanted forest begins to mature. As with earthworks, if a significant rainfall event occurs during harvest or following harvest, the risk of large sediment losses is high.

The Committee recognises that its objective of a 40 percent reduction in sediment load inputs into the harbour poses a challenge. Earthworks and forestry operations, if undertaken correctly and on suitable land, should result in minimal (if any) discharges of sediment to the streams and harbour. The challenge is to ensure all earthworks and forestry operations are undertaken on suitable land and using good practice and the risks of sediment-laden water running off-site is minimised.

10.2 Earthworks

The PNRP requires that large site earthworks (greater than 3000m²) be consented. Such sites are therefore actively managed to ensure good management practices are used. Current practice for earthworks on larger sites is to require the works to be staged to ensure that the area exposed at any given time can be effectively managed by the controls being used on site.

The Committee considered options for the best way to limit the amount of earthworks occurring in the Whaitua at any one time in order to reduce the risk of significant pulses of sediment entering the harbour. It concluded that the current approach was the most appropriate – that is, to stage the earthworks at each site and ensure through compliance monitoring that the appropriate controls were in place. In making this determination, the Committee considered the effects of climate change, including the prediction of more intense rainfall events, and how these effects will impact on the design requirements for controls used to treat stormwater runoff from an earthworks site. The most significant shift in management is the new requirement for all resource consents to meet discharge limits.

Small site earthworks (less than 3000m²) need to comply with the PNRP permitted earthworks rule. In some cases resource consent may also be required from WCC or PCC. Often small-site earthworks have limited controls in place and collectively can contribute to significant sediment losses. While these small site activities are often permitted (i.e. do not require a consent), the Committee sought assurances that they are undertaken using best practice to prevent any unnecessary discharges of sediment. As with large site earthworks, it is important to ensure compliance monitoring of resource consents and permitted activities is undertaken.

Recommendation 49

Greater Wellington amends the policy and rule framework in the PNRP to set discharge standards for earthwork activities that require consent in order to achieve the sediment targets and limits in the WIP.

Recommendation 50

WCC and PCC have consistent bylaws and guidance for silt and sediment control within the Whaitua. Consideration must be given to the effects of climate change to ensure control measures are designed to meet increasing intensity and duration of rainfall events.

Recommendation 51

Greater Wellington reviews and updates publications, including *Small earthworks – Erosion and sediment control for small sites (2006)*, and *Erosion and sediment control guidelines (2000)*, to ensure the methods and principles they set out reflect current good practice. Amendments may include increasing the design standards to deal with more significant but less frequent rainfall events.

Recommendation 52

Greater Wellington, WCC and PCC develop a compliance programme to ensure good practice in relation to silt and sediment control is followed for all earthworks, particularly in relation to permitted activities. This should also include a required frequency of cleanout and monitoring of retention basins to reduce the risks of retention basins being overwhelmed.

Recommendation 53

Greater Wellington, in conjunction with WCC and PCC, develops an education programme to ensure that good practice for silt and sediment control is understood by those carrying out earthworks.



Good management practice during earthworks and forestry activity can reduce impacts on the harbour and streams.

10.3 Forestry

Approximately 13% of the land in Te Awarua-o-Porirua Whaitua is estimated to be in forestry, most of which will reach maturity within the next ten years. Harvesting activities that are not undertaken using good practice standards can result in significant increases in sediment loads.

The National Environmental Standard for Plantation Forestry (NESPF) permits most forestry activities as long as forestry operators meet specific conditions to prevent significant adverse environmental effects. The regulations are based on existing good practice standards for the forestry industry.

The NESPF uses a nation-wide scale Erosion Susceptibility Classification that determines the risk of erosion on land. Where land is categorised as having a high or very high erosion risk, resource consents are required for various activities such as earthworks associated with forestry and harvesting operations. The NESPF does not identify high or very high risk areas in the Whaitua and therefore no consents are required, that is all forestry activity in the Whaitua is deemed permitted.

The NESPF allows for more stringent rules in a regional plan to be set to give effect to an objective developed under the NPSFM, including more detailed local-scale assessments and mapping of erosion susceptible land that would trigger consent. The Committee considered whether more stringent rules were required to achieve the sediment objectives and concluded that the permitted framework of NESPF should be given time to be implemented. The Committee did, however, think it was important to ensure the forestry operations were carried out in compliance with good practice and the NESPF requirements and recommended all permitted forestry operations were monitored for compliance and enforcement action taken where necessary. The Committee also concluded that it was important to improve understanding and mapping of erosion prone land at the local whaitua scale to inform future planning; this has been incorporated into recommendations in section 11.1.

The NESPF contains provisions for enabling Greater Wellington the ability to charge for monitoring of permitted activities. The Committee recommends Greater Wellington adopts a charging policy to allow it to recover costs associated with monitoring compliance of permitted forestry activities.

Recommendation 54

Greater Wellington works with the forestry sector to identify potential barriers and risks to good practice in reducing sediment from forestry operations and works with the industry to overcome the risks and barriers.

Recommendation 55

Upon receiving notice under the NESPF of earthworks, forestry quarrying or harvesting in the Te Awarua-o-Porirua Whaitua, Greater Wellington requests a copy of the Forestry Earthworks Management Plan and Harvest Plan or Quarry Erosion and Sediment Management Plan and actively monitors compliance to ensure sediment discharges to waterbodies are minimised.

Recommendation 56

Greater Wellington provides sufficient resources to deliver consistent advice on forestry good practice and compliance, both within the Whaitua and across the region.

Recommendation 57

Greater Wellington develops a charging policy under the NESPF for the monitoring of permitted activities.



Rural topics

This section outlines recommendations relating to how activities in the rural areas of the Whaitua should be managed to reduce impacts on waterways. Previous sections include recommendations that also relate to rural landuse, in particular stream bank erosion (Section 6, Stream form and function) and sediment losses (Section 10, Earthworks and forestry).

11.1 Management of erosion prone land

Before the area was settled by Europeans, the harbour edge and the surrounding catchment were forested in dense podocarp-hardwood forest including kohekohe, tawa, titoki, kahikatea, tōtara, rata, miro and rimu. Conversion of forest to farmland and subsequently to urban settlements has led to erosion, particularly of hill country, which has contributed to an increased sediment load in the streams and harbour.

Farmland makes an ongoing contribution to the sediment load in the catchment (from grazed pasture, especially on steeper slopes). Modelling information using the SedNetNZ model indicates that a significant portion of the total sediment load is coming from hill slope and landslides where:

- the hill slope component is from the overland flow of water over the land that picks up sediment as the water moves down the catchment into the streams and the harbour
- the landslide component occurs when there is a mass movement of land, usually when vulnerable soils have exceeded their threshold to absorb water and become unstable. When soil has lost its structure it is more easily picked up and carried by water.

Table 11 describes the modelled estimated sediment load contributions from each catchment and the likely source of that sediment. Measures and recommendations to address sediment from stream bank erosion are discussed in section 6.

The Committee considered whether to focus on the top five sediment-producing catchments or a whole-of-Whaitua approach. The Committee considered that it was most effective to identify priority areas in the Whaitua where immediate gains in sediment reduction may be made. Priority areas were identified as areas of steeply sloped or sloping land susceptible to hill-slope and landslide erosion.

Where priority areas have been identified, an environment plan will be developed setting out how sediment losses will be reduced for those areas.²⁴ Each plan should be specific to the relevant landowner, ensuring that the measures put in place are appropriate and achievable for landowners.

Not all land in priority areas will be farmland: there are also likely to be areas of forestry, lifestyle properties, and regional or local parks. The requirement to develop a sediment reduction plan will apply equally to any land within a priority area.

²⁴ A environment plan is a plan developed for a specific property/farm to identify environmental risks associated with operations occurring on the property and sets out actions and goals to ensure compliance and environmental sustainability.

Table 11. Estimated current sediment loads and percentage contribution from different erosion types for catchments in the Te Awarua-o-Porirua Whaitua

Catchment Name	Current state			
	Annual average sediment load (t/yr)	% load from different erosion processes		
		Hillslope	Landslide	Streambank
Pukerua	10	88	9	3
Hongoeka to Pukerua	10	88	9	3
Titahi	1	99	0	0
Taupō Stream	90	55	25	19
Horokiri and Motukaraka	960	31	36	33
Kakaho	250	43	41	16
Ration	200	91	0	9
Judgeford	630	76	13	11
Pauatahanui	3210	41	6	53
Lower Duck	530	69	26	6
Upper Duck	380	62	35	3
Hukarito Stream	10	100	0	0
Mahinawa Stream	40	92	7	1
Whitireia	10	100	0	0
Rangituhi Stream	30	98	2	0
Takapu	650	42	56	1
Belmont Stream	270	76	23	0
Stebbing's Stream	110	99	0	1
Upper Kenepuru	530	22	78	0
Kenepuru	820	48	50	2
Porirua	2660	59	32	9

The Committee acknowledges that Greater Wellington has only been working with the rural community within the Whaitua for a short time on erosion compared to other areas in the region and this is likely to be reflected in levels of awareness and trust. In particular, there is a lack of knowledge on the part of landowners about the services provided by Greater Wellington, mainly due to the lack of resource investment in this area to date.

