Options for managing contaminants in Te Awarua-o-Porirua whaitua

E.coli

4 October 2018 Whaitua Committee Workshop

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Background and context

This document lays out the current problem with *E. coli* and where it's coming from in Te Awarua-o-Porirua whaitua. It briefly covers what the Committee's modelling scenarios show by way of changes in *E. coli* through different mitigation methods. It also covers the key options for improving *E. coli* including limits, targets and policy approaches to achieve the Committee's freshwater objectives, and objectives in the harbour.

1. What is the problem and where is the E. coli coming from?

E. coli and enterococci are indicators of the presence of faecal material in water (from animals and humans) and therefore the possible presence of disease-causing bacteria, viruses and protozoa. These may present a risk to human health when people come into contact with them in freshwater and saltwater. *E. coli* is used as an indicator of the risk to human health in freshwater. Enterococci can survive in salt water and is therefore used as an indicator of pathogens in salt water.

E. coli is a contaminant that comes from different sources which means our response to managing it is quite different between rural and urban areas. In rural areas the main source of *E. coli* is animals and can be generated from stock access to waterways and overland flow through grazed paddocks. In urban areas the main source of *E. coli* is from humans, from wastewater discharges and from stormwater discharges that have been infiltrated with wastewater.

The wastewater network and the treatment plant in Te Awarua-o-Porirua whaitua have capacity problems which contribute to poor water quality. In wet weather the wastewater network and wastewater treatment plant overflow into the freshwater and coastal areas. This is contributed to by issues with infiltration and inflow from stormwater into the wastewater network. This can be through cross connections of stormwater and wastewater pipes or through degraded leaking pipes, and under capacity systems.

Current state monitoring and modelling information shows high concentrations of *E. coli* across the catchment due to its multiple sources. All rivers and streams in the whaitua are in the D or E bands set out in the National Objectives Framework of the National Policy Statement for Freshwater Management (NPS-FM). Rivers and streams need to be in the A, B or C bands to be considered suitable for primary contact so significant improvements in water quality are needed across the catchment to meet both the community's needs and the statutory requirements.

The presence of *E. coli* and enterococci negatively impacts on a range of values including recreation, mahinga kai, Māori customary use, drinking water supply and stock watering. Values are impacted in both the streams and rivers and in the harbour. It has been recognised that the intertidal areas in the Porirua harbour are the most utilised in terms of recreation and mahinga kai activities, and the Committee has been clear there is an expectation of being able to swim in the harbour.

2. What have we learnt from scenario modelling?

As part of the scenario modelling, a series of mitigations were applied to rural and urban land uses that impact on *E. coli* concentrations.

	Improved mitigations	Water sensitive mitigations
Rural	Fencing and planting of most streams in pastoral areas with a 5m width	Fencing and planting of most streams in pastoral areas is increased to a 10m width
	Retirement of the steepest pastoral slopes - Retired lands revert to scrub/native cover – LUC class 7e and 8	Retirement of highly and moderately erodible pastoral slopes – LUC class 6e, 7e and 8
Urban	Treatment of stormwater runoff in new urban developments with catchment scale devices such as wetlands.	Treatment of stormwater runoff in new urban developments with catchment scale devices such as wetlands.
	Limited treatment of road runoff in new urban developments with bioretention – 40% of roads in greenfield and infill development.	Treatment of most road runoff in new urban developments with bioretention – 90% of roads in greenfield and infill development.
	Fixing cross connections and broken pipes in the wastewater network.	Fixing cross connections and broken pipes in the wastewater network.
	Reduce wastewater overflows to an average of 4 per year.	Reduce wastewater overflows to an average of 2 per year.
		Reduced impervious footprint in new development - 100% of new greenfield and

		infill development.
		Wetland treatment of runoff from major roads.
		Bioretention treatment of runoff from paved surfaces in commercial areas.

In the rural water management units (WMUs) modelling of fencing, stock exclusion and retirement of grazing land provided significant reductions in *E.coli*. Most of the rural WMUs were estimated to reach a C band under the improved scenario reductions, though there is uncertainty around the estimates in some of the headwater catchments with extensive grazing and lower water flows - Upper Kenepuru, Upper Duck, Judgeford and Takapu streams. The Taupo Stream needed water sensitive reductions to achieve a C band.

