Ruamāhanga Whaitua Committee

greater WELLINGTON REGIONAL COUNCIL Te Pane Matua Taiao

Title: Pathogen management in the Ruamāhanga catchment

Purpose: To provide information on current approaches to managing pathogens in the Ruamāhanga catchment

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Executive Summary

Pathogens in water can cause disease in people if they come into contact with contaminated water. A link can therefore be made between recreation (e.g. swimming) and Māori customary use of water (e.g. harvesting food), and the risk of disease-causing pathogens.

Some rivers and lakes in the Ruamāhanga catchment are currently not suitable for swimming or other forms of recreation at certain times, and no longer offer suitable conditions for a range of customary uses such as mahinga kai, because of pathogen contamination.

Objective O24 of the Proposed Natural Resources Plan (proposed Plan) establishes water quality to be met as a minimum for primary contact recreation in the coastal marine area (including Lake Onoke) and rivers and lakes with identified significant primary contact recreation values. These rivers and lakes are the Ruamāhanga River, Waipoua River, Waingawa River, Waiohine River, Tauherenikau River and Lake Wairarapa. They currently meet the objective for pathogens.

Objective O24 also establishes water quality to be met as a minimum for secondary contact recreation in the Ruamāhanga catchment in accordance with the bottom line for secondary contact recreation identified in the National Policy Statement for Freshwater Management (NPS-FM). The Huangarua, Kopuaranga, Taueru and Whangaehu rivers, and Mangatarere, Ngarara and Parkvale streams all currently meet the NPS-FM bottom line, but are identified as priorities for improvement because they are getting close to the bottom line.

Policies give courses of action for reducing pathogens in discharges. In particular, Policy P63 identifies priorities for contact recreation and Māori use to meet the minimums in the proposed Plan. The proposed Plan regulates pathogen discharges at the present time by permitting diffuse source discharges and requiring resource consents for point source discharges from livestock and community sewage and stormwater systems. Method M27 is for the development and implementation of a programme to improve water quality for contact recreation and customary use in water bodies identified as having significant primary contact recreation values.

1. Background

This report has been prepared to assist the Ruamāhanga Whaitua Committee (the Committee) in understanding the current approaches to pathogen management in the Ruamāhanga catchment that can be addressed in the Whaitua Implementation Programme (WIP). Problems associated with pathogen contamination of water, their sources, and current regulatory and non-regulatory approaches for the management of pathogens are identified.

The terms of reference for the Committee direct the management of water quality as a key task, and specifically include developing:

- water quality limits, including nutrient load and contaminant limits for freshwater and coastal waters if appropriate
- programmes or activities that will support or contribute to the achievement of the established objectives and targets for water quality and quantity outcomes, including such tools as environmental accords and post-settlement arrangements.

2. What's the problem?

Pathogens, including bacteria, protozoa and viruses, can cause illness if people come into contact with water contaminated with human or animal faecal matter. Pathogens can also accumulate in some types of shellfish posing a risk to people if eaten. Exposure to these pathogens typically only produces minor or short-lived health problems. Less common, but more serious diseases potentially caused by exposure to pathogens in water include hepatitis A, giardiasis, cryptosporidiosis, campylobacteriosis and salmonellosis (MfE 2003).

Recreational activities involving full immersion in water such as swimming are referred to as primary contact recreation whereas activities involving partial immersion such as walking across a stream are called secondary contact. Water is only deemed safe for drinking if there are very low concentrations of *E. coli* present.

Typically, faecal contamination is monitored using 'indicator' bacteria (or microbes) that are present in the faeces of warm-blooded mammals (including people) and birds. Indicator bacteria indirectly tell us about the levels of disease-causing pathogens because a relationship has been established between the presence of these indicator species and disease-causing pathogens. The two most commonly measured faecal indicator bacteria are *E.coli*[1] (in freshwater) and Enterococci[2] (in marine waters).

