Report of Te Awarua-o-Porirua Whaitua Committee Workshop

19 April 2018, Plimmerton Boating Club, Plimmerton
5.00pm – 9.00pm
Workshop (Closed to the public)

Summary

This report summarises notes from a workshop of the Te Awarua-o-Porirua Whaitua Committee held on 19 April 2018 at the Plimmerton Boating Club.

Contents

These notes contain the following:

Overview

Workshop attendees

Te Awarua-o-Porirua Whaitua Committee:

Present: Diane Strugnell, Larissa Toelupe, David Lee (arrived 6pm), Barbara Donaldson, John Gibbs Sharli-Jo Solomon (arrived 5.45pm), Warrick Lyon, John McKoy, Stu Farrant (Chair)

Apologies: Dale Williams, Richard Cook, Hikitia Ropata, Jennie Smeaton

Greater Wellington Project Team: Alastair Smaill (Project Manager), Suze Keith, Brent King, Jon Gabites, Sheryl Miller, Hayley Vujcich, Paula Hammond, Mike Grace, Keith Calder (PCC), Kara Dentice (WWL), Kate Pascall (WCC)

Independent Facilitator: Kristy McGregor

Guests:
- Stuart Easton, Jacobs
- Penny Fairbrother, Greater Wellington Regional Council
- Tim Sharp, Mitchell Daysh

Notes prepared by Suze Keith.

Workshop purpose

The purposes of this workshop were:

Development of Freshwater Objectives

1. Develop freshwater objectives for *E. coli* and the four toxicity attributes (ammonia, nitrate, dissolved copper and dissolved zinc) for each water management unit (WMU) in the Whaitua.

Community engagement

2. To update the group on previous engagement activities undertaken and any future dates scheduled.
3. To establish that the Committee is comfortable with the outline of the presentation that Stu has developed for the meeting with Councillors from Porirua City Council on 26th April.

Purpose 1 was mostly achieved. Purpose 2 was completed. Purpose 3 was partially achieved.

Agenda

The agenda is detailed in the table below.

TIME	TASK	PURPOSE	WHO
Introduction			
5.00pm	Karakia		Jennie/Larissa
	Welcome • Apologies & Introductions **Chair's Direction** Purpose of meeting & agenda outline	Establish purpose of meeting	Stu
	Housekeeping		Kristy
Development of Freshwater Objectives			
5.10pm	**Role of Tonight's Workshop** Focus of this workshop	Clarify what we are doing tonight, and where this fits in the process	Kristy
5.15pm	**Introduction to setting freshwater objectives** *Refresher of previous discussions*	Orientation to freshwater objectives & process for	Al

	• What is an objective? • Key principles for setting objectives • Process for setting objectives - Role of WMUs; refresh on NOF bands, meaning of toxicity (chronic and toxic) • How modelling can help inform an objective Why the objective setting has been split into two separate chunks	setting objectives	
5.25pm	**Presentation: Scenario Modelling Data for *E. coli*** • Results of modelling undertaken - high region-wide overview; main drivers of change; patterns of note • How this modelling can be used to form an objective Questions	Inform Committee of high level overview of *E. coli* data	Brent & Stuart Easton
5.40pm	**Process for setting a freshwater objective for *E. coli*** Lead through process of objective setting using modelling data & drawing on own experience and knowledge	Work through the process of objective setting as a group	Al
5.50pm	**Introduction to Group Activity: Developing Objectives for *E. coli*** Walk through group activity instructions	Introduce group activity	Kristy
	Group Activity: Developing Objectives for *E. coli* • Break into three allocated groups • Use WMUs allocated to each group Complete activity sheets	Work in small groups to set *E. coli* objectives	Group Facilitators
6.30pm	**Reporting & Group Discussion**	Achieve consensus	Kristy

	• Reporting back from each group • Discussion on each objective Confirmation of objectives	on objectives discussed in smaller groups	
7.00pm	**Dinner**		
7.30pm	**Presentation: Scenario Modelling Data for Toxicity for Ecosystem Health** • Why Ammonia, Nitrate, Dissolved zinc, Dissolved Copper are grouped together • Results of modelling undertaken - high region-wide overview; main drivers of change; patterns of note • How this modelling can be used to form an objective Questions	Inform Committee of high level overview of toxicity data	Brent & Stuart Easton
7.45pm	**Introduction to Group Activity: Developing Objectives for Toxicity for Ecosystem Health** Walk through group activity instructions	Introduce group activity	Kristy
	Group Activity: Developing Objectives for Toxicity for Ecosystem Health • Break into three allocated groups • Use WMUs allocated to each group Complete activity sheets	Work in small groups to set toxicity objectives	Group Facilitator
8.25pm	**Reporting & Group Discussion** • Reporting back from each group • Discussion on each objective Confirmation of objectives	Achieve consensus on objectives discussed in smaller groups	Kristy
Engagement Activities			
8.45pm	**Update on Previous Engagement Activities**	Inform Committee	Suze & Stu

