BRIEFING NOTE

To: Kaituna and Pongakawa-Waitahanui Freshwater Futures Community Groups

From: Nicki Green, Principal Advisor, Policy and Planning; Rochelle Carter, Principal Advisor, Science

Date: 10 May 2019

Subject: **Workshop 10: Surface Water Quality**
29 May 2019, The Orchard, Te Puke

1 Introduction

1.1 Purpose

In this workshop, we will continue to talk through surface water quality information and implications. This will include a recap on some material already discussed by the group, as well as presentation of some new information.

The main purpose will be to explore the modelling results and implications of the good management land use practice scenario.

1.2 Outcomes sought

Group members consider good practice mitigation scenario modelling results and agree/advise on conclusions.

1.3 Agenda

The agenda is attached.

2 Technical modelling session - *Optional*

Some members have indicated they would like to read the detailed full technical report about the SOURCE biophysical catchment model. A draft of the report (dated 10 May 2019) is being made available to all members, but is certainly not compulsory reading. It has only briefly been reviewed by Council staff and so has not been approved for public release.

For this reason, **please do not circulate it**. Staff will let you know of any amendments and will make the final report publicly available.

Modellers will attend the first hour of the workshop (9am-10am), specifically so that those group members with an interest in the detail can ask questions. This first hour is entirely optional.

3 Updates

3.1 National

As noted at the previous workshop, central government has a large *Essential Freshwater* work programme and also is undertaking a *Three Waters Review*. Changes will be made to legislation, national policy and environmental standards for freshwater and three waters management. Government intends to release public discussion documents for feedback in July / August. Some changes being considered have implications in this Water Management Area. While we will continue working towards a *draft* plan change, Bay of Plenty Regional Council will

not notify any more freshwater plan changes until government policy changes and implications are understood.

3.2 Regional

Information for the community

As promised at the last meeting, we have prepared an initial information sheet for the public about the situation in the estuaries. This will be available at the workshop. We may not advance any discussion with the wider community about policy options until national changes are understood.

Proposed Plan Change 9: Region wide water quantity

Council is holding meetings with groups of appellants to clarify matters of appeal, with a view to addressing some of those matters out of Court, and narrowing those matters that need to go to Court. No Court dates have been set.

Plan Change 10: Lake Rotorua Nutrient rules

The first part of the Environment Court hearing has been held. Council is now awaiting the interim decision and dates for the remainder.

Focus catchments

Council's Coastal Catchments team have recently changed the way catchments are managed, from an area based approach to one that looks at prioritising smaller catchments and sub-catchments based on risk. The selected catchment areas will be small enough to enable a measurable success. Waitepuia stream catchment, Kaikokopu Canal catchment, and all of Waihī Estuary catchment have been provisionally selected as some of the region's focus catchments.

4 The story so far

Late last year, we provided a summary of draft measurable objectives that would support the in-river values and preferred state you communicated to us in Workshops 4 and 5, and which are expressed in the *Kaituna: he taonga tuku iho – a treasure handed down*.

Workshop notes can be found at the following links:

Kaituna Community Group

Pongakawa-Waitahanui Community Group

Draft measurable objectives for rivers are summarised in Table 1 below. In addition, Total Phosphorus, Total Nitrogen, Total Suspended Sediment, and *E. coli* need to be managed to support the values of Waihī and Maketū Estuaries, and objectives set for these in the Regional Coastal Environment Plan.

Table 1: Recommended attributes and draft measurable objectives for Kaituna-Pongakawa-Waitahanui Water Management Area.

Boxes shaded green – monitoring data indicates objective is currently met.
Boxes shaded orange – monitoring data indicates objective is not currently met.
Boxes shaded grey – insufficient data to determine.