In the urban areas the biggest reductions in *E. coli* came from wastewater network improvements such as repairing leaking wastewater pipes, cross connections and reducing wastewater overflows. The scenario modelling estimated significant improvements in some WMUs e.g. a 50-75% reduction in *E. coli* through the improved scenario in the Kenepuru and Porirua stream sites and a 70-85% reduction in the water sensitive scenario. However, all the measures on which the band is determined started in a very poor state so the improvement is not always enough for a band improvement. Treatment of runoff in infill and greenfield areas is highly effective for *E. coli*, removing around 90% of *E. coli* from these areas, but the areas are relatively small so effects are masked in the bigger catchments.

These scenario modelling results illustrate that the magnitude of *E. coli* reductions needed in urban WMUs to achieve the Committee's freshwater objectives may be greater than those modelled in the water sensitive scenario. This suggests that mitigations in urban areas will need to be widespread in both existing and new urban areas to reduce *E. coli.* More detailed investment and network upgrade design will also be needed.

Dealing with overflows has been seen as cost effective by the Committee.

Other things to consider about the future include the effects of climate change and population growth. Higher intensity rainfall events and future urban development are likely to put more pressure on the wastewater and stormwater networks, and the wastewater treatment plant, potentially causing the system to overflow more.

Committee decisions

3. Values and Objectives

Te Awarua-o-Porirua Whaitua Committee has already identified their freshwater objectives for *E. coli*, responding to those values impacted. The relevant values, high level objectives and a summary of the freshwater objectives are below. The full list of freshwater objectives by WMU is included in appendix 1. Objectives for enterococci in the harbour and timeframes for objectives to be achieved by are still to be confirmed.

Values most relevant to E. coli

Te Awarua- o-Porirua Whaitua Committee values that are the most relevant to *E. coli* are:

Kai kete – the harbour, streams and coast can be used to gather and catch kaimoana and mahinga kai for food

Hauora kaiao – the harbour, streams and coast are clean and brimming with life and have diverse and healthy ecosystems

Ka taea e te tangata – the harbour, streams and coast are safe and accessible for people to enjoy and undertake recreational activities

Whanaketanga tauwhiro o te whenua – land is developed, used and managed sustainably, recognising its effect on water quality and quantity.

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.

High level objectives that relate to E. coli[1]

Improve water quality for human health	**Sustainable urban development**	**Sustainable rural land use**	**Te mana o Te Awarua-o-Porirua**
Achieve water quality suitable for swimming: - reduce fecal inputs Improve amenity	Achieve sustainable urban development: - maintain and improving water quality - provide housing stock and built environment that meets the communities needs Provide sustainable and resilient water infrastructure	Achieve sustainable land management and land use practice	Provide for Māori use including mahinga kai Restore the mana of Te Awarua-o-Porirua

Summary of draft objectives[2]

Draft objectives

Significantly improve *E. coli* concentrations in all streams, urban and rural, from being below national bottom lines to:
- firstly, achieve national bottom line requirements for swimmability, and,
- then, progress towards meeting the higher expectations of the community.

[1] Committee meeting minutes 19 May and 16 June 2016
[2] ENPL-6-2812 confirmed with committee on 23 August 2018

What is driving this and what might it mean?

Significant reductions in pathogen loads reaching water are going to be needed across all land uses, both urban and rural, and across all freshwater management units.

The types of mitigations that will achieve these improvements will be different in urban areas vs rural areas.

Water quality improvement will mean significant infrastructure upgrades in urban areas and may only be possible over long timeframes.

Modelled wastewater network improvements appear cost effective and achievable.

Improvement is made more difficult by the small size of the whaitua sub-catchments and the lack of relatively large vegetated head water catchments providing clean, diluting water.

We are not sure about the sources of measured and modelled *E. coli* in some parts of the whaitua. There is value in working with communities, in particular rural and lifestyle block landowners, to better understand this and target implementation options.

Draft harbour objectives for Enterococci[3]

Enterococci is an indicator of the presence of faecal material in water and therefore the possible presence of disease-causing bacteria, viruses and protozoa. Enterococci are distinguished by their ability to survive in salt water and are typically more human-specific and are therefore used as an indicator of pathogens in salt water.