	• What activities have been held since the last meeting? • Upcoming Committee attendance at Council engagements: ○ Tomorrow – Go Deep Developers Group at PCC – Diane, John and John ○ Next Thursday, April 26 – PCC Councillor's Workshop – John G, Stu, David, Diane, Sharli Jo ○ May 10 – WCC Councillor's Workshop – Stu, John M, Sharli Jo, Diane Outline of proposed presentation to Porirua City Council Councillors on 26th April	of progress of engagement activities	
8:50pm	**Other Business** Field trip prior to 10th May (when finalising freshwater objectives).		Stu & Suze
8.55pm	Thank yous		Stu
	Karakia		Jennie/Larissa

Committee Decisions The Committee made decisions on the objectives for freshwater quality for *E. coli*, ammonia toxicity, nitrate toxicity, dissolved zinc toxicity and dissolved copper toxicity the 23 water management units in the whaitua.

Workshop Actions The following actions were agreed to:

1. Suze to follow up with some possible dates for the field trip, inviting all Committee members and Project Team members who wish to attend, by 27th April.

Workshop Notes

Part 1 – Introductions

Stu welcomed everyone to the meeting.

Introduction of new Facilitator

Stu introduced Kristy McGregor as the new facilitator for the TAoPW. Kristy noted she is very excited to be working with the committee on grass roots community participation in decision making around resource management. She has a background in community engagement and development. She is particularly interested in policy development is currently writing her Masters thesis on community involvement and representation in decision making in policy development. She lives on a dairy and beef farm at Manakau.

Part 2 – Development of Freshwater Objectives

Role of the workshop in setting freshwater objectives

Kristy explained the role of the workshop in developing freshwater objectives. There are two meetings set aside to develop freshwater objectives: 19th April and 10th May. Kristy referred the Committee to the Objectives Summary Table, which sets out all of the Freshwater Objectives the Committee will need to set. She outlined that these are only first cut decisions and that further opportunities will be given to refine them. She outlined that the focus of the workshop was on setting objectives for human health for recreation (*E. coli*) and for the four water quality toxicity attributes for ecosystem health. She outlined the flow of the evening's workshop.

Introduction to setting freshwater objectives

Al Smaill provided a refresher on freshwater objectives. He talked through the attributes the Committee would be setting objectives for this evening, noting *E. coli* relates to human health is a compulsory attribute under the National Policy Statement for Freshwater Management (NPS-FM). The toxicity attributes relate to the health of the ecosystem. Nitrate and ammonia toxicity are compulsory in the NPS. For example, ammonia in water kills the bugs. Acute toxicity means risk to bugs quickly; chronic toxicity is a slow risk to bugs. Zinc and copper, while not compulsory in the NPS-FM, are common urban contaminants so very important for the TAoPW. There is no standard or regulation for zinc and copper, as these are currently being developed, so Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines[1]) have been used as a starting point, and built into a framework that is consistent with the NPSFM.

Al outlined that the next meeting would look at ecological attributes, from the smallest freshwater species to the largest: periphyton, Macroinvertebrate Community Index (MCI), and fish. Al noted there is also an opportunity to consider objectives around habitat.

[1] The aim of the ANZECC 2000 Guidelines is to provide authoritative guidance on fresh and marine water quality management issues in both New Zealand and Australia. Basic sediment quality information is also included.
http://www.mfe.govt.nz/fresh-water/technical-guidance-and-guidelines/anzecc-2000-guidelines

Al spoke to the role of an objective in referring to the state of the water we want. We have current state information. The task for the Committee in this workshop is how much do we want to improve the state of the waterway? He outlined the NPS-FM requirements, which specify that attributes in bands D and E must at least become a C. For other bands, C and up, the Committee have a choice about whether they want to maintain or improve, and by how much. Al outlined the meaning of the bands for *E. coli* in terms of risk of people engaging in contact recreation (swimming) and getting sick.

Al explained that this process of objective setting is a quick, initial cut, and we will need to rationalise as we go. He explained that factors including upstream and downstream, and the intersection of freshwater objectives with coastal objectives, may influence the shape of the final freshwater objectives.

Questions raised by the Committee:

Timeframes	• What timeframe is being placed on achieving these objectives? ○ Al explained that when an objective is set, guidance will be provided as to how fast that change is required.
What the bands represent	• How the bands relate to numbers? ○ Al explained that a number will be used at the end of the process, but for the purposes of initial objective setting and general communications, a band will currently be used.
Economics	• We don't yet have information on economics? How much it will cost and over what time? ○ Al explained that while we might need more information to make the decision, for now the task is to provide a first cut, including a range of objectives if need be, with reasoning behind it.