The relationship between indicator bacteria and disease causing pathogens allows for a less costly and easier monitoring approach than measuring actual presence of a variety of disease-causing pathogens. However, while high indicator bacteria levels mean water is unsuitable for recreational use, if water is affected by faecal matter that has been treated (such as through a wastewater treatment plant), the converse is not necessarily true. This is because effluent that has been treated may have successfully removed indicator bacteria, but other disease-causing pathogens such as viruses and protozoa

[1] http://www.lawa.org.nz/learn/glossary/e/e-coli-(escherichia-coli)/
[2] http://www.lawa.org.nz/learn/glossary/e/enterococci/

may still be present at substantial concentrations. To this end, the national guidelines for recreational water quality recommend caution when applying frameworks relying on this indicator relationship to monitoring water impacted by treated wastewater (MfE 2003).

3. Sources of pathogens

Contamination of water by pathogens can occur from a number of sources, including:

- from livestock waste, such as:
  - livestock access to waterways
  - overland flow from grazed paddocks during rainfall
  - overland flow from spreading collected effluent including during rainfall and via land drainage systems, and
- from urban infrastructure, such as:
  - stormwater network cross-contamination with wastewater
  - contaminated stormwater (e.g. from faecal matter on surfaces)
  - wastewater network and pump station overflows and breaks
  - wastewater treatment plant discharges
  - on-site wastewater treatment systems (e.g. from ponding or leachate).

Birds such as ducks and geese can also be a source of contamination in some waterways, particularly lakes. As for other contaminants already discussed by the Committee (nitrogen, phosphorus and sediment), pathogens come from two sources that are managed very differently: point source discharges and diffuse source discharges.

Point source discharges of pathogens into rivers and lakes in the Ruamāhanga Whaitua occur from community wastewater treatment systems and stormwater discharges at Masterton, Carterton, Greytown, Featherston and Martinborough. Table 1 gives the receiving water bodies and expiry dates for resource consents. At Carterton, discharges of wastewater are made to land during summer months and at Masterton some discharges also go to land. Planning by the district councils is underway for community wastewater discharges in the Ruamāhanga catchment to progressively be moved to land rather than continuing these discharges directly to water.

Table 1: Resource consents for discharges of community wastewater directly to rivers in the Ruamāhanga catchment

Community	Receiving water	Expiry date
Masterton	Makoura Stream, Ruamāhanga River	2034
Carterton	Mangatarere Stream	2017
Greytown	Papawai Stream, Ruamāhanga River	Consents expired and applications made for renewal
Featherston	Donalds Creek, Lake Wairarapa	Consents expired and applications made for renewal
Martinborough	Ruamāhanga River	Consents expired and applications made for renewal

Current resource consents provide an ability to review conditions. Conditions can be reviewed if the WIP recommendations lead to rules relating to minimum standards of water quality in the Proposed Natural Resources Plan.

Diffuse or non-point source discharges of pathogens are largely the result of overland flow. Pathogen contaminants usually come from overland flow associated with on-site sewage and domestic, farmed and wild animals. Such overland flow is primarily a problem during and shortly after heavy rainfall.

4. Regulating pathogen management

The Proposed Natural Resources Plan (the proposed Plan) has region-wide objectives, policies and rules for the management of water quality. The process for preparing the new plan has two stages. The first stage of publicly notifying region-wide provisions in the proposed Plan was in July 2015. The second stage of whaitua committees recommending catchment-specific provisions is underway for the Ruamāhanga catchment. The Wellington Regional Council's programme for implementation of the NPS-FM (WRC 2015) establishes that whaitua committees will be responsible for recommending water quality limits that will be included in the regional plan. The proposed Plan provides direction on pathogen management and this is discussed below.

4.1 Objectives

Objectives identify environmental states the proposed Plan is trying to achieve and give management directions. The proposed Plan includes three objectives for the management of the coastal marine area and rivers, lakes and wetlands relating specifically to recreational values (and therefore pathogen discharges). These objectives are set out in full in Appendix 1.

- Objective O5 includes providing for contact recreation and Māori customary use as a minimum
- Objective O9 states that recreational values of the coastal marine area, rivers and lakes and their margins and natural wetlands are maintained and enhanced

- Objective O24 states that rivers, lakes and natural wetlands are suitable for contact recreation and customary use including by maintaining or improving water quality water to meet identified minimums where they are not being met in rivers, lakes, estuaries or the open coast

Other objectives listed in Appendix 1 address what the proposed Plan is seeking for discharges of pathogens. These objectives include: reducing adverse effects of livestock access on surface water (O45), improving stormwater networks (O48), promoting discharges to land rather than water (O49), and progressively reducing discharges of wastewater to fresh water (O50).

