Hearing Stream 2 – Day 3 – Part 1

Greater Wellington Regional Council

HEARING STREAM 2

Overarching Matters and Region-Wide Changes:
Air Quality; Beds of Lakes and Rivers; Schedules and Threatened Species

Date: Wednesday 9th April 2025

Time: 8.45am

Hearing Stream: Two

Venue: Greater Wellington Regional Council Chamber
100 Cuba Street, Te Aro, Wellington

Hearing Panel: Dhilum Nightingale (Chair)
Sharon McGarry (Deputy Chair)
Puāwai Kake
Gillian Wratt
Sarah Stevenson

Nightingale: Nau mai, haere mai to our third day of hearings for Hearing Stream Two. Our sessions today focus on the coastal and lakes subtopics. Just do a really quick round of introductions in case there is anyone… I think we do have some new connecting with us today.

Ko Dhilum Nightingale tōku ingoa. I am chairing for the panel and the-

McGarry: Mōrena. My name's Sharon McGarry. I'm an independent commissioner based in Christchurch.

Kake: Ata mārie tātou. Puāwai Kake. I'm an independent commissioner based out of Northland.

Wratt: Kia ora tātou. I am Gillian Wratt, independent commissioner based in Whakatū, Nelson.

Stevenson: Ngā mihi nui kia koutou. I'