Presentation: Scenario Modelling Data for *E.coli*

Prior to the workshop, a summary of the scenario modelling data was circulated to Committee members.

Brent King presented on the scenario modelling undertaken and how it can be used. The purpose of modelling is to extend beyond areas that are monitored using known patterns and how contaminants are generated and transported. Brent notes that scenarios show interventions in the form of mitigation devices and land use change, to help get a sense of levels of effort relative to water quality improvements.

Brent noted that the current state of *E. coli* across the WMU's is largely in the E band. He noted that there are four metrics within the National Objectives Framework (NOF) that make up the overall grade. There are a few sites where we are pretty close to tipping into the next band and only need a little extra effort to get over the line.

Questions raised by the Committee:

Robustness of Modelling

- How does modelling calibrate with reality given the lack of monitoring sites? How do we know that the model is well calibrated?
    - Brent noted that there are four sites used for calibration, covering three rivers, including two rural and one urban (with two sites on the urban river). Most examples are showing good correlation. Hundreds of records, 5-10 years of data with twelve monthly samples.
- What is meant by effort?
- Al noted that modelling tells, for a given amount of effort, what shift will occur. It is not exact and some decisions will need to be revised when more information comes to hand.
    - Brent noted that effort is a reference to differing management practices on the land which are parts of the scenarios. In a rural context, for example, effort includes levels of riparian planting and stock exclusion. In an urban setting, effort includes types of roofing materials, water sensitive design.
- Feedback was provided that the presentation of results was really helpful.

Summary of rural results

Rural with extensive grazing and low flows, such as the small eastern streams, for example Upper Duck and Takapu, are unlikely to get to a C band. Most other rural streams will get there with the types of changes modelled in the improved summary. Some mitigations have been modelled but can't model all potential mitigations in the scenario model.

Using a water sensitive (WS)scenario (which includes water sensitive design practices in the urban environment and higher implementation of mitigation practices in the rural area too) a couple of WMUs got closer to the B band. Retirement is the biggest driver of change in the modelled scenarios. For example, for the Horokiri Stream, D band is based on 40% of the catchment in rural grazing. A C band can be reached with 20% in rural grazing; and a B band reached with 12% of the catchment in rural grazing. Similar results are seen in the Pauatahanui Stream catchment, with a reduction from 55% to 20%.

Questions raised by the Committee:

Setting Objectives for WMUs below Band C

- If we can't get beyond a C band in the scenario modelling, do we actually need to set an objective? What about the ones that will struggle to change?
    - Al advised that we have to set objectives for all WMUs. Objectives can't be set below a C. Options that exist to the Committee are in time flexibility.

Assumptions in Scenario Modelling

- What assumptions have been made in the scenario modelling regarding the extent of certain activities to make changes? Is there scope for pulling some levers harder on the tools used to mitigate effects?
    - Brent notes that where total stock exclusion was applied in the model this saw reductions in *E. coli* of 45% from treated areas. Where the retirement of grazing land was conducted, this saw reductions of 99%. There is scope to pull different levers harder and to use mitigations not modelled.

- How do you explain a significant jump between bands for the different scenarios modelled?
    - Brent explained there were dramatic change between scenarios. Al notes that it sometimes depended on where the stream was sitting in the band to start with. Stu noted the scale of the subcatchment was also important. If steep land is retired, it may jump more dramatically.

Sources of E.coli

- What is the impact on the results of not differentiating between human and animal sources of *E. coli*? How do we know what the source of *E. coli* is, and therefore what mitigation is needed?
    - Al noted that for some WMUs we need to have a closer look at the sources of *E. coli*. This will be an implementation step. The success or otherwise of all of the objective decisions rely on good implementation.

Summary of urban results

Unlike the rural area, there are big changes but these are not reflected in changes in bands – they stay in the same band. Arrows do however represent a shift within bands. For example, in the water sensitive scenario, there is a 70-85% reduction in concentrations. Model assumptions are that the biggest changes are in the repairing of cross connections and leakages plus wastewater overflows.

Questions raised by the Committee:

Assumptions for greenfields sites

- For greenfield sites, what assumptions are made in terms of quality of building areas, and does it factor in increases in overflow downstream because of the wastewater network?
    - Brent outlined that new areas adopt the base *E.coli* as per now, under Business as usual (BAU). Additional load and its effects on overflows is not captured under BAU.
- What about Aotea block, which uses newer housing with better design?
    - Brent described how Aotea will fit with greenfield development modelling, in which it models the treatment of runoff in infill and brownfill areas, and is highly effective in removing 90% of the *E.coli*.