Under Objective O24, the proposed Plan aims for all rivers and lakes identified as having significant primary contact recreation values to have pathogen levels suitable for swimming during all flows outside of high flows (defined as all flows below three times median flow) for the period between September and April each year. The objective for these waterbodies corresponds to the B band for primary contact recreation in the National Objectives Framework (NOF) in the NPS-FM. In the Ruamāhanga whaitua, the following rivers and lakes are identified in the proposed Plan as having significant primary contact recreation values:

- Ruamāhanga River
- Tauherenikau River
- Waingawa River
- Waiohine River
- Waipoua River
- Lake Wairarapa

For all other freshwater bodies, Objective O24 requires that water quality is maintained, or improved where pathogen concentrations are worse than the national bottom line for secondary contact with water (as identified in the NPS-FM). The NPS-FM bottom line for secondary contact is a median *E. coli* count greater than 1000cfu/100mL. The proposed Plan does not identify any waterbodies in the Ruamāhanga whaitua that do not meet this bottom line, but does identify water bodies that are approaching it.

In the coast, Objective O24 aims for all coastal water to be suitable for swimming at all times. This equates to a 95th percentile *E.coli* count of no more than 540cfu/100mL in estuaries and a 95th percentile enterococci count of no more than 500 cfu/100mL in open coastal water.

4.2 Policies

Policies in the proposed Plan identify matters that are relevant when resource consent applications are considered and generally what the Council considers appropriate in the management of natural resources. Policies reflect the NPS-FM requirement that water quality in a region is maintained and improved. A number of these policies more specifically relate to adverse effects on the recreational use of water, including as a result of pathogen discharges. A summary of these key policies is as follows (policies are listed in full in Appendix 1):

- **Managing water for contact recreation**. Particular regard is required to be given to actual and potential adverse effects on contact recreation (P10). Discharges of contaminants to land are promoted over direct discharges to water, particularly where there are adverse effects on contact recreation (P62). Water bodies are identified as priorities for contact recreation and Māori use to meet the minimums in Tables 3.1, 3.2 and 3.3 of the proposed Plan (P63)
- **Wastewater** policies give directions on the management of point source discharges of community wastewater to water, including that new discharges are to be avoided (P83) and existing discharges are progressively improved and the quantity of discharges progressively reduced (P81). Discharges to land of community wastewater and on-site domestic wastewater must meet relevant New Zealand Standards (P84, P85)
- **Stormwater** discharges are minimised (P73)
- **Livestock access** is managed to protect aquatic habitat and water quality (P99). Where livestock are not excluded, mitigation shall include such matters as restricting numbers and types of livestock, providing sufficient alternative water supplies and limiting density, frequency and duration of access.
- **Rural land use activities** shall be managed using good management practice (P96).

Schedule H2 of the proposed Plan identifies first priority and second priority water bodies and areas of coastal water for secondary contact recreation. First priority water bodies are those that do not meet NPS-FM bottom lines. These bottom lines are the same as the minimums for secondary contact recreation in rivers and lakes in Table 3.2 of the proposed Plan. All freshwater bodies and coastal water in the Ruamāhanga catchment meet the NPS-FM bottom lines at present (and the proposed Plan minimums in Table 3.1, 3.2 and 3.3 of Objective O24).

Second priority water bodies in Schedule H2 of the proposed Plan are those with water quality approaching NPS-FM bottom lines, identified as those that exceed 1000 cfu/100mL as a 95th percentile. The second priority water bodies in the Ruamāhanga catchment are listed in Table 2.