At their workshop on 23 August 2018 the Committee requested further information before making decisions on objectives for enterococci in the harbour. This information will be provided to inform discussions at the 4 October 2018 workshop.

Achieving the *E. coli* objectives set by the Committee for freshwater will assist in achieving enterococci objectives in the harbour.

Timeframes by which to achieve freshwater objectives

The NPS-FM has a national target to increase the proportion of specified rivers suitable for primary contact to 90% by 2040, and to improve water quality across all categories. For those rivers in the whaitua that are specified, *E. coli* freshwater objectives of C band and above will need to be achieved by 2040 to be in line with the NPS-FM. It is recommended the Committee consider 2040 timeframes for all *E. coli* freshwater objectives for both equity reasons across rural and urban WMUs and because smaller streams feed into the larger specified rivers so the connection should be acknowledged.

4. What limits and targets are on the table

Limits and targets for *E. coli* will be set using in-stream concentrations rather than annual loads as calculated for other contaminants. This is because *E. coli* is used as a proxy for human health and it dies off in a relatively short time period. While load limits could be set it wouldn't be

[3] Recommended harbour objectives memo discussed with committee 23 August 2018

meaningful as it's the level of *E. coli* in a water body at a given time which indicates the risk of people contracting an infection.

In-stream concentrations will be developed from the Committee's attribute state freshwater objectives for *E. coli* using the relevant NOF attribute state thresholds. The timeframes for these targets to be achieved will be the same as the timeframes the Committee sets for meeting their freshwater objectives for *E. coli*.

5. To allocate or not to allocate

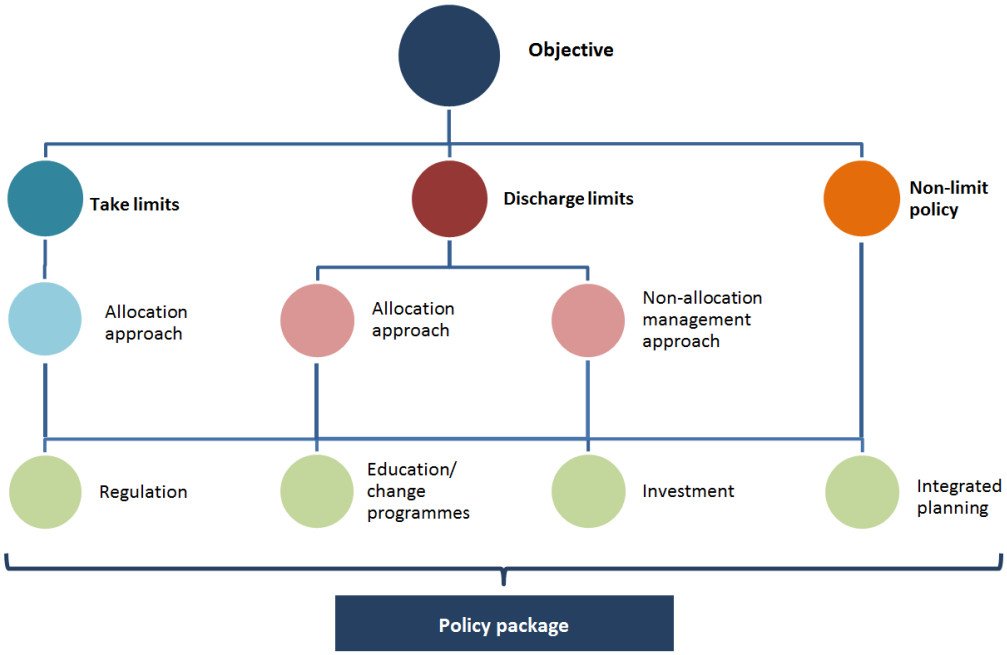
Two important principles to consider when deciding whether to allocate or not are, can you allocate and if so, should you allocate? *E. coli* isn't generally allocated as it's measured as an in-stream concentration rather than a load so it can't be attributed back to an individual with enough certainty to provide a property right. In lieu of an allocation methodology it is common to set discharge standards for point sources which are identifiable points.

In Te Awarua-o-Porirua whaitua *E. coli* from rural areas is generally from diffuse sources and therefore can't be allocated. In the urban areas point source discharges are largely managed by Wellington Water – stormwater outlets and overflows at specific points in the network. These will be managed through discharge standards as part of the policy approach rather than as individual allocations.