The Committee was concerned that landowners whose property is identified as a priority area will be required to bear a significant proportion of the costs to reduce sediment losses from their property, while the measures will benefit the whole Whaitua and therefore the wider community. Therefore, the Committee recommends that the resources available to landowners in priority areas are increased.

Battle Hill Farm Forest Park and Belmont Regional Park encompass significant areas within the Pouewe and Takapū WMUs. The Committee sees the parks as an opportunity to showcase good land management practice and measures that can be taken to address sediment loss in the catchment.

Recommendation 58

Greater Wellington undertakes further work to determine priority areas for reducing sediment in the Whaitua's streams and harbour. Once priority areas have been identified, Greater Wellington should work with landowners to develop environment plans that set out how sediment losses will be reduced at a farm/property scale.

Recommendation 59

Greater Wellington develops a regulatory framework in the PNRP to:

- undertake farm/property-scale mapping to identify erosion-prone land in priority areas identified in Recommendation 58
- require land owners to develop an environment plan setting out how sediment losses will be reduced where erosion-prone land is identified above a certain threshold (e.g. more than specified number of hectares)
- require that, where identified erosion-prone land is vegetated in scrub, shrubs and/or non-plantation forestry, that vegetation should not be cleared for uses that are likely to increase sediment loss.

Recommendation 60

Greater Wellington aligns its programmes, planning, funding and support of sediment mitigation activities, including both riparian restoration and reductions in hill-slope and landslide erosion, within the identified priority areas.

Recommendation 61

Greater Wellington provides sufficient resources in the Whaitua to deliver land management advice, provide expert input into environment plans and to deliver on the work programmes identified.

Recommendation 62

Greater Wellington prioritises opportunities to mitigate sediment loss from erosion-prone lands in council-administered regional parks within the Whaitua.

11.2 Cultivation, break-feeding, vegetation clearance

There are a number of land-use activities that can cause excessive sedimentation in surface water bodies. The effects of these activities are managed through permitted activities provisions in the PNRP and the Committee considers these provisions are appropriate.

11.3 Stock access to waterways

Stock access to waterways and overland flow paths through grazed paddocks is one of the main routes for *E. coli* (from stock dung) entering waterways. Restricting stock access to waterways is a common method used to address a range of freshwater contaminants in rural areas, including *E. coli*.

The rule in the PNRP relating to livestock exclusion currently permits livestock access to water bodies in this Whaitua due to the criteria used to determine the exclusion areas and the scale of mapping.

The Committee recommends that where practical and where land slope permits, stock should be excluded from water bodies in the Whaitua. The general approach taken in the existing PNRP is largely appropriate but the Committee recommends amending it for the Whaitua to ensure all classes of land are included, not just the predominantly low land LUC Classes 1–4.²⁵ Before implementing livestock exclusion rules in the Whaitua, further work is required to develop the criteria for determining the exact areas where the rule would apply. The Committee has set the direction and intent of the rule but recommends that the setting of final criteria be undertaken as part of the plan change process.

The Committee acknowledged that there are a number of lifestyle blocks in the Whaitua and a wide variety of animals are kept on these properties. The Committee determined that the stock exclusion rule should apply equally to all types of livestock, including those kept on lifestyle blocks.

Recommendation 63

Greater Wellington amends the PNRP policy and rule framework to:

- map low-slope land areas for livestock exclusion using finer scale land-slope criteria that also take into account the average land slope within a specified distance from a water body
- require livestock exclusion from water bodies with an active bed of greater than 1m in width within the mapped low-slope areas
- apply to livestock as defined in Section 2 (*Interpretation*) of the PNRP.

Recommendation 64

Greater Wellington works with rural landowners to promote and implement good management practices, including integrated farm environment planning.



Planting and fencing is necessary to stop stock from entering waterways.

²⁵ Land use capability classification – Landcare Research

11.4 Wastewater in rural areas

The rural parts of the Whaitua (primarily the Pouewe and Takapū WMUs) do not have a reticulated wastewater system and are therefore reliant on on-site wastewater systems (septic tanks). There is some uncertainty about the exact contribution of different sources of *E. coli* in rural parts of the Whaitua, but leaking or faulty on-site wastewater systems are likely to be a contributing factor.

While the nature and contribution of *E. coli* from on-site wastewater systems within the Whaitua is unclear, it is likely to be from older septic tanks that are not performing adequately and/or tanks that are non-compliant or not licenced.

PCC has a wastewater bylaw that requires that all on-site wastewater systems have a current wastewater system licence and that these systems comply with the by-law and other relevant codes and standards. The bylaw also includes provision for PCC to carry out inspections of these on-site wastewater systems and associated land application area. The PNRP also includes rules for new and upgraded on-site wastewater systems, and for existing on-site wastewater systems to ensure these are maintained and functioning properly.

Currently, there is a lack of proactive compliance monitoring of on-site wastewater systems in the Whaitua. The focus of the policy approach to manage domestic wastewater in rural areas is therefore on ensuring on-site wastewater systems are maintained and performing and that all systems are compliant.

Recommendation 65

Greater Wellington and PCC develop and implement a proactive compliance monitoring programme for on-site wastewater systems in the Whaitua to ensure they comply with the rules in the PNRP and PCC wastewater by-law.

Recommendation 66

PCC prioritises initial compliance monitoring efforts on unlicensed on-site wastewater systems and takes appropriate enforcement action as necessary to ensure all on-site wastewater systems in the Whaitua are licensed and compliant.

Recommendation 67

Greater Wellington and PCC provide information and raise the awareness of property owners about the importance of maintaining on-site wastewater systems and how to identify and address performance issues.



Water abstraction

12.1 Background

12.1.1 Issues and drivers

The taking of water from waterways (water abstractions) directly affects the ecological health of waterways by reducing stream flow – sometimes for substantial periods. This can reduce habitat space, and in smaller streams, lead to increases in temperature and reductions in dissolved oxygen. This directly impacts fish life and macroinvertebrate health. Therefore, the taking of water needs to be limited to ensure stream flow is adequate to provide for ecological health.

There is less demand for water in Te Awarua-o-Porirua Whaitua compared to other parts of the region such as the Ruamāhanga and the Kāpiti Coast. However, the streams in Te Awarua-o-Porirua Whaitua are generally small, short and have steep catchments and therefore do not have the quantity of water available for use as do other catchments in the region. Because of their relatively small size (catchment, length and flows) the streams in the Whaitua can be affected by relatively small abstractions.

12.1.2 Demand for taking water

Much of the Whaitua's population is served by a reticulated water supply sourced from outside the Whaitua (from the Hutt, Wainuiomata and Orongorongo catchments) so abstraction from streams is mostly limited to rural areas, where water is taken for domestic needs, animal drinking water, golf course, nursery and pastoral irrigation, and for temporary construction works (e.g. Transmission Gully).

Estimates indicate that of the total amount of water available in streams in the Whaitua only a small proportion is taken (less than 5%), principally for domestic use and animal drinking water.²⁶ However, the potential amount of water that could be used under the current PNRP permitted activity provisions is substantial and could exceed the allocation limits for some of the streams.