Improvements

- With improvements, how long will that stay in the same band before you see it move to another band?
    - Brent noted that the model is based on full implementation of the changes all at once.

Process for setting a freshwater objective for *E. coli*

Al talked the Committee through the process of setting an objective for *E. coli*, using the Horokiri Stream as an example.

- Current state: B and D bands (the D could be an E, as shown from monitoring)
- Minimum shift: C band
- Where might you like to go? Must protect for human health for swimming and secondary contact - a range of community expectations - probably A-C

- Mana whenua expectation is A
- Scenario modelling results:
    - BAU = D/E
    - Improved = C/D
    - WS = C/B
- Useful to have an idea of expectations, and an idea of what is possible in practice. How does it relate to our expectations?
- For the improved, D is one where ¾ of the metrices re better than D and the 4th is dragging down the results. Therefore for improved the last D is almost a C band and for WS the C is on the cusp of turning into a B band
- Probably could get to B with a lot of effort, with expectation from the community and a mana whenua of A band.
- In behind each band is a lot of different scores – each is made up of four different scores. Lowest one sets the overall score and gives you an idea of where you want to channel your effort.

The session was whiteboarded and workings are attached at Appendix A.

Questions raised by Committee members:

Difference in effort between bands	• How different are the bands to each other? How easy is it to jump from one to another?
Setting an objective we can't deliver on	• If you can't set an objective below C but you can set expectation above C, are we confusing ourselves if we set an objective we can't deliver? o Al explained that whatever the objective, we have to be confident that we will get there. Must be realistic and practical. Before it becomes policy, we must be able to do cost benefit analysis. • If a lot of effort for C, then perhaps that's our initial objective and over time spread the cost to increase to another band?

Values	• Perhaps there are some places where it is important to achieve an A and others where a C is fine – depending on where people choose to swim.
	  o Al explained that it is really important to record an expectation, but we still have to set an objective at a place which is achievable.
	• You might ask the question - how much do people really want to swim or take mahinga kai? If in reality people don't intend in that stream to swim or take mahinga kai then we could adjust our expectations.
	  o Al noted this was a really good suggestion, to think about the values for a particular stream.

Connection between freshwater and coastal water	• How much can we assume how much contaminant ends up in the harbour where people do swim? o Al noted that we do know it ends up in the harbour, but for now the focus is on the freshwater objectives, and we will come to the coastal objectives in the future. • The standards for the harbour are very different.

Group Activity: Developing Objectives for *E. coli*

Kristy introduced the group activity. She explained the purpose of the group as being to set objectives for *E. coli* for each of the WMUs, and noted that each group had been allocated 7-8 WMUs to work through, grouped according to the WMU groups. If different opinions in the group existed, both or a range of band options could be recorded. Kristy reminded the group this was a first cut and would be revisited with future information. She noted the importance of coming back together as a group to seek a consensus and provide time to debate any concerns that may be had by choices made by other groups.

Committee members then broke into groups where they worked through the activity sheets. The results of the activity are attached in Appendix B.

Reporting & Group Discussion

The group then moved back together, and the objectives decided by each group were put up on the Objective Summary Table. As a group, each of the selected objectives were worked through and reasoning of the groups shared. There was a general contentment with the objectives set by Committee members.

Presentation: Scenario Modelling Data for Toxicity for Ecosystem Health

Prior to the workshop, a summary of the scenario modelling data for toxicity was circulated to Committee members.

Brent outlined the four toxicity attributes, chosen for management of effects on fish, insects and plants.

Ammonia Toxicity

For ammonia, the overall grade is based on the worst performing of the metrics. The objective is to maintain or improve the current state. Urban streams were good/fair. Rural streams were very good or good. We haven't modelled pH which strongly effects ammonia toxicity, although with an adjustment based on a nominal pH from monitoring data, many rural streams would likely be in or close to an A band.

Summary of rural results

For rural streams, a little extra effort is all that is required in a lot of places. Only a handful of WMUs that wouldn't meet the minimum requirement and a few that would need a water sensitive effort. Belmont is unlikely to get there, due to wastewater overflows.

Summary of urban results

While there are differences between measured and modelled data, modelled results in urban areas are generally believable because of the wastewater overflows. Those in C band require significant improvement of wastewater overflows to move into a higher band.

Questions raised by the Committee:

Source of urea

- The main source of urea?
    - Brent responded that the main source is nitrogen through wastewater overflows.

Nitrate Toxicity

In rural areas, maintain or improve the current or C band or better if not already there. Main source of nitrate in rural is run-off from grazing pasture. In urban areas the main source is run-off from urban parks, such as golf courses, gardens and lawns.