Future Management Unit (FMU)	**Lower Kaituna**	**Mid-Upper Kaituna**	**Waiari - Water Supply**	**Lower Pongakawa**	**Mid-Upper Pongakawa**	**Waitahanui**
Attribute	Objective	Objective	Objective	Objective	Objective	Objective
Macro Invertebrate Community Index (MCI)	B	B	A	B	B	A
EPT - Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly)	B	B	A	B	B	A
Bay of Plenty Index of Biotic Integrity (BOP_IBI)	B	B	A	B	B	A
Periphyton	B	A	A	B	A	A
Macrophytes	< 50%	< 50%	< 50%	< 50%	< 50%	< 50%
Nitrate-nitrogen (toxicity)	A	A	A	A	A	A
Ammonia-nitrogen (toxicity)	A	A	A	A	A	A
Dissolve Oxygen (below point sources)	B	B	A	B	B	A
Acidity (pH)	B	B	A	B	A	A
Temperature (Cox-Rutherford Index)	B	B	A	B	A	A
Flow habitat protection level for indicator species						
E. Coli	B	B	A	B	A	A
Benthic Cyanobacteria	A	A	A	A	A	A
Cyanobacteria- planktonic	A	A				
Toxicants/irritants	>90%	>90%	>99%	>90%	>90%	>90%

4.1 Estimated contaminant load reductions for Maketū and Waihī estuaries

At workshop 9, we presented and discussed the estimated Total Nitrogen, Total Phosphorus load and *E. coli* reductions needed to support moderate ecological health in Maketū and Waihī estuaries (summarised in Table 2 below).

	Total Nitrogen (tonnes/year)		**Total Phosphorus (tonnes/year)**	
	Current	**Limit and % reduction needed**	**Current**	**Limit and % reduction needed**
Maketū Estuary	477	179 (63%)	22	14 (38%)
Waihī Estuary	618	212 (66%)	57	40 (30%)

	Total Suspended Solids - Sediment (tonnes/year)		***E. coli* (units/day)**	
	Current	**Interim target**	**Current**	**Limit (% reduction)**
Maketū Estuary	4,647	2014 level (to be estimated)	2.84×10^{12} estimated, after Kaituna re-diversion. *Note: 2.84×10^{12} is 2.84 trillion*	1.1×10^{12} trillion (60%)
Waihī Estuary	8076	2014 level (to be estimated)	1.74×10^{12}	9×10^{11} (50%)

Table 2: Current estimated combined contaminant load (from all upstream freshwater bodies) discharging to the estuary and estimated limits (maximum load) and % reduction needed to achieve moderate ecological health in Maketū and Waihī estuaries.

A question was raised as to why the load needed for moderate ecological health is not so different from the estimated *natural* load coming from the catchment.

Scientists and modellers have discussed this. The modellers are confident with model performance and the estimated load for the natural state scenario. The modelled natural load assumed the river channels remain as they are now, but assumed the surrounding land was wetland. This scenario is used just to estimate natural generation *now*.

It is not an estimation of the past. In the past, the rivers discharged in to extensive wetlands and the water made its way *through* wetlands (not via channels) to the estuaries. This is likely to have removed a lot of contaminants and so the load reaching the estuaries prior to land drainage would have been less. It is very important to understand this distinction.

The limits for estuaries are based on the information we have available today and will be refined as more information is collected over time.

4.2 Management issues and focus

As noted in Workshop 8, scientific monitoring using these indicators, and modelling of nitrogen, phosphorus and *E. coli* indicates:

1. Sediment, phosphorus and nitrogen loads from human activities (i.e., productive land uses and discharges) contribute to current poor ecological health (like loss of native plants and fauna) and significantly affects recreational and mahinga kai values of Maketū and Waihī estuaries.
2. Water quality is safe for contact recreation / swimming at monitored freshwater sites, but worsening in Lower Pongakawa. Modelling indicates water quality may not be acceptable for contact recreation in some lower catchment water bodies. Science also indicates that Maketū and Waihī estuaries are affected. There may be localised *E.coli* hot spots in the WMA.
3. Current nitrate and ammonia concentrations do not pose significant risk of toxicity to aquatic life, but these nutrients can promote plant, weed or algal growth in the estuaries.
4. Algal growth in streams is generally not an issue.
5. Macro-invertebrate monitoring indicates ecological health is compromised in some lowland water bodies.

The results suggest the focus of water quality work should be on:

- arresting increasing concentrations of Nitrate and Phosphorus
- reducing sediment, nitrogen and phosphorus loads entering the estuaries, with a focus on reducing that generated by human activities, particularly in the lower catchments.
- continuing improving trends (e.g, Ammonia in Kaituna River at Te Matai).
- arresting worsening *E. coli* trends in Pongakawa catchment and water bodies with D or C band.
- managing the risk of increasing *E. coli*, nitrogen, phosphorus or sediment generation if land use and/or practices change in the estuary catchments.
- action planning to improve ecological health in lowland water bodies, as measured using MCI in particular.