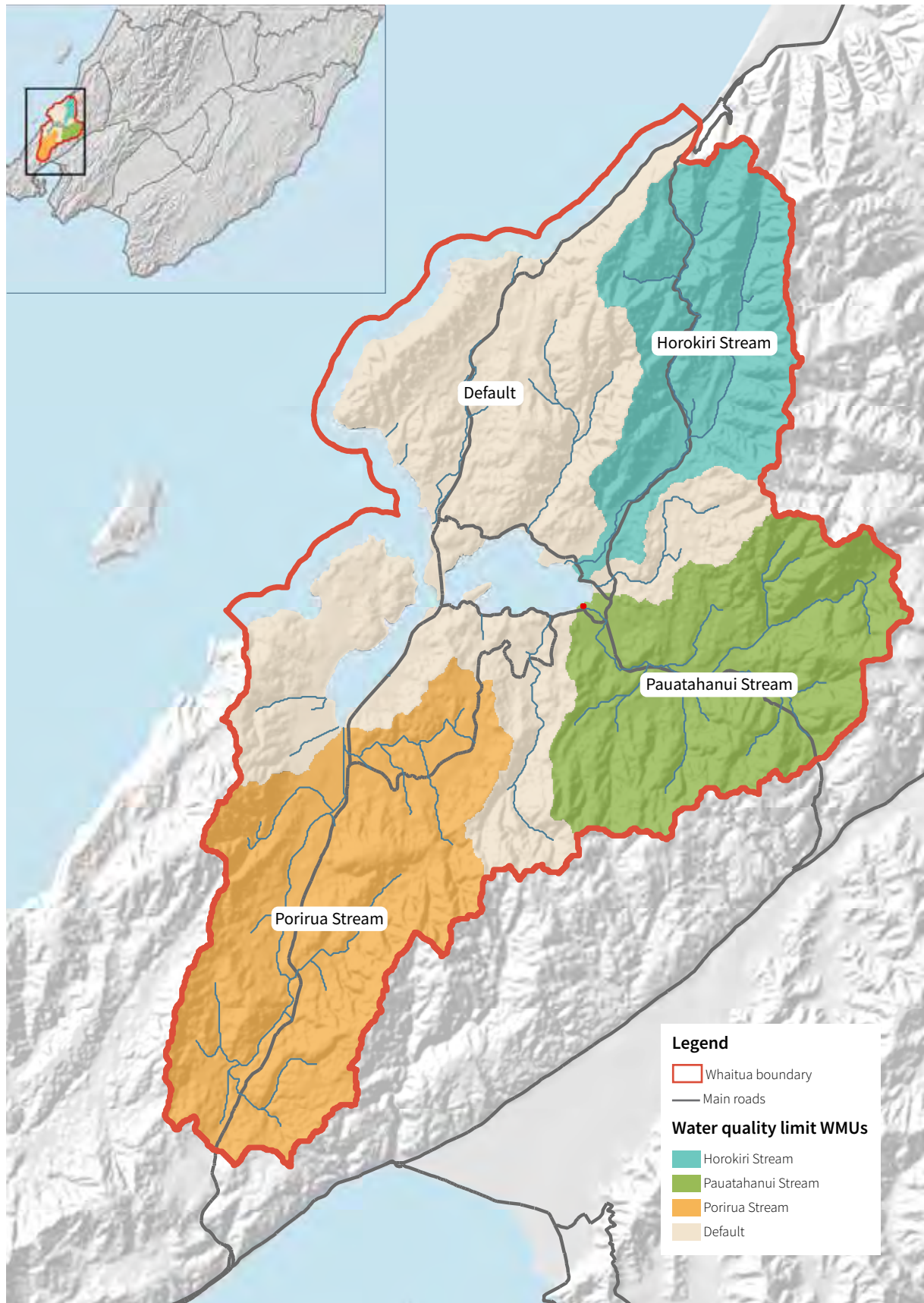
Pressure on streams could also increase in future as a result of climate change, which is predicted to decrease the mean annual low flow (MALF) in streams by up to 40% by 2040, increase the number of hot days (above 25°C) annually by up to 10 days by 2040 (30 days by 2090), and increase annual potential evapotranspiration²⁷ deficit by 60-100mm (2040) and 60-120mm (2090)²⁸.

26 Beca 2017. 'Modelling permitted surface water use in Te Awarua-o-Porirua Whaitua'. <http://www.gw.govt.nz/assets/Whaitua/REPORT-Modelling-Permitted-Surface-Water-Use-in-Te-Awarua-o-Porirua-Whaitua-23-May-2017.pdf>

27 The amount of water that would be evaporated and transpired by a crop or ecosystem if there were sufficient water available

28 GWRC 2017. Whaitua climate change projections <http://www.gw.govt.nz/assets/Climate-change-2/WhaituaClimateChangeprojections.pdf>

Figure 4. Map of Te Awarua-o-Porirua Water quantity management units



12.2 Water quantity management units

It should be noted that the management units for the purpose of water allocation differ from the WMUs for water quality described in Section 3. The management units for water allocation have been based on catchment delineation in order to apply minimum flow and allocation limits, while the water quality WMUs have been based on a variety of factors, as outlined in Section 3. The water allocation WMUs are shown in Figure 4 (previous page).

12.3 Water quantity limits

Policy B1 of the NPSFM requires regional councils to set environmental flows (limits) for all freshwater management units in its region. Environmental flows for rivers and streams must include at least an allocation limit and a minimum flow (or other flow/s), primarily to manage abstraction effects. However, they can also include other types of limits to manage other aspects of flow regimes such as flow variability. The Committee considered that both allocation and minimum flow of limits are justified in the Te Awarua-o-Porirua Whaitua.

Current policy and rules in the PNRP uses default limits of 90% mean annual low flow (MALF) for the minimum flow and 30% MALF for the allocation limit for Te Awarua-o-Porirua Whaitua. Technical advice given to the Committee based on habitat modelling was that 90% and 30% was at the environmentally conservative end of the spectrum, meaning the limits provide well for the ecological health, habitat space and mahinga kai species such as the taonga species tuna (longfin eels).

However, the Committee wished to see these limits expressed as specific numbers rather than default percentages of MALF as presently set out in the PNRP.

For WMUs with monitoring information available the following minimum flows and allocation amounts have been set as outlined in Tables 12 and 13.

Table 12. Minimum flows

WMU	Management point	Minimum flow (litres per second)
Porirua Stream	Town Centre	128
Pauatahanui Stream	Gorge	101
Horokiri Stream	Snodgrass	82

Table 13. Allocation amounts for water quantity management units

WMU	Allocation amount (litres per second)
Porirua Stream	60
Pauatahanui Stream	34
Horokiri Stream	27

For all other streams in the Whaitua not included in the WMUs listed in Tables 12 and 13, a minimum flow of 90% of MALF and an allocation amount of 30% of MALF will apply. The actual flows will be calculated at the time of a resource consent application by the applicant in conjunction with Greater Wellington.

Recommendation 68

Greater Wellington amends the rule and the associated policy framework in the PNRP to take water from a stream in the Te Awarua-o-Porirua Whaitua so that it incorporates the limits listed in Tables 12 and 13. Amendments to the rule and policy framework should also ensure that no more than 30% of MALF (of the tributary) can be taken from a tributary within the WMUs listed in Tables 12 and 13.

12.4 Permitted activities

The current region-wide provisions of the PNRP allow a property to take up to 20,000 litres of water per day without resource consent. Because there is no current requirement to register or monitor a permitted use this creates considerable uncertainty, undermining the Committee's desire to manage human impacts on water bodies in the Whaitua.

The Committee noted that under the PNRP, property owners currently have an (perceived and actual) entitlement to take water for uses beyond reasonable domestic and animal drinking water. However, the Committee considered that people taking water from streams in rural areas should be subject to the same sort of restrictions/limits as those in urban areas. For example, users should not be able to take water from a stream for garden or lawn irrigation when the streams have low flows and urban areas have restrictions on outdoor use of water. The Committee therefore considered it appropriate to recommend removing the permitted activity rule for the taking of water and require consent for any take of water that cannot be considered reasonable domestic use or use for animal water. Removing the permitted activity rule for the Whaitua will remove the uncertainty and create a good incentive for using alternative sources of water such as rainwater tanks.

In its decision to remove the permitted activity rule, the Committee recognised that there are some 'one-off' or infrequent uses of water such as for farm-spraying operations. The Committee considered it would be unreasonable to require users to obtain resource consent for these 'one-off' activities as the effects of the takes would be expected to be minor (provided the rate and volume were small and the take did not occur when the stream was at or below its minimum flow).

In addition to removing the PNRP permitted activity rule, the Committee considered it was important to provide certainty for water users by defining what constituted 'reasonable domestic use' and 'animal drinking water' and the type of uses and volume of abstraction these categories allowed for.

Recommendation 69

Greater Wellington removes the permitted activity rule in the PNRP that allows water to be taken from a waterbody in the Te Awarua-o-Porirua Whaitua.

Note: water for reasonable domestic use and animal drinking water is authorised under section 14(3)(b) of the RMA.

Recommendation 70

Greater Wellington amends the PNRP policy and rule framework to allow for 'one off' incidental uses of water in the Te Awarua-o-Porirua Whaitua (such as for water required for farm-spraying operations). The rate of water taken must be no greater than 2.5L/s, the volume no greater than 5,000 litres per day and no more than 10,000 litres in any one calendar month. Water must not be taken when the affected waterway is below the minimum flow. Users must keep records of the amount taken.

Recommendation 71

Greater Wellington defines the meaning of domestic and animal drinking water use in the PNRP, using narrative and (as appropriate) numbers (volume/day), for example:

- water for an individual's reasonable domestic needs is the amount sufficient to provide for hygiene, sanitary and domestic requirements. Consideration should be given to how vegetable garden watering could be allowed for while lawn or pasture irrigation may be beyond the scope of reasonable domestic needs
- water for reasonable needs of a person's animals for drinking is the amount sufficient to provide for the health and welfare of animals.

Recommendation 72

Greater Wellington investigates mechanisms to incentivise or encourage the installation and use of roof-collected rainwater (tanks) for domestic and non-domestic uses.

Recommendation 73

Greater Wellington collects better information on water take and use volumes, including for takes under 14(3)(b) of the RMA, in order to provide for more accurate and transparent accounting of water use, better management of the Whaitua's waterways, and to ensure the requirements of the NPSFM are met.