Al referred the Committee to the nitrate sheet. Nitrate is toxic to aquatic life and the reason it was included in the NOF is that there are places where it is very high. It is usually associated with high intensive agriculture and is a major contributor to algal growth. Levels here will potentially cause problems for algae growth, both for freshwater and the harbour. Al notes that in terms of nuisance, anything below an A is becoming a problem for algal growth. Committee can recommend levels like this. Al recommended thinking about nitrate from the perspective of doing what you can. This can be then taken to the periphyton objectives, asking, is there a problem for algae growth?

Questions raised by the Committee:

Levels of nitrate

- What level of nitrate is allowed for in an A band?
    - Brent explained for a WMU to be an A band, it is still exhibiting a high level of nitrate.

Relationship between nitrate and ammonia

- If nitrates are a by-product of ammonia – wouldn't ammonia and nitrate mirror each other?
    - Brent noted that there are a couple of different forms of nitrogen and the nitrate form is less associated with wastewater. Ammonia is quite toxic to aquatic life so the thresholds are relatively lower and give a different pattern of grading compared to nitrate. Al noted that ammonia does oxidise to nitrogen so over the flow of the stream, and with sewage inputs at bottom of streams, the ammonia and nitrate load make up the total nitrogen load which drives algal growth in the harbour.

Dissolved Zinc

The results are based on the ANZECC Guidance as the interpretation framework because there is currently no NOF regulation for zinc. Currently drawing on best available knowledge, while the framework is still in development. There remains lots of unknowns, so for now this is the starting point.

Rural areas have maintained an A band most of the time. Results for BAU around Taupō Stream are due to the traffic load, and the treatment of industrial areas. For urban, the results are overly

optimistic re roof painting and replacement. Roof painting and replacement are an effective treatment method, though they are more likely to bring the urban results closer to a B band than an A band in the water sensitive scenario.

Questions raised by the Committee:

Dissolved metals

- Why are we only looking at dissolved metals?
  - Brent noted that totals (dissolved plus solids) will be looked at in regard to the harbour for the coastal objectives.
- Are the dissolved ones biologically active? Bioaccumulation in freshwater shellfish?
  - Brent noted that it gives an idea of the response of the streams and risk to ecosystem.

Sources of dissolved metals

- What are the main sources of dissolved zinc?
  - Brent noted roofs, roads, tyres.

Improved & water sensitive models

- What would change under improved and water sensitive? What is meant by treatment of high traffic roads?
  - Brent noted swales, bioretention, wetland treatments as all being fairly effective for zinc. And roof painting or replacement had a significant effect too. People are replacing their roofs over time with products that use less zinc, so that will improve.

Dissolved Copper

Also no NOF guidance for copper. Rural areas are generally very good. Urban is poor or fair. Extensive sources such as roads and residential paved surfaces won't see a lot of change. The biggest impact treatment high traffic roads and commercial/industrial paved areas have limited extent so the scope for improvement is not as great.

Questions raised by the Committee:

Anomalies

- Is there an anomaly that all urban sites either don't change or get worse?
  - Brent noted that large, highly trafficked roads are included in the modelling, but local roads were not, so results are masked. There is also an anomaly in the representation of source and catchment treatment of the high risk areas which appears to make some places get worse in the water sensitive scenario.

Causes of copper toxicity

- Is leakage/contaminants from trade waste a problem?
- Is use of copper in domestic gardens a problem? Are antifoul paints an issue?

Part 3 – Community Engagement

Community Engagement Update

Al spoke to his meeting with Porirua City Council (PCC) officers, including the District Plan and Consenting Team, on April 13. They talked about alignment needs and especially the consenting process, and doing a similar session with Wellington City Council (WCC) staff.

Other business

Suze raised the idea of doing a field trip between now and 10th May to ground truth the streams. This could either be for the purposes of the Committee better understanding the streams, noting the correct common and traditional naming of the steams or for community engagement, if the trip was opened to a wider group.

There was some discussion on the merits of a trip and there were a number of committee members who felt that it would be really useful to walk the streams and understand the local context, the smells, the geography, how people interact with them. This would be open to all Committee members for those who wish to attend able to come along.

It was suggested a representative stream be used, with Ration Creek, and the streams behind Takapuwahia and Taupō Stream each identified as possible spots to visit. The monitoring points, along with the upper points and where the streams reach the coast were identified as being useful places to stop.

Action: Suze to follow up with some possible dates for the field trip, inviting all Committee members and Project Team members who wish to attend, by 27th April.