5 Scenarios

We can explore ways to manage nitrogen, phosphorus and sediment, using scenarios and modelling. In this project, a scenario is a description of a possible land and water use and management situation in the catchment that is different from now. Each scenario is run through our catchment modelling tool to:

- estimate what might happen to nitrogen, phosphorus, and suspended solids/sediment loads in the rivers and also to source areas in the catchment; and
- estimate what might happen to *E. coli* concentrations in rivers.

At the meeting we will recap the land use change scenarios you have already discussed and provided input to at previous workshops (workshop 6), just to ensure everyone remembers and understands.

Table 3: Summary of Land Use scenarios

	Scenario	Description	
A	Naturalised	Natural land cover. No productive/developed land use. No water takes or discharges. Existing major structural modifications remain in place (e.g., channels straightened and cut to sea).	
B	**Current/Baseline**	Current land use, estimated current takes, discharges, and land use practice.	
C	Development C	Estimated future credible land use change. Estimated takes, discharges, and land use practice are based on the current scenario assumptions, except for known/consented changes like the initiation of the Waiari water supply take.	Urban growth, horticulture, forestry and mānuka expansion, wetlands extend over the full extent of estimated ~2050 sea level rise.
D	Development D		Urban growth, dairy expansion, forestry and mānuka expansion, wetlands extend over part of the extent of estimated ~2050 sea level rise.

If you have time, please look over the discussion about scenarios in the briefing notes, slides and meeting notes from workshops 6 and 7 to refresh your memory. If there is anything you don't understand, bring your questions to the workshop.

5.1 Yields from land use types

Staff requested and received from modellers some initial estimates of contaminant loads from each land use type in the catchments. However, we have queried some matters of detail about these estimates and so cannot express the results as firm numbers. Indicatively, on a whole of WMA scale the relative proportions are shown in Table 4 below.

Table 4: Indicative percentage contribution to total load for each land use, compared to percentage of land area in each land use in Kaituna-Pongakawa-Waitahanui Water Management Areas.

Landuse and percentage contribution	Land use	TSS*	TN	TP	*E.coli*
Dairy	28	16	58	72	49
Plantation Forest	22	34	8	4	13
Forest	19	23	9	4	13
Sheep and Beef	14	14	13	10	12
Kiwifruit and Orchards	7	5	7	7	6
Urban, Road, Rail, Unknown	4	4	1	0	3
Lifestyle	3	2	1	1	2
Arable	1	1	3	3	1
Wetland/river	1	1	0	0	1
Scrub	1	1	0	0	0
Parks and Reserves	0	0	0	0	0
Vegetables	0	0	0	0	0

*TSS results are still subject to review after sensitivity analysis and information from forestry industry.

5.2 Good Practice Mitigation Scenario Modelling Results

In workshop 7 community group members looked at a range of management/mitigation practices that farm/horticulture blocks could do to reduce sediment, phosphorus, nitrogen and *E.coli* coming from the land and entering water. The group helped to categorise these in to lists based on whether they thought these practices are:

- Standard current practice
- Good practice that should really be expected of every farmer/horticulturalist – Mitigation 1 (M1)
- More advanced practices that might be more expensive or difficult to implement, but should also be quite effective - Mitigation 2 and 3 (M2 and M3)

Based on your input, input from industry organisations and professional advisors Council has developed a good practice scenario M1. This will be presented / explained at the workshop, including explanation of the main assumptions we had to make in the absence of data.

The modelling results for the good practice mitigation scenario will be presented at the workshop alongside all of the results you have seen before. We will also present the key conclusions staff have made based on the modelling, and will ask members to consider and provide feedback on these.

Unfortunately we will not be presenting sediment results yet because we are waiting for some sensitivity testing of the model and for some industry advice about the sediment losses from forestry.

At the workshop, we will ask you ….

1. Do the results and conclusions seem about right to you?
2. Would you draw other conclusions?

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