Table 2: Priorities for improvement of fresh and coastal water quality for contact recreation and Māori customary use in the Ruamāhanga catchment from Schedule H2 of the proposed Plan

Fresh water bodies for secondary contact recreation Fresh water bodies with water quality approaching the NOF bottom line for the health of people and communities from secondary contact with fresh water, identified as those that exceed 1000 cfu/100mL as a 95th percentile[3]
Huangarua River, Kopuaranga River, Mangatarere Stream, Parkvale Stream, Taueru River, Whangaehu River

[3] Based on 5yr monthly monitoring July 2008 to June 2013 inclusive

4.3 Rules

Discharge rules in the proposed Plan identified below can include consideration of pathogens entering rivers and lakes (in small quantities in some cases). Activities that are not permitted or prohibited by rules in the proposed Plan require resource consent. Table 3 sets out the rules most relevant to pathogen discharges.

Table 3: Regulation of activities relevant to pathogen management in the proposed Plan

*Unless the activity does not meet the conditions of the relevant rule, in which case it requires consent
‡ But may be consented if less than minor effects or is supported by policies in the proposed Plan

Does not require consent*	Requires consent	Inappropriate‡
Minor discharges to water and land (R42 and R69) Stormwater from an individual property (R48, R49) Discharges from existing drainage schemes (R59) or water races (R58) to water Discharges from pit latrines (R71), composting toilets (R72), greywater (R73) or onsite wastewater (R74 and R75) to land Application of Aa biosolids (R77), fertiliser (R82) or compost (R85) to land Application and storage of silage and compost (R90)	Stormwater discharges from a local authority network at plan notification (R50) Stormwater discharges from a local authority network two years after public notification (R51) Stormwater dicharges from large sites (R52) All other stormwater discharges (R53) Existing and new wastewater discharges (R61, R62)) Discharges of collected animal effluent (e.g. effluent ponds) (R83 or R84) New or upgraded on-site wastewater systems within community water supply areas (R76) Application of biosolids to land (R78) Discharge of wastewater to land (R79, R80) Discharges of collected animal effluent (e.g. effluent ponds) (R83 or R84) All other discharges that do not meet permitted activity conditions (R67, R68 or R93)	Discharges of untreated wastewater Discharges of collected animal effluent directly to water

4.4 Other methods

The proposed Plan includes non-regulatory methods that the Wellington Regional Council will implement to promote the sustainable management of natural resources. There are a number of other methods that will generally promote reducing pathogen discharges. These include M1 (Regional plan implementation and integration); M10 (Water quality investigations and remediation actions); M12 (Sustainable land management practices) and M28 (Development of good management practice guidelines).

Of particular relevance is Method M27 for the development and implementation of a programme to improve water quality for contact recreation and customary use in water bodies identified in Table 4. The water bodies in Table 4 are identified in the Regional Policy Statement as significant for recreation involving swimming, rafting, canoeing or kayaking.

Table 4: Regionally significant primary contact recreation water bodies in the Ruamāhanga catchment from Schedule H1 of the PNRP

Rivers
Ruamāhanga River
Tauherenikau River
Waingawa River
Waiohine River
Waipoua River
Lakes
Lake Wairarapa

All the rivers and lakes in Table 4 meet the minimums for primary contact recreation in Table 3.1 of the proposed Plan.

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Report approved by:
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29 February 2016

References

Greenfield et al. 2015. Benchmarking of aquatic ecosystem health and contact recreation outcomes in the Proposed Natural Resources Plan. Wellington Regional Council publication number GW/ESCI-T-15/46.

MfE. 2003. Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas. Ministry for the Environment.
http://www.mfe.govt.nz/sites/default/files/microbiological-quality-jun03.pdf

Wellington Regional Council. 2015. Programme for Implementation of the National Policy Statement for Freshwater Management 2014. http://www.gw.govt.nz/nps-implementation-timetable/

Appendix 1: Objectives and policies in the Proposed Plan

Objectives

Objective O5 COASTAL

Fresh water bodies and the coastal marine area, as a minimum, are managed to:

(a) safeguard **aquatic ecosystem health** and **mahinga kai**, and

(b) provide for contact recreation and **Māori customary use**, and

(c) in the case of fresh water, provide for the health needs of people.

Objective O9 COASTAL

The recreational values of the coastal marine area, rivers and lakes and their margins and **natural wetlands** are maintained and enhanced.