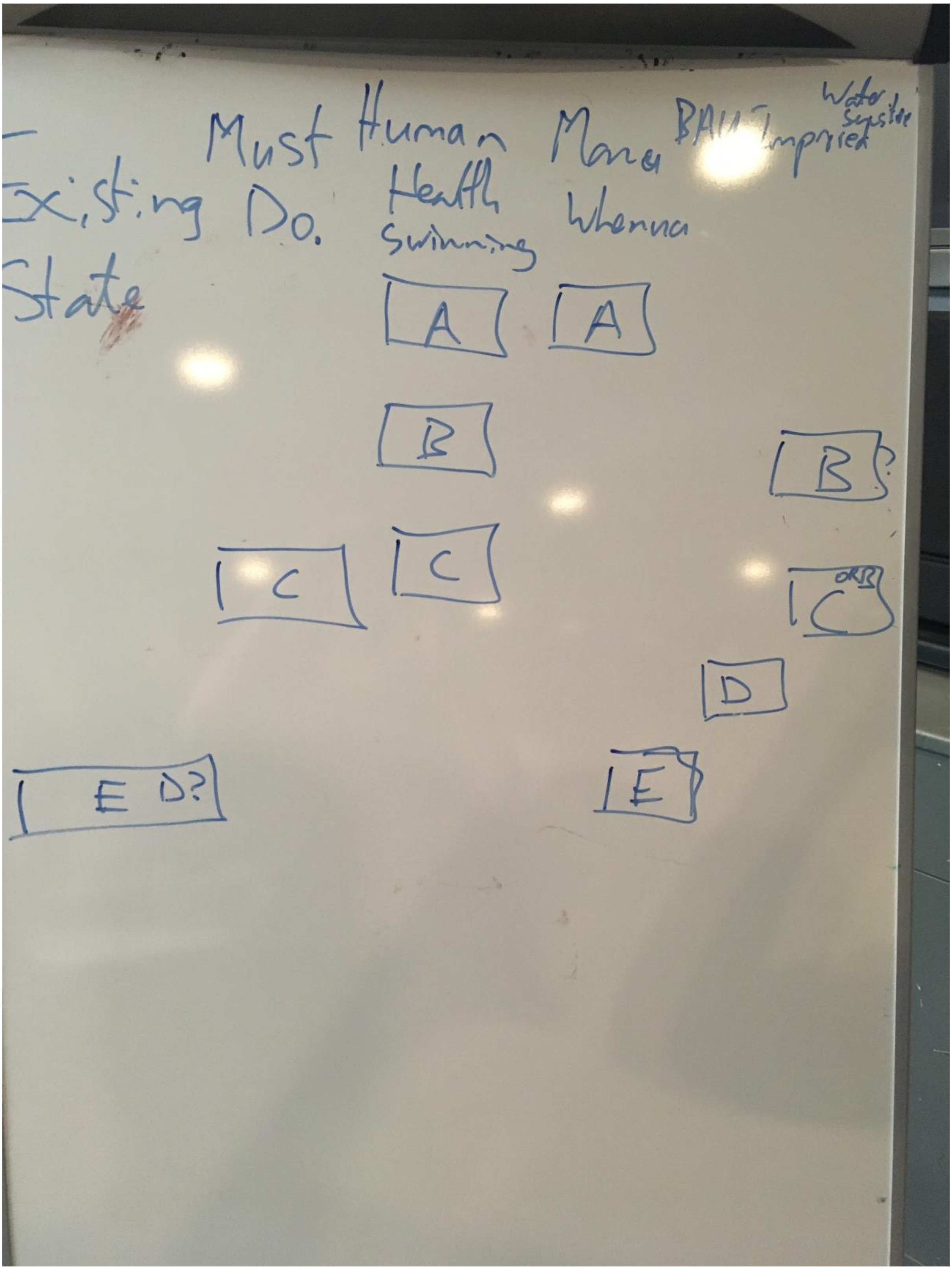
Stu commended the Committee on the great effort and exercise.

Warrick noted his apologies for the next meeting on 10th May.

Mike Grace and Sharli Jo completed the karakia.

The meeting closed at 9.05pm.