6. Policy decisions

Policy approach to achieving E. coli objectives

The policy package diagram shown in figure 1 is the conceptual framework that shows how the parts of the policy package (the limits and methods) can be put together in order to achieve an objective. The following sections propose policy approaches for urban and rural WMUs to achieve *E. coli* freshwater objectives.



In rural areas limits and targets will mostly be achieved through non-regulatory tools such as education, good management practice and the use of sub-catchment groups. The limits and targets themselves will drive changes in land use and practice. In urban areas there is a more regulatory focus through limits, targets and the regulation of point source discharges. This will drive greater investment and better integration between agencies.

Policy approach – Rural

It should be noted that a lot of approaches in the rural space will also have the dual benefit of reducing sediment loads as well.

Regulation

- *Stock exclusion and retirement*
  Most of the stock exclusion rules in the PNRP don't apply in this whaitua. There could be further regulation requiring stock exclusion in the hill country.

Investment

- *Retirement of grazing land*
  Greater Wellington Regional Council should look to increase opportunities for retirement in their regional parks in the whaitua.

Education

- *Managing discharges from septic tanks*
  Information on good practice should be provided to users. A septic tank inspection as part of a certification programme to be undertaken within sub-catchments to improve the quality of treatment of older tanks in particular is an option. Potential new owners could be informed about their ability to have a septic tank cleaned/checked at the time of sale and purchase. A warrant of fitness could be introduced for septic tanks.

- *Industry good practice*
  Greater connection between councils and industry to promote and implement good management practice through greater education and support services.

- *Advisory activities*
  Increase advisory activities in the rural land use space to increase retirement and planting rates, and to produce better integrated farm planning services.

Integrated planning

- *Sub-catchment groups*
  Assist in the set-up and support of sub-catchment scale land user group processes to meet sub-catchment limits. Sub-catchment groups will work together to target the best local solutions in their area.

Policy approach - Urban

Regulation

- *Public network stormwater and wastewater discharges (including overflows)*
  Amend the rules in the PNRP to ensure all new and existing discharges are consented (including the use of discharge standards) in line with *E. coli* limits and targets.

Investment

- *Network upgrades and cross connections*
  Significant investment will be needed to upgrade the network and to reduce cross connections to meet limits and targets.

Education

- *Industry good practice*
  Greater connection between organisations to promote and implement good management practice in urban development through greater education and support services.

- *Cross connections*
  Education for targeted groups (e.g. plumbers) to understand the impact of cross connections. Programmes by Wellington Water and councils to identify and rectify cross connections.

Integrated planning

- *Planning alignment*
  Integration and alignment of regional plans, infrastructure asset plans and district plans to effectively achieve l limits and targets.

Appendix 1 - Draft freshwater objectives for *E. coli*

Drains to	WMU group	WMU name	*E. coli*	
			Current State	Objective (As at 19.4.18)
Open coast	Coastal catchments	Pukerua	E	***C****
		Hongoeka to Pukerua	E	**A-B**
		Whitireia	E	**B**
Taupo	Taupo Stream and Swamp	Taupo Stream	E	**B**
			E	**B**
Pauatahanui Inlet	Pauatahanui steep rural streams	Horokiri and Motukaraka	E	**B**
			D	**B**
		Kakaho Stream	E	***C****
		Judgeford Stream	E	**C**
		Upper Duck Creek	E	***B****
	Pauatahanui rural streams	Pauatahanui Stream	E	***C****
		Ration Creek	E	**B**
	Pauatahanui urban streams	Lower Duck Creek	E	***C****
		Pauatahanui fringe streams	E	***C****
Onepoto inlet	Onepoto steep rural streams	Rangituhi Stream	E	**A**
		Takapu Stream	E	**C**
		Upper Kenepuru	E	**C**
	Onepoto rural streams	Belmont Stream	E	**C**
		Stebbings Stream	E	**C**
	Onepoto small urban streams	Hukarito Stream	E	***C-B****
		Mahinawa Stream	E	***C-B****
		Onepoto Fringe	E	**C**
		Titahi	E	***C****
	Kenepuru Stream	Kenepuru	E	**C**
	Porirua Stream	Porirua	E	**C**
			E	**C**
			E	**C**
			E	**C**