Objective O24 COASTAL

Rivers, lakes, natural wetlands and coastal water are suitable for contact recreation and Māori customary use, including by:

(a) maintaining water quality, or

(b) improving water quality in:

(i) **significant contact recreation fresh water bodies** to meet, as a minimum, the primary contact recreation objectives in Table 3.1, and

(ii) coastal water to meet, as a minimum, the primary contact recreation objectives in Table 3.3, and

(iii) all other rivers and lakes and **natural wetlands** to meet, as a minimum, the secondary contact recreation objectives in Table 3.2.

Table 3.1 Primary contact recreation in significant contact recreation freshwater bodies

Water body type	*E. coli* cfu/100mL 95th percentile[4]	Cyanobacteria		Māori customary use	Toxicants and irritants
		Planktonic[5]	Benthic		

[4] Derived using the Hazen method from a minimum of 30 data points collected over three years
[5] 80th percentile derived using the Hazen method from a minimum of three years data

Table 3.1 Primary contact recreation in significant contact recreation freshwater bodies					
Water body type	***E. coli*** cfu/100mL 95th percentile[4]	**Cyanobacteria**		**Māori customary use**	**Toxicants and irritants**
		Planktonic[5]	**Benthic**		
Rivers	≤ 540 at all flows below 3x median flow, September to April inclusive		Low risk of health effects from exposure	Fresh water is safe for primary contact and supports Māori customary use	Concentrations of toxicants or irritants do not pose a threat to water users
Lakes	≤ 540 September to April inclusive	≤ 1.8mm³/L biovolume equivalent of potentially toxic cyanobacteria OR ≤ 10mm³/L total biovolume of all cyanobacteria			

Table 3.2 Secondary contact with water in freshwater bodies			
Water body type	***E. coli*** cfu/100mL median[6]	**Cyanobacteria**	
		Planktonic[2]	**Benthic**
Rivers	≤ 1,000		Low risk of health effects from exposure

[6] Based on a minimum of 12 data points collected over three years

Table 3.2 Secondary contact with water in freshwater bodies			
Water body type	***E. coli*** cfu/100mL median[6]	**Cyanobacteria**	
		Planktonic[2]	**Benthic**
Lakes		≤ 1.8mm^3/L biovolume equivalent of potentially toxic cyanobacteria OR ≤ 10mm^3/L total biovolume of all cyanobacteria	

Table 3.3 Contact recreation in coastal water			
Coastal water type	**Pathogens** Indicator bacteria/100mL 95th percentile[7]	**Māori customary use**	**Shellfish quality**
Estuaries[8]	≤ 540 *E. coli*	Coastal water is safe for primary contact and supports Māori customary use	Concentrations of contaminants, including pathogens, are sufficiently low for shellfish to be safe to collect and consume where appropriate
Open coast and harbours[9]	≤ 500 enterococci		

Objective O45 COASTAL
The adverse effects of **livestock** access on **surface water bodies** are reduced.

Objective O48 COASTAL
Stormwater networks and urban land uses are managed so that the adverse quality and quantity effects of discharges from the networks are improved over time.

Objective O49 COASTAL
Discharges of **wastewater** to land are promoted over discharges to fresh water and coastal water.

[7] Derived using the Hazen method from a minimum of 30 data points collected over three years
[8] Excludes Te Awarua-o-Porirua Harbour and includes Lake Onoke. Estuaries, including river mouth estuaries, should be treated as an estuary when they are dominated by saline water, in which case Table 3.3 applies, and as rivers when they are dominated by fresh water, in which case Table 3.1 or 3.2 applies.
[9] Includes Wellington Harbour (Port Nicholson) and Te Awarua-o-Porirua Harbour. Excludes the Lambton Harbour Area within the Commercial Port delineated in Map 32.

Objective O50
Discharges of **wastewater** to fresh water are progressively reduced.