APPENDIX A


Existing State
Must Do.
Human Health Swimming
Mana Whenua
BAU
Improved Water Systems
A
A
B
B?
C
C
C OR B
D
E D?
E

APPENDIX B

Drains to	WMU group	WMU name	Attributes	Current State	Objective 19.4.18	Under what scenario?	Reasons
Open coast	Coastal catchments	Pukerua	*E.Coli*	E	C		Urban contamination issue, small catchment with little dilution. Don't know a lot about this catchment
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	A		doable, low effort to achieve
			Dissolved zinc	A	A		
			Dissolved Copper	C	B		
		Hongoeka to Pukerua	*E.Coli*	E	A-B		Between objective and aspiration. Cld be D current state? Inlcudes the marae, high m.w. values
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	*A**		Special place, other similar catchments eg. Whitireia gone for an A – similar effort required
			Dissolved zinc	A	A		
			Dissolved Copper	C	A		Rural so think model is overestimating current state
		Whitireia	*E.Coli*	E	B		current state D? no longer grazed so e.coli could be lower than modelled. Active restoration group
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	A		Special place, other similar catchments have set an A
			Dissolved zinc	B	A		Easy effort
			Dissolved Copper	C	A		Rural so think model is overestimating current state
Taupo	Taupo Stream and Swamp	Taupo Stream	*E.Coli*	E	B		High m.w. values, swimming beach, very imp. to protect wetland, opportunity w. greenfield devpt
			Nitrate toxicity	B	A		Maximum effort catchment
			Ammonia Toxicity	B	A		highly valued. Opportunity created with new development to easily implement WSUD
			Dissolved zinc	B-C	A		SH1 gets flooded + it runs off, opportunity to fix this. It is a special place with high m.w. values
			Dissolved Copper	D-C	B-A		Highly valued and opportunity to change with greenfield development
Pauatahanui Inlet	Pauatahanui steep rural streams	Horikiri and Motukaraka	*E.Coli*	D-E	B		already used for recreation, lots of different types of activities and interests
			Nitrate toxicity	B-A	A		
			Ammonia Toxicity	B-A	A		Already almost there
			Dissolved zinc	A	A		
			Dissolved Copper	A	*A**		at risk due to increase in vehicles. Source control and additional measures to maintain current state
		Kakaho Stream	*E.Coli*	E	*C**		all private land so accesibility restricted, discharges near recreation sites, lots of effort to get to D
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	A		amount of effort to get to high conservation is betw. Improved + w.s. Satisfies all the values
			Dissolved zinc	A	A		
			Dissolved Copper	A	*A**		At risk of decreasing under BAU (potential increased urban development). Need to do better than BAU
		Judgeford Stream	*E.Coli*	E	C		pushing beyond C will not impact values related to e.coli + cld impact value of sustainable land use
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	A		Close to current state least effort
			Dissolved zinc	A	*A**		
			Dissolved Copper	A	*A**		maintain, achieved at BAU
		Upper Duck Creek	*E.Coli*	E	*B**		lots of RC land so bigger opp to change practice for higher imprve., lower reaches high m.w. values
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	A		amount of effort to get to high conservation is betw. Improved + w.s. Satisfies all the values
			Dissolved zinc	A	A		
			Dissolved Copper	A	*A**		at risk due to increase in vehicles. Source control and additional measures to maintain current state
	Pauatahanui rural streams	Pauatahanui Stream	*E.Coli*	E	C		wildlife reserve, mahinga kai and weaving materials, largest stream, LU changes can improve W.Q.
			Nitrate toxicity	A	A		
			Ammonia Toxicity	B	A		Close to current state, achievable
			Dissolved zinc	A	A		It is already an A, same reasons as all other rural streams
			Dissolved Copper	A	*A**		Highly value ecologically, flow through sign wetlands + saltmarshes. Need WS scenario to maintain
		Ration Creek	*E.Coli*	E	B		high access, recn, ecological values, potential for A, but impact of doing so outweighs the gains
			Nitrate toxicity	B	A		As for all streams, nitrate toxicity can be improved with small effort. Also supports all the values
			Ammonia Toxicity	B	A		Highly valued mana whenua site. Already close to optimal
			Dissolved zinc	A	A		
			Dissolved Copper	A	*A**		Highly value ecologically, flow through sign wetlands + saltmarshes. Need WS scenario to maintain
	Pauatahanui urban streams	Lower Duck Creek	*E.Coli*	E	*C**		Deserves more. High mahinga kai + amenity values. Gets to C w improved b unlikely to ach. m.w. values
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	A		High mana whenua values, high recreational values
			Dissolved zinc	B	A		Mana whenua values and ecological values
			Dissolved Copper	C	B		More achievable than A. An improvement for ecology. Practical improvement