12.5 Resource Consents

In addition to the recommendations to meet water quantity limits set by the Committee in section 4, the Committee considered it was important that every take of water from a stream was metered, regardless of the size of the take. It considered metering was necessary given the relatively small size and flow of streams in the Whaitua, the potential increase in demand from lifestyle blocks and other developments and the impacts of climate change.

To ensure the community is aware of the new requirements to obtain resource consent for all takes (other than for reasonable domestic and stock drinking water) the Committee recommends the roll-out of a public information and education programme. The programme would raise awareness of the new consent requirements and provide assistance with the resource consent process.

Recommendation 74

Greater Wellington amends the PNRP to ensure all takes requiring resource consent within the Te Awarua-o-Porirua Whaitua require metering to ensure accurate and reliable records of abstractions are maintained.

Recommendation 75

Greater Wellington develops an information and education programme to ensure land owners affected by the removal of the permitted activity rule are aware of the new resource consent requirements and provided with assistance with the resource consent process.



List of recommendations

Recommendation 1

Greater Wellington amends the PNRP to include the objectives set out in Table 3 and 4 (including the numeric objectives in Appendix 3) and the narrative objectives in Section 4.8.

Recommendation 2

Greater Wellington undertakes a full review at the next regional plan review (in 10 years) on progress towards achieving the objectives in this WIP and the effectiveness of the management responses and makes changes as necessary to the PNRP to ensure progress is satisfactory.

Recommendation 3

Greater Wellington works with Ngāti Toa Rangatira, PCC and Wellington Water through various mechanisms (including the Harbour Strategy) to implement this WIP and prioritise actions within the Rangituhi WMU and the catchments that contribute to hotspot areas of elevated metal concentrations within the harbour. This work will comprise:

- identifying the catchments that contribute to the harbour hotspot areas
- identifying areas of piped stream in the lower reaches of the Rangituhi WMU that could be daylighted
- targeting a pollution prevention programme (Recommendation 36) within these catchments.

Recommendation 4

Greater Wellington amends the policy and rule framework of the PNRP to set water quality limits and targets for *E. coli* for each freshwater WMU within Te Awarua-o-Porirua Whaitua, in accordance with the *E. coli* objectives set out in Table 14 (Appendix 3).

Recommendation 5

Greater Wellington amends the policy and rule framework of the PNRP to set water quality limits and targets for ammonia for each freshwater WMU within Te Awarua-o-Porirua Whaitua, in accordance with the ammonia objectives in Table 15 (Appendix 3).

Recommendation 6

Greater Wellington amends the policy and rule framework of the PNRP to set total nitrogen and total phosphorus load limits entering the Onepoto Arm WMU and Pauatahanui Inlet WMU to maintain the current loads (as shown in Tables 5 and 6).

Recommendation 7

Greater Wellington amends the policy and rule framework of the PNRP to set total zinc and copper load limits and targets entering the Onepoto Arm WMU and Pauatahanui Inlet WMU, in accordance with Tables 7 and 8.

Recommendation 8

Greater Wellington amends the policy and rule framework of the PNRP to set sediment load limits and targets entering the Onepoto Arm WMU and Pauatahanui Inlet WMU, in accordance with Table 9.

Recommendation 9

Greater Wellington amends the policy and rule framework of the PNRP to include incrementally decreasing limits for each contaminant over time.

Recommendation 10

Greater Wellington amends the policy and rule framework of the PNRP to set nutrient concentration criteria for DIN and DRP concentrations for each freshwater WMU within Te Awarua-o-Porirua Whaitua, in accordance with Table 10.

Recommendation 11

Together with Harbour Strategy partners PCC, WCC and Ngāti Toa Rangatira, Greater Wellington develops and implements an aquatic ecosystem and habitat action plan for Te Awarua-o-Porirua Whaitua to achieve the freshwater and coastal water objectives.

Greater Wellington amends the PNRP to include this action plan development as a method for achievement of the objectives.

The action plan could include, but not be limited to, the following components.

- 1) **Baseline assessment** of aquatic ecosystem health including identification, analysis and mapping of:
 - aquatic habitats, including wetland seep areas and streams (perennial, intermittent and ephemeral)
 - existing riparian vegetation and its protection (e.g. fenced areas) and
 - areas of ecological significance, including spawning areas.
- 2) **Identification of factors affecting ecosystem health** including:
 - locations with streambank erosion
 - stormwater outfalls and retaining structures
 - high-risk sediment source areas
 - fish passage barriers and
 - modified areas of water courses (e.g. straightened, piped, hard edged or bottomed streams).
- 3) **Implementation plan**, including:
 - prioritisation of catchments and interventions for greatest impact
 - criteria for re-vegetation and other measurable targets
 - targets and timeframes to protect and restore aquatic habitats and
 - a description of commitments by Greater Wellington, other relevant organisations and landowners.

When developing and implementing the action plan, Greater Wellington should:

- work with landowners, councils, sectors and community groups
- incorporate traditional and local knowledge
- ensure all riparian margins on Greater Wellington land are protected and planted (where practicable) as a matter of priority to showcase best practice
- align with existing programmes, including those in the revised Harbour Strategy and
- recognise, review and align with PNRP changes, including schedules identifying areas of significance.

This aquatic ecosystem and habitat action plan would ideally be integrated into the reviewed and revised actions of Harbour Strategy partners (Greater Wellington, PCC, WCC and Ngāti Toa Rangatira) in the updated Harbour Strategy.

Recommendation 12

Greater Wellington, WCC and PCC amend the policy and rule framework in the PNRP and district plans to control the effects of urban development on riparian margins. The framework must require:

- setbacks from streams for any activity (excluding riparian restoration activities)
- restrictions on hard surfaces.

Recommendation 13

Greater Wellington works with WCC and PCC:

- to identify options to protect, restore and enhance riparian margins in greenfield and brownfield developments
- on a Whaitua-wide riparian protection, planting and maintenance programme by:
 - increasing funding (and awareness of existing funding) for riparian protection and restoration (including fencing, planting and maintenance)
 - building partnerships and supporting existing and new restoration projects
 - providing educational programmes and expert advice.

Recommendation 14

Greater Wellington amends the PNRP policy and rule framework to require, where necessary:

- protection and restoration of all aquatic ecosystems in the Te Awarua-o-Porirua Whaitua
- the avoidance of reclamation and/or drainage of beds of lakes, streams (including intermittent) and wetlands, with no exemption for special housing areas and urban growth areas.

Recommendation 15

Greater Wellington works with PCC, WCC and Wellington Water to identify opportunities to enhance the natural form, character, ecosystem health and capacity for mahinga kai of streams and the harbour, including:

- restoring modified streams, including hard-edged, hard-bottomed (e.g. concreted) or channelled sections, to provide physical diversity of banks and bed habitat
- restoring natural meander in straightened channels
- restoring piped or culverted reaches to a more natural state by daylighting streams
- protecting native aquatic species habitat
- protecting fish passage, including removal of tide valves from stream outlets or use of valves which enable fish passage and
- investigating fish passage barriers in piped streams and developing methods to enhance their ecological connectivity.

Recommendation 16

Greater Wellington works towards reducing streambank erosion by:

- investigating the causes of streambank erosion
- identifying land-use activities that contribute to streambank erosion
- exploring options for streambank protection and rehabilitation, including options to support and incentivise landowner action.

Recommendation 17

Greater Wellington works together with Ngāti toa Rangatira, PCC, WCC and other relevant stakeholders to help set up and/or support catchment and community groups to identify and implement optimal local solutions to achieve the objectives, limits and targets in this WIP.

Recommendation 18

Greater Wellington, WCC, PCC and Wellington Water work together to raise water literacy, awareness of receiving freshwater and marine environments, and consumption and conservation practices. This work will be coordinated and delivered through various mechanisms (including the Harbour Strategy) and should include:

- PCC and WCC adding an 'Environmental Water Zone' to residential and commercial Land Information Memorandum (LIM) reports to link properties with receiving freshwater and marine environments
- naming streams from headwaters to the harbour, including piped sections and drains, and using these in stormwater network infrastructure and asset plans
- installing signs at all freshwater outlets into the harbour, including pipes, to indicate that they are streams
- Greater Wellington developing an online interactive mapping tool with a GIS layer identifying WMUs and associated streams, including headwaters.

Recommendation 19

Innovation in land and water management practice in Te Awarua-o-Porirua Whaitua is encouraged and actively facilitated by Greater Wellington, PCC, WCC and Wellington Water, including by:

- regularly monitoring and reviewing progress towards achieving the freshwater and coastal water objectives as set out in this WIP and the updated Harbour Strategy and the effectiveness of the management responses
- adding a policy into the PNRP, to be considered in resource consent processes, that recognises the value of innovative practice in the achievement of the objectives of Te Awarua-o-Porirua Harbour Whaitua
- taking opportunities for ongoing plan changes and updates to guidance documents to provide for innovative practice
- avoiding resource consent conditions that would prevent trialling of alternative management approaches
- encouraging and providing opportunities for landowners and sector groups to develop innovative practice
- investing in research and development to identify and adopt innovative practice.