Policies

Policy P10: Contact recreation and Māori customary use COASTAL
The management of natural resources shall have particular regard to the actual and potential adverse effects on contact recreation and **Māori customary use** in fresh and coastal water, including by:

(a) providing water quality and, in rivers, flows suitable for the community's objectives for contact recreation and **Māori customary use**, and

(b) managing activities to maintain or enhance contact recreation values in the beds of lakes and rivers, including by retaining existing swimming holes and maintaining access to existing contact recreation locations, and

(c) encouraging improved access to suitable swimming locations, and

(d) providing for the passive recreation and amenity values of fresh water bodies and the coastal marine area

Policy P62: Promoting discharges to land COASTAL
The discharge of contaminants to land is promoted over direct discharges to water, particularly where there are adverse effects on:

(a) **aquatic ecosystem health** and **mahinga kai**, or

(b) contact recreation and **Māori customary use**.

Policy P63: Improving water quality for contact recreation and Māori customary use COASTAL
The water quality of water bodies identified as priorities for improvement for contact recreation and **Māori customary use** in Schedule H2 (priority water bodies) shall be improved to meet, over time and as a minimum, the objectives in Table 3.1, 3.2 and 3.3, including by:

(a) improving water quality in all first priority water bodies for secondary contact with water in Schedule H2 (priority water bodies) in accordance with Method M27, and

(b) **Stormwater Management Strategies** having particular regard to improving water quality in fresh water bodies and coastal water identified in Schedule H2 (priority water bodies) that are adversely affected by discharges from **stormwater networks**, and

(c) having particular regard to improving water quality in fresh water bodies and coastal water identified in Schedule H2 (priority water bodies) that are adversely affected by discharges from **wastewater networks** and **wastewater** treatment plants.

Note

Whaitua committees will identify methods and timeframes to improve water quality in all first and second priority water bodies listed in Schedule H2 (priority water bodies) within their **whaitua**. These may be incorporated into the Plan by a future plan change or variation.

Policy P74: First-stage local authority network consents COASTAL

The adverse effects of discharges from a local authority **stormwater network** during a controlled activity consent granted under Rule R50 shall be managed by:

(a) …

(b) undertaking monitoring to identify the adverse quality and quantity effects of discharges from the **stormwater network** on:

(i) **…**

(ii) contact recreation and **Māori customary use**, and

(iii) …

… in order to develop a prioritised programme for improvement of areas within the **stormwater network** that will form the basis of a **stormwater management strategy**, and

(c) managing any acute adverse effects of discharges from the **stormwater network** detected during the monitoring under (b), including significant adverse effects on primary and secondary contact with water, by:

(i) implementing mitigation as soon as practicable after the effect is determined, and

(ii) identifying long-term options for remediation or mitigation, and

(d) …

(a)

Policy P78: Managing stormwater from large sites COASTAL

The adverse effects of the discharge of **stormwater** from a port, airport or state highway, where the discharge will enter water shall be managed by:

(a) managing the discharge in order to minimise the adverse effects of **stormwater** discharges on **aquatic ecosystem health** and **mahinga kai**, contact recreation and **Māori customary use**, and …

Policy P81: Minimising and improving wastewater discharges COASTAL

The adverse effects of **existing discharges** of **wastewater** to fresh water and coastal water shall be minimised, and:

(a) in the case of **existing discharges** to fresh water from **wastewater** treatment plants, the quality of discharges shall be progressively improved and the quantity of discharges shall be progressively reduced, and

(b) in the case of **existing discharges** to fresh water or coastal water from **wastewater networks** during or following rainfall events, the frequency and/or volume of discharges shall be progressively reduced.

Policy P83: Avoiding new wastewater discharges to fresh water

New discharges of **wastewater** to fresh water are avoided.

Policy P84: On-site domestic wastewater management COASTAL

More than minor adverse effects on fresh water, including groundwater and coastal water from discharges from **on-site domestic wastewater treatment and discharge systems** shall be avoided. **On-site domestic wastewater treatment and discharge systems** shall be designed, operated and maintained in accordance with the *New Zealand Standard AS/NZS 1547:2012 – On-site domestic wastewater management*.

Policy P85: Biosolids and treated wastewater to land COASTAL

The adverse effects on fresh water, including groundwater and coastal water and on soil from the application of **biosolids** or treated **wastewater** to land shall be minimised. The application of **biosolids** shall be managed in accordance with *Guidelines for the safe application of biosolids to land in New Zealand, 2003*.

Policy P96: Managing land use

Rural land use activities shall be managed using **good management practice**.