		Pauatahanui fringe streams	*E.Coli*	E	*C**		amenity, non-contact recreation values. C under improved, unlikely to provide for m.w.values
			Nitrate toxicity	A	A		
			Ammonia Toxicity	C	B		Needs to be drivers for change, reasonable scope to move beyond C and benefits to other attributes
			Dissolved zinc	C	A		Ecological and mana whenua values
			Dissolved Copper	D	B		High m.w., recreation, ecological values
Onepoto inlet	Onepoto steep rural streams	Rangituhi Stream	*E.Coli*	E	A		achievable under BAU; low hanging fruit!
			Nitrate toxicity	B	A		
			Ammonia Toxicity	B	A		Achievable under BAU
			Dissolved zinc	A	A		Already there - maintain
			Dissolved Copper	A	A		Already there - maintain
		Takapu Stream	*E.Coli*	E	C		largely rural, will be a huge challenge
			Nitrate toxicity	B	B		Maintain – lifestyle blocks. Improvements likely to come from e.coli improvement measures
			Ammonia Toxicity	B	B		Rural animal contributions
			Dissolved zinc	C	C		Industrial area in lower reach limits the improvement potential in this attribute
			Dissolved Copper	A	A		Maintain – achieved under BAU
		Upper Kenepuru	*E.Coli*	E	C		extremely aspirational
			Nitrate toxicity	B	A		Improvement will follow land use change. Land use change will assist E.Coli + Nitrate levels
			Ammonia Toxicity	B	A		Achievable – marginal improvement required
			Dissolved zinc	A	A		Slightly anomalous due to decreasing flows from retirement. No new impacts – less dilution
			Dissolved Copper	A	A		Slightly anomalous due to decreasing flows from retirement. No new impacts – less dilution
	Onepoto rural streams	Belmont Stream	*E.Coli*	E	C		Downstream effects on Porirua
			Nitrate toxicity	B	B		
			Ammonia Toxicity	C	C		Change in landuse from rural to urban
			Dissolved zinc	C	C		Area facing intensification
			Dissolved Copper	C	C		Developed hillside suburb where development likely to contribute to copper
		Stebbings Stream	*E.Coli*	E	C		More urban. Downstream effects on Porirua
			Nitrate toxicity	C	B		Rural to urban land use change
			Ammonia Toxicity	B	B		Change in land use rural to urban
			Dissolved zinc	A	A		Maintain is achievable
			Dissolved Copper	A	A		
	Onepoto small urban streams	Hukarito Stream	*E.Coli*	E	*C-B**		next to the marae. Wide range of mahinga kai vlaues and wahi tapu. Appears hard to change
			Nitrate toxicity	B	B		Scenarios not showing improvement but could be a good case study site with high m.w values
			Ammonia Toxicity	C	A		special to Ngati Toa. Small numbers of overflows should mean improve is easy
			Dissolved zinc	B	A		Treatment of road run off
			Dissolved Copper	C	B		Requires considerable effort just to maintain
		Mahinawa Stream	*E.Coli*	E	*C-B**		next to the marae. Similar to Hukarito but bigger dilution so higher potential for change
			Nitrate toxicity	B	B		Scenarios not showing improvement but could be a good case study site with high m.w values
			Ammonia Toxicity	B	B		Beautiful bush, high ecol. Values. Takapuwahia. Why B - cross connections? Case study project?
			Dissolved zinc	B	A		
			Dissolved Copper	C	B		Over est in model because of a lack of data to calibrate, plus flow is low/ time step leads to uncertainty
		Onepoto Fringe	*E.Coli*	E	C		stream piped so no interaction at bottom. Flows into the harbour. Will need massive investment
			Nitrate toxicity	A	A		
			Ammonia Toxicity	C	B		Aligns with e.coli effort. Also thinking about the coast
			Dissolved zinc	D	A-B		Challenging problem – will take a long time to remedy. What is possible?
			Dissolved Copper	D	C		Must get to C; but it is an existing urban location so very hard to achieve
		Titahi	*E.Coli*	E	*C**		C under improved. Modelling shows change can occur, recreational space which meets the coast
			Nitrate toxicity	A	A		
			Ammonia Toxicity	C	B		Linked with ecoli and coastal outcomes
			Dissolved zinc	C	A		
			Dissolved Copper	D	C		Must get to C; but it is an existing urban location so very hard to achieve
	Kenepuru Stream	Kenepuru Stream	*E.Coli*	E	C		wil get benefit from Upper Kenepuru, need to hammer infrastructure to ach objective
			Nitrate toxicity	B	B		Hard to improve in urban area
			Ammonia Toxicity	C	C		May improve as waste water network improves
			Dissolved zinc	C	B		Stormwater neutrality
			Dissolved Copper	D	C		Heavy vehicle and state highway
	Porirua Stream	Porirua	*E.Coli*	E	C		minimum standard, good aspiration, somewhat achievable
			Nitrate toxicity	B	B		major improvement will be from upper stream
			Ammonia Toxicity	A/C	A/C		Grenada North Industrial should remain an A. Maintain as C. Cost of improvement significant. Likely to be prioritised for E.Coli which will lead to ammonia toxicity improvements
			Dissolved zinc	D	C		Doable!
			Dissolved Copper	D	C		Shows potential