Recommendation 20

Greater Wellington, PCC, WCC and Wellington Water maximise opportunities to demonstrate good management practice in respect of ecosystem health and water management, including by:

- demonstrating water-sensitive urban design practice on projects such as town centre redevelopments, transport hubs and buildings
- replacing copper brake pads in fleet vehicles with low copper or copper-free alternatives
- increasing targeted street sweeping in high traffic locations
- demonstrating and showcasing good practice land and ecosystem management on council land, including in Greater Wellington's regional parks
- promoting best practice by community and industry

- identifying opportunities to promote best practice water management messages through the media.

These opportunities will be identified and delivered through the various mechanisms, including the Harbour Strategy. They may also be included in other planning documents developed by Greater Wellington and the contributing agencies such as the Parks Network Plan.

Recommendation 21

Greater Wellington undertakes an exercise to determine additional investigations and monitoring needed to better understand the causes and effects of poor water quality to inform future management.

Recommendation 22

Greater Wellington works with relevant agencies and groups to support citizen science initiatives that enable communities to assess stream health and evaluate management activities.

Recommendation 23

Greater Wellington, PCC, WCC and Wellington Water reviews their compliance and enforcement practices to ensure:

- a consistent and reliable approach between institutions to the enforcement of all water-related policies, bylaws and regulations, creating a clear pathway for changing practice
- regulations are applied fairly and consistently
- sufficient resource is committed for compliance and enforcement activities, including the collection of financial fines for infringements
- local communities are provided with enough information to enable them to more effectively assist with reporting of non-compliance and pollution incidents to the council.

Recommendation 24

Greater Wellington, WCC, PCC and Wellington Water look at options for spatial planning for the future development of Te-Awarua-o-Porirua Whaitua.

Recommendation 25

Greater Wellington, WCC, PCC and Wellington Water work to align urban growth planning within Te Awarua-o-Porirua Whaitua to achieve social, cultural, economic and environmental objectives that provide for the values of Ngāti Toa Rangatira and the community. Consideration must be given to the:

- National Policy Statement for Urban Development Capacity, including the results from the Wellington Housing and Business Capacity Assessment
- National Policy Statement for Freshwater Management, including the freshwater objectives, limits and targets for Te Awarua-o-Porirua Harbour and streams
- Full cost of urban development, including construction and maintenance of infrastructure over its lifetime
- Specific characteristics of Te Awarua-o-Porirua Whaitua, including the relationship with Ngāti Toa Rangatira, topography, demography, transport infrastructure and urban form.

Recommendation 26

Greater Wellington, PCC, WCC and Wellington Water work together to provide a clear cohesive policy direction and align and streamline planning processes. This work may include:

- amendments to the Regional Policy Statement for the Wellington Region to guide regional and district plan changes
- alignment of strategic plans, regional plans, district plans, and infrastructure plans and supporting documentation including water-sensitive urban design guidelines
- joint resource consent application processing
- joint plan change processing to add new urban areas to existing zoned areas
- distinction in respect of any jurisdictional overlap
- utilising the transfer of powers or delegated authority provisions in the RMA.

Recommendation 27

Greater Wellington amends the PNRP to include a policy and rule framework that identifies the urban area and controls the location and extent of new urban development areas within Te-Awarua-o-Porirua. The framework must set a more stringent rule activity status for new urban development outside of the identified urban area.

Recommendation 28

Greater Wellington, WCC and PCC amend the policy and rule framework in the PNRP and the district plans to control the effects of urban development on water quality and catchment hydrology. In particular the policy and rule framework must:

- require the design, construction and maintenance of developments to demonstrate good practice in water sensitive urban design
- specify that a certain percentage of the mean annual volume of the catchment be treated by an approved device(s) to achieve a certain percentage reduction in total zinc and copper, these being proxies for a suite of other contaminants
- manage the effects from both small infill developments and larger scale brownfield and greenfield developments through permitted activity conditions and the resource consenting process.

Recommendation 29

Greater Wellington, PCC, WCC and Wellington Water look for opportunities to initiate and incentivise the adoption of good practice in water-sensitive urban design, including through:

- development and implementation of an education programme for consultants, developers and council staff on the new policy direction and ways to meet requirements
- programmes that improve industry and council capability and capacity
- financial incentives
- recognition and acknowledgement of good practice through certification schemes and design competitions.

Recommendation 30

Greater Wellington, WCC and PCC amend the policy and rule framework in the PNRP and/ the district plans, to control hydrological impacts of urban development by ensuring that the design, construction and maintenance of new developments manage stormwater runoff to mitigate changes in runoff volumes and flow rates. This will be achieved through good practice in water-sensitive urban design. In particular the policy and rule framework must require the following from developers.

For greenfield development:

- The modelled mean annual runoff volume generated by the fully developed area must not exceed the mean annual runoff volume modelled from the site in an undeveloped (pastoral) state
- The modelled mean annual exceedance frequency of the 2-year Average Recurrence Interval (ARI) so-called 'channel forming' (or 'bankfull') flow for the point where the fully developed area discharges to a stream must not exceed the mean annual exceedance frequency modelled for the same site and flow event arising from the area in an undeveloped (pastoral) state.

For brownfield and infill development:

- The modelled mean annual runoff volume generated by the fully developed area must, when compared to the mean annual runoff volume modelled for the site prior to the brownfield or infill development, be reduced as far as practicable towards the mean annual runoff volume modelled for the site in an undeveloped state
- The modelled mean annual exceedance frequency of the 2-year ARI so-called 'channel forming' (or 'bankfull') flow for the point where the fully developed area discharges to a stream, or stormwater network, shall be reduced as far as practicable towards the mean annual exceedance frequency modelled for the same site and flow event in an undeveloped state. (See also implementation notes, below.)

Implementation notes for Recommendation 30

- Potential developers will be required to demonstrate compliance with the above hydrological limits through the process of obtaining resource consent.
- The policy and rule framework will include a permitted activity threshold for small brownfield and infill developments, above which a consent pathway is required to demonstrate compliance with the hydrological limits. The permitted activity provision will include conditions requiring prescriptive, demonstrable minimum standards of practice to be met for small activities to be permitted.
- Guidance will be provided on acceptable models for developers to use in their consent application to demonstrate compliance with limits. This will include guidance on acceptable assumptions around the meaning of 'undeveloped state'. The same model must be used to assess the pre-, post- and undeveloped state for a given development application, in order to provide a robust assessment against the limits.
- For brownfield and infill developments, the practicability of the proposed reductions in mean annual runoff volume and mean annual exceedance frequency must be justified in the consent application for the proposed development.

Recommendation 31

Greater Wellington amends the policy and rule framework in the PNRP to manage and progressively improve stormwater discharges to achieve the freshwater and coastal water objectives, limits and targets for Te Awarua-o-Porirua. In developing the amended framework Greater Wellington must:

- tailor the framework to the different scales and types of stormwater discharges such as for individual properties, state highways and local authority stormwater networks
- include a more stringent rule activity status for stormwater discharges that discharge into waterbodies where the current water quality is worse than the limit or target compared to those catchments where current water quality is better than the limit for a respective contaminant

- investigate the potential to increase the alignment of the resource consent requirements with the service planning function undertaken by Wellington Water
- include requirements for resource consent applications and stormwater management strategies to demonstrate how they will meet the freshwater and coastal water objectives, limits and targets in this WIP, including a staged approach to meet progressively reducing limits
- include policy direction to target 'priority' areas in both freshwater and coastal environments by prioritising improvements in the stormwater network.

Recommendation 32

Greater Wellington, PCC, WCC and Wellington Water identify opportunities and investigate methods for incentivising stormwater mitigations within the existing urban footprint and maximise the opportunities provided by infill and brownfields redevelopments. This could include:

- identifying potential brownfield redevelopment areas and supporting master planning at the outset to integrate water management with other development drivers
- identifying potential locations for stormwater mitigations
- providing public investment into upgrading existing stormwater infrastructure
- providing incentives to treat stormwater from the wider stormwater network within brownfield development sites
- exploring and promoting public-private partnerships and funding models to encourage redevelopment of brownfield sites.

Recommendation 33

Greater Wellington, PCC, WCC and Wellington Water investigate and implement options to progressively upgrade or replace high zinc and copper-yielding building materials from existing urban areas. This may include:

- developing and implementing an incentive scheme to paint or replace large-scale high zinc-yielding industrial and commercial roofs

- identifying and targeting high contaminant contributing areas
- prioritising catchments that contribute to the hotspot areas of degradation.

Recommendation 34

Greater Wellington advocates to central government that it initiate change at a national level to restrict the use of high zinc- and copper-yielding building materials.

Recommendation 35

PCC, WCC and Wellington Water work together in high-risk areas to increase and prioritise regular street sweeping and sump clearance and investigate other opportunities to capture and clear contaminants from stormwater drains.

Recommendation 36

Greater Wellington, PCC, WCC, Wellington Water and relevant industry groups develop and implement a pollution prevention programme. This will be outlined, delivered and monitored through various mechanisms, including the Harbour Strategy. The programme must:

- raise the awareness of the public about what they can do to reduce their impacts on harbour and stream health
- promote and incentivise industry good management practice targeting high-risk land-use activities that contribute relatively high levels of contamination
- identify and target priority areas for contaminant reduction based on the identification of catchments that contribute to localised hotspot areas
- investigate opportunities to enable change by streamlining regulatory processes and removing barriers to businesses and industry initiating change
- work with specific industries/suppliers to increase understanding around risks from exterior chemical cleaning products with an aim to reduce usage through point of sale warnings and changes in product care advice.

Recommendation 37

Greater Wellington investigates options to revise the controls on chemical cleaning products (such as '30 seconds' type cleaning products) and advocates to central government for better control of these products at a national level.

Recommendation 38

Greater Wellington advocates to central government that high zinc and copper yielding materials in vehicles be progressively replaced with lower yielding alternatives.

Recommendation 39

Greater Wellington, PCC and WCC raise the awareness of the public of the effects of copper brake pads and actively promote low-copper/copper-free alternatives.

Recommendation 40

Greater Wellington amends the policy and rule framework in the PNRP as necessary to manage and progressively improve wastewater discharges in Te Awarua-o-Porirua Whaitua to achieve the freshwater and coastal water objectives, limits and targets in this WIP. The policy and rule framework must:

- require resource consent applications and wastewater management strategies to demonstrate how they will meet the freshwater and coastal water objectives, limits and targets in this WIP, including through a staged approach
- recognise and address the complexities of the wastewater network, including issues with capacity, overflows, leaks, and cross connections
- require assessment of the progress towards achieving the *E. coli* and enterococci objectives and amendments of programmes and strategies if expected progress is not achieved
- acknowledge the interrelationship of stormwater and wastewater.

Recommendation 41

Greater Wellington amends the policy and rule framework in the PNRP and PCC and WCC amend the relevant district plans as necessary to ensure that new urban development and redevelopment do not exacerbate issues with the wastewater network by providing adequate on-site storage, including requirements for applicants to demonstrate how wastewater generated by development will be managed.

Recommendation 42

Wellington Water develops and implements wastewater programmes, strategies and/or plans to improve the wastewater network to achieve the freshwater and coastal water objectives, limits and targets in this WIP. The development and implementation of these programmes, strategies and plans must:

- clearly set out the steps, actions and milestones to deliver the necessary improvements
- inform the investment strategies of the 2021-2031 Long Term Plans for Greater Wellington, PCC and WCC
- assess all wastewater management options and identify priority areas for actions
- provide an integrated assessment and management approach for all forms of wastewater discharges from the network and the associated effects on freshwater and coastal receiving environments
- address both dry weather wastewater discharges and wastewater network overflows
- adopt an integrated catchment approach that recognises the interconnected nature of the wastewater network and the receiving environments for these discharges
- align funding and investment with Greater Wellington, PCC and WCC for these actions and improvements to occur.

Recommendation 43

Greater Wellington, WCC and PCC work together to integrate and align regional plans, district plans and infrastructure service plans to achieve the freshwater and coastal water objectives, limits and targets in this WIP.

Recommendation 44

PCC and WCC align their policies on the licencing, monitoring and enforcement of Trade Waste discharges into the wastewater network.

Recommendation 45

PCC, WCC and Wellington Water work together to identify sub-catchments within the Whaitua that have the most widespread issues with private laterals and cross connections, and prioritise these sub-catchments for improvement.

Recommendation 46

PCC, WCC and Wellington Water initiate a comprehensive work programme to identify and address issues with the private wastewater network within the Whaitua, including:

- education and guidance for home and business-owners in relation to leaking laterals, cross-connections and the consequences of non-compliance
- promotion of redevelopment as an opportunity to address existing cross-connections and leaking laterals
- financial mechanisms and incentives, such as rates relief or targeted rates in priority sub-catchments, to assist property owners to get their pipes checked and fixed
- investigation and implementation of the best regulatory methods to address cross connections, e.g. through a by-law that requires the pipes to be checked and certified at the time of sale or through a warrant of fitness scheme.

Recommendation 47

Greater Wellington, PCC, WCC and Wellington Water target redevelopment and regeneration projects, such as those led by Housing New Zealand, as an opportunity to address existing wastewater and stormwater network issues through education, advocacy and regulation.

Recommendation 48

PCC and WCC building compliance officers undertake proactive, consistent compliance monitoring of connections in new builds and renovations to ensure there are no cross connections, including a system for recording which properties have been checked and assessed and when issues have been resolved.

Recommendation 49

Greater Wellington amends the policy and rule framework in the PNRP to set discharge standards for earthwork activities that require consent in order to achieve the sediment targets and limits in the WIP.

Recommendation 50

WCC and PCC have consistent bylaws and guidance for silt and sediment control within the Whaitua. Consideration must be given to the effects of climate change to ensure control measures are designed to meet increasing intensity and duration of rainfall events.

Recommendation 51

Greater Wellington reviews and updates publications, including *Small earthworks – Erosion and sediment control for small sites* (2006), and *Erosion and sediment control guidelines* (2000), to ensure the methods and principles they set out reflect current good practice. Amendments may include increasing the design standards to deal with more significant but less frequent rainfall events.

Recommendation 52

Greater Wellington, WCC and PCC develop a compliance programme to ensure good practice in relation to silt and sediment control is followed for all earthworks, particularly in relation to permitted activities. This should also include a required frequency of cleanout and monitoring of retention basins to reduce the risks of retention basins being overwhelmed.

Recommendation 53

Greater Wellington, in conjunction with WCC and PCC, develops an education programme to ensure that good practice for silt and sediment control is understood by those carrying out earthworks.

Recommendation 54

Greater Wellington works with the forestry sector to identify potential barriers and risks to good practice in reducing sediment from forestry operations and works with the industry to overcome the risks and barriers.

Recommendation 55

Upon receiving notice under the NESPF of earthworks, forestry quarrying or harvesting in the Te Awarua-o-Porirua Whaitua, Greater Wellington requests a copy of the Forestry Earthworks Management Plan and Harvest Plan or Quarry Erosion and Sediment Management Plan and actively monitors compliance to ensure sediment discharges to waterbodies are minimised.

Recommendation 56

Greater Wellington provides sufficient resources to deliver consistent advice on forestry good practice and compliance, both within the Whaitua and across the region.

Recommendation 57

Greater Wellington develops a charging policy under the NESPF for the monitoring of permitted activities.

Recommendation 58

Greater Wellington undertakes further work to determine priority areas for reducing sediment in the Whaitua's streams and harbour. Once priority areas have been identified, Greater Wellington should work with landowners to develop environment plans that set out how sediment losses will be reduced at a farm/property scale.

Recommendation 59

Greater Wellington develops a regulatory framework in the PNRP to:

- undertake farm/property-scale mapping to identify erosion-prone land in priority areas identified in Recommendation 58
- require land owners to develop an environment plan setting out how sediment losses will be reduced where erosion-prone land is identified above a certain threshold (e.g. more than specified number of hectares)
- require that, where identified erosion-prone land is vegetated in scrub, shrubs and/or non-plantation forestry, that vegetation should not be cleared for uses that are likely to increase sediment loss.

Recommendation 60

Greater Wellington aligns its programmes, planning, funding and support of sediment mitigation activities, including both riparian restoration and reductions in hill-slope and landslide erosion, within the identified priority areas.

Recommendation 61

Greater Wellington provides sufficient resources in the Whaitua to deliver land management advice, provide expert input into environment plans and to deliver on the work programmes identified.

Recommendation 62

Greater Wellington prioritises opportunities to mitigate sediment loss from erosion-prone lands in council-administered regional parks within the Whaitua.

Recommendation 63

Greater Wellington amends the PNRP policy and rule framework to:

- map low-slope land areas for livestock exclusion using finer scale land-slope criteria that also take into account the average land slope within a specified distance from a water body
- require livestock exclusion from water bodies with an active bed of greater than 1m in width within the mapped low-slope areas
- apply to livestock as defined in Section 2 (*Interpretation*) of the PNRP.

Recommendation 64

Greater Wellington works with rural landowners to promote and implement good management practices, including integrated farm environment planning.

Recommendation 65

Greater Wellington and PCC develop and implement a proactive compliance monitoring programme for on-site wastewater systems in the Whaitua to ensure they comply with the rules in the PNRP and PCC wastewater by-law.

Recommendation 66

PCC prioritises initial compliance monitoring efforts on unlicensed on-site wastewater systems and takes appropriate enforcement action as necessary to ensure all on-site wastewater systems in the Whaitua are licensed and compliant.

Recommendation 67

Greater Wellington and PCC provide information and raise the awareness of property owners about the importance of maintaining on-site wastewater systems and how to identify and address performance issues.

Recommendation 68

Greater Wellington amends the rule and the associated policy framework in the PNRP to take water from a stream in the Te Awarua-o-Porirua Whaitua so that it incorporates the limits listed in Tables 12 and 13. Amendments to the rule and policy framework should also ensure that no more than 30% of MALF (of the tributary) can be taken from a tributary within the WMUs listed in Tables 12 and 13.

Recommendation 69

Greater Wellington removes the permitted activity rule in the PNRP that allows water to be taken from a waterbody in the Te Awarua-o-Porirua Whaitua.

Note: water for reasonable domestic use and animal drinking water is authorised under section 14(3)(b) of the RMA.

Recommendation 70

Greater Wellington amends the PNRP policy and rule framework to allow for 'one off' incidental uses of water in the Te Awarua-o-Porirua Whaitua (such as for water required for farm-spraying operations). The rate of water taken must be no greater than 2.5L/s, the volume no greater than 5,000 litres per day and no more than 10,000 litres in any one calendar month. Water must not be taken when the affected waterway is below the minimum flow. Users must keep records of the amount taken.

Recommendation 71

Greater Wellington defines the meaning of domestic and animal drinking water use in the PNRP, using narrative and (as appropriate) numbers (volume/day), for example:

- water for an individual's reasonable domestic needs is the amount sufficient to provide for hygiene, sanitary and domestic requirements. Consideration should be given to how vegetable garden watering could be allowed for while lawn or pasture irrigation may be beyond the scope of reasonable domestic needs
- water for reasonable needs of a person's animals for drinking is the amount sufficient to provide for the health and welfare of animals.

Recommendation 72

Greater Wellington investigates mechanisms to incentivise or encourage the installation and use of roof-collected rainwater (tanks) for domestic and non-domestic uses.

Recommendation 73

Greater Wellington collects better information on water take and use volumes, including for takes under 14(3)(b) of the RMA, in order to provide for more accurate and transparent accounting of water use, better management of the Whaitua's waterways, and to ensure the requirements of the NPSFM are met.

Recommendation 74

Greater Wellington amends the PNRP to ensure all takes requiring resource consent within the Te Awarua-o-Porirua Whaitua require metering to ensure accurate and reliable records of abstractions are maintained.

Recommendation 75

Greater Wellington develops an information and education programme to ensure land owners affected by the removal of the permitted activity rule are aware of the new resource consent requirements and provided with assistance with the resource consent process.



Improving water quality for safe and regular access to the harbour is important.



Appendices

Appendix 1: Public engagement activities to develop values

Event	Where and when	Surveys completed
Community Events (Information stall set up and community members asked to fill in a survey of three values questions)		
Festival of the Elements	Te Rauparaha Park and Arena, Aquatic Centre and Pataka, Porirua 6 February 2016	103
CreekFest	Cannons Creek Park 14 March 2016	111
Hongoeka Summer Festival	Hongoeka Marae, Plimmerton 27 February 2016	91
Whitireia Polytechnic Open Day	Whitireia, Porirua campus 15 February 2016	47
Public engagement workshops (open access public meetings where community members could meet the committee members)		
Lindon Social Centre	30 March 2016, 4-7pm	
Churton Park Community Centre	4 April 2016, 4-7pm	
St Mary's Church, Whitby	7 April 2016, 4-7pm	
Online survey (including the three values questions)		
Committee website	13 December 2015 – 31 st August 2016	
Other face-to-face discussions and Facebook		

Appendix 2: Additional attribute tables to develop freshwater and coastal water objectives for Te Awarua-o-Porirua Whaitua

The following tables have been developed to support the Committee in setting freshwater and coastal water objectives in a way that is consistent with the attributes provided in Appendix 2 of the NPSFM.

Value	Ecosystem health		
Water body type	Rivers and streams		
Attribute	Macroinvertebrate Community Index (MCI) ²⁹		
Attribute unit			
Attribute State	Numeric attribute state	Narrative attribute state	
	River class 2	River class 6	
A	≥130	≥120	Macroinvertebrate community is typical of undisturbed or reference conditions for the stream type
B	≥105	≥100	Macroinvertebrate community shows limited variance from the expected conditions for the stream type. Indicates low levels of disturbance and/or pollution
C	≥80	≥80	Macroinvertebrate community shows variance from the expected conditions for the stream type. Indicates moderate levels of disturbance and/or pollution
D	<80	<80	Macroinvertebrate community shows substantial variance from the expected conditions for the stream type. Indicates significant levels of disturbance and/or pollution.

29 Clapcott J, Goodwin E 2014. Technical report of Macroinvertebrate Community Index predictions for the Greater Wellington region. Prepared for Greater Wellington Regional Council. Cawthron Report No. 2503.

<http://www.gw.govt.nz/assets/Plans--Publications/Regional-Plan-Review/Draft-Regional-Plan-docs/2014-Technical-Reports/TechnicalreportMCIpredictionsfortheWellingtonregion.pdf>

Value	Ecosystem health	
Water body type	Rivers and streams	
Attribute	Native freshwater fish	
Attribute unit		
Attribute State	Numeric attribute state	Narrative attribute state
A	N/A	Fish community is typical of undisturbed or reference conditions for the stream type
B	N/A	All expected reference condition species are present but populations may be under a low level of stress from, for example: <ul style="list-style-type: none"> • habitat disturbance • passage barriers • toxicants or organic pollutants
C	N/A	Most expected reference condition species are present but populations may be under a moderate level of stress from, for example: <ul style="list-style-type: none"> • habitat disturbance • passage barriers • toxicants or organic pollutants
D	N/A	Fish community shows large changes with loss of species that would be expected for the reference stream type. Reflects significant levels of disturbance and/or pollution.

Value	Ecosystem health	
Water body type	Intertidal harbour	
Attribute	Macroalgae³⁰	
Attribute unit	Ecological Quality Rating	
Attribute State	Numeric attribute state	Narrative attribute state
A	≥0.8	High ecological quality rating
B	≥0.6	Good ecological quality rating
C	≥0.4	Moderate ecological quality rating
D	<0.4	Poor ecological quality rating

30 Stevens, L.M. and Robertson, B.P. 2016. Porirua Harbour: Intertidal Macroalgal Monitoring 2015/16. Report prepared by Wriggle Coastal Management for Greater Wellington Regional Council. 12p <http://www.gw.govt.nz/assets/council-publications/Porirua-Harbour-Macroalgae-monitoring-2016.pdf>

Value	Ecosystem health		
Water body type	Rivers and streams		
Attribute	Dissolved zinc (Toxicity)³¹		
Attribute unit	mg DZn/L		
Attribute State	Numeric attribute state	Narrative attribute state	
	Median	95 th percentile	
A	≤0.0024	≤0.008	99% species protection High conservation value system. Unlikely to be effects even on sensitive species
B	≤0.008	≤0.015	95% species protection Some limited impact on most sensitive 5% of species
C	≤0.031	≤0.042	80% species protection Starts impacting regularly on the 20% most sensitive species. May be reduced survival of the most sensitive species
D	>0.031	>0.042	Impacts on multiple species, including risk of death for sensitive species

31 ANZECC. 2000. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand

Values for this metal should be expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a standard hardness for ANZECC guidelines of 30 mg CaCO₃/L. Criteria values for other hardness may be calculated as per the equation presented in the ANZECC 2000 guidelines

Value				Ecosystem health			
Water body type	Rivers and streams						
Attribute	Dissolved copper (Toxicity)³²						
Attribute unit	mg DCu/L						
Attribute State	Numeric attribute state			Narrative attribute state			
	Median		95 th percentile				
A	≤0.001	≤0.0014	99% species protection High conservation value system. Unlikely to be effects even on sensitive species				
B	≤0.0014	≤0.0018	95% species protection Some limited impact on most sensitive 5% of species				
C	≤0.0025	≤0.0043	80% species protection Starts impacting regularly on the 20% most sensitive species. May be reduced survival of the most sensitive species				
D	>0.0025	>0.0043	Impacts on multiple species, including risk of death for sensitive species				

32 ANZECC. 2000. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand

Values for this metal should be expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a standard hardness for ANZECC guidelines of 30 mg CaCO₃/L. Criteria values for other hardness may be calculated as per the equation presented in the ANZECC 2000 guidelines

Value		Ecosystem health	
Water body type	Coastal water		
Attribute	Total zinc in sediment³³		
Attribute unit	mg Zn/Kg		
Attribute State	Numeric attribute state	Narrative attribute state	
		Fraction of ANZECC Interim Sediment Quality Guideline	
A	≤40	≤0.2	Very low risk of harm to aquatic species
B	≤100	≤0.5	Low risk of harm to aquatic species
C	≤200	≤1	<10% probability risk of harm to aquatic species
D	>200	>1	>10% probability risk of harm to aquatic species

33 Robertson, B.P. and Stevens, L.M. 2015. Porirua Harbour: Fine Scale Monitoring 2014/15. Report prepared by Wriggle Coastal Management for Greater Wellington Regional Council. 56p.

ANZECC. 2000. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand

<http://www.gw.govt.nz/assets/council-publications/Porirua-Harbour-Sediment-plate-monitoring-2016.pdf>

Value	Ecosystem health		
Water body type	Coastal water		
Attribute	Total copper in sediment³⁴		
Attribute unit	mg Cu/Kg		
Attribute State	Numeric attribute state	Narrative attribute state	
		Fraction of ANZECC Interim Sediment Quality Guideline	
A	≤13	≤0.2	Very low risk of harm to aquatic species
B	≤32	≤0.5	Low risk of harm to aquatic species
C	≤65	≤1	<10% probability risk of harm to aquatic species
D	>65	>1	>10% probability risk of harm to aquatic species

34 Robertson, B.P. and Stevens, L.M. 2015. Porirua Harbour: Fine Scale Monitoring 2014/15. Report prepared by Wriggle Coastal Management for Greater Wellington Regional Council. 56p.

ANZECC. 2000. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand

<http://www.gw.govt.nz/assets/council-publications/Porirua-Harbour-Sediment-plate-monitoring-2016.pdf>

Value		Human health for recreation	
Water body type	Coastal water		
Attribute	Enterococci³⁵		
Attribute unit	Enterococci/100mL		
Attribute State	Numeric attribute state	Narrative attribute state	
	95 percentile (cfu/100ml)	Percentage of exceedances over 500 Enterococci per 100 ml	
A	≤40	≤5%	Estimated GI risk is <1% and AFRI risk is <0.3% from a single exposure. The estimated GI risk is >10% and AFRI risk is >4% less than 5% of the time.
B	≤200	≤10%	Estimated GI risk is 1-5% and AFRI risk is 0.3-2% from a single exposure. The estimated GI risk is >10% and AFRI risk is >4% between 5 and 10% of the time.
C	≤500	≤20%	Estimated GI risk is 5-10% and AFRI risk is 2-4% from a single exposure. The estimated GI risk is >10% and AFRI risk is >4% between 10 and 20% of the time.
D	>500	>20%	Estimated GI risk is >10% and AFRI risk is >4% from a single exposure. The estimated GI risk is >10% and AFRI risk is >4% more than 20% of the time.
GI is gastrointestinal illness and AFRI is acute febrile respiratory illness			

35 Ministry for the Environment 2003. Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas.

Appendix 3: Summary of current state and freshwater and coastal water objectives for Te Awarua-o-Porirua Whaitua

Table 14. Numeric freshwater objectives for river freshwater management units: *E. coli*

Freshwater WMU group		Taupō	Rangituhi	Pouewe	Takapū	Te Riu o Porirua	
<i>E. coli</i>	CURRENT STATE	E	E	E	E	E	
	FRESHWATER OBJECTIVE	OBJECTIVE STATE	B	A	B	C	C
		% EXCEEDANCES 540cfu/100mL ≤	10%	5%	10%	20%	20%
		% EXCEEDANCES 260cfu/100mL ≤	30%	20%	30%	30%	30%
		MEDIAN CONCENTRATION (<i>E. coli</i> /100mL) ≤	130	130	130	130	130
		95 TH PERCENTILE CONCENTRATION (<i>E. coli</i> /100mL) ≤	1000	540	1000	1200	1200
		OBJECTIVES TO BE MET BY	2040	2040	2040	2040	2040

Table 15. Numeric freshwater objectives for river freshwater management units: Ammonia (toxicity), Nitrate (toxicity), dissolved zinc and dissolved copper

Freshwater WMU group		Taupō	Rangituhi	Pouewe	Takapū	Te Riu o Porirua	
Ammonia (toxicity)	CURRENT STATE	A	A	A	A	C	
	FRESHWATER OBJECTIVE	OBJECTIVE STATE	A	A	A	A	A/C ³⁶
		MEDIAN CONCENTRATION (mg/L) ≤	0.03	0.03	0.03	0.03	0.03
		MAXIMUM CONCENTRATION (mg/L) ≤	0.05	0.05	0.05	0.05	2.2
		OBJECTIVES TO BE MET BY	M	M	M	M	M
Nitrate (toxicity)	CURRENT STATE	A	A	A	A	B	
	FRESHWATER OBJECTIVE	OBJECTIVE STATE	A	A	A	A	A
		MEDIAN CONCENTRATION (mg/L) ≤	1	1	1	1	1
		95 TH PERCENTILE CONCENTRATION (mg/L) ≤	1.5	1.5	1.5	1.5	1.5
		OBJECTIVES TO BE MET BY	M	M	M	M	2040
Dissolved Zinc	CURRENT STATE	C	D	A	A	D	
	FRESHWATER OBJECTIVE	OBJECTIVE STATE	A	A	A	A	C
		MEDIAN CONCENTRATION (mg DZn/L) ≤	0.0024	0.0024	0.0024	0.0024	0.031
		95 TH PERCENTILE CONCENTRATION (mg DZn/L) ≤	0.008	0.008	0.008	0.008	0.042
		OBJECTIVES TO BE MET BY	2040	2040	M	M	2040
Dissolved Copper	CURRENT STATE	D	D	A	A	D	
	FRESHWATER OBJECTIVE	OBJECTIVE STATE	B	A	A	A	C
		MEDIAN CONCENTRATION (mg DCu/L) ≤	0.0014	0.001	0.001	0.001	0.0025
		95 TH PERCENTILE CONCENTRATION (mg DCu/L) ≤	0.0018	0.0014	0.0014	0.0014	0.0043
		OBJECTIVES TO BE MET BY	2040	2040	M	M	2040

M – Maintain the current state

³⁶ The attribute state for median ammonia is estimated to be A attribute state and the maximum is estimated to be C attribute state. The objective is to maintain the median in A attribute state and the maximum in C attribute state

Table 16. Numeric freshwater objectives for river freshwater management units: periphyton and macroinvertebrate community index

WMU group		Taupō	Rangituhi	Pouewe	Takapū	Te Riu o Porirua	
Periphyton	CURRENT STATE	C	A	C	C	C/B ³⁷	
	FRESHWATER OBJECTIVE	OBJECTIVE STATE	B	A	B	B	B
		NO MORE THAN 8% OF SAMPLES WITH mg chl-a/m ² ≤	120 ³⁹	50	120	120	120
		OBJECTIVES TO BE MET BY	2040	M	2040	2040	2040
Macroinvertebrate community index	CURRENT STATE	C	C	C/B ⁴⁰	C/B ⁴¹	C	
	FRESHWATER OBJECTIVE	OBJECTIVE	B	A	A	B	C
		MCI ≥ RIVER CLASS 2 ⁴²	105	130	130	105	80
		MCI ≥ RIVER CLASS 6	100	120	120	100	80
		OBJECTIVES TO BE MET BY	2040	2040	2040	2040	M

M – Maintain the current state

39 The Taupō WMU is predominantly in the 'Productive Class' defined by the NPS-PM periphyton attribute. The objective is no more than 17% of samples with mg chl-a/m² ≤ 120

40 Expert estimate of current state for MCI in the Pouewe WMU is between B and C attribute state

41 Expert estimate of current state for MCI in the Takapū WMU is between B and C attribute state

42 River classes are shown on Maps 21a to 21e of the PNRP

Table 17. Numeric coastal water objectives: Enterococci, total zinc, total copper and macroalgae

Coast WMU group		Onewpoto Arm		Pauatahanui Inlet		Coastal	
		Intertidal	Subtidal	Intertidal	Subtidal		
Enterococci	CURRENT STATE		D		D		B
	COASTAL OBJECTIVE	OBJECTIVE STATE	C		B		B
		EXCEEDANCES 500cfu/ 100mL ≤	20%		10%		10%
		95 TH PERCENTILE CONCENTRATION (ENTEROCOCCI/ 100mL) ≤	500		200		200
		OBJECTIVES TO BE MET BY	2040		2040		M
Total Zinc in sediment	CURRENT STATE		B	C	A	B	
	COASTAL OBJECTIVE	OBJECTIVE STATE	B	C	A	B	
		TOTAL ZINC IN SEDIMENT (mg Zn/Kg) ≤	100	200	40	100	
		OBJECTIVES TO BE MET BY	M	M	M	M	
Total Copper in sediment	CURRENT STATE		A	B	A	A	
	COASTAL OBJECTIVE	OBJECTIVE	A	B	A	A	
		TOTAL COPPER IN SEDIMENT (mg Cu/Kg) ≤	13	32	13	13	
		OBJECTIVES TO BE MET BY	M	M	M	M	
Macroalgae	CURRENT STATE		B	N/A	B	N/A	
	COASTAL OBJECTIVE	OBJECTIVE	B	N/A	B	N/A	
		EQR ≥	0.6	N/A	0.6	N/A	
		OBJECTIVES TO BE MET BY	M	N/A	M	N/A	

M – Maintain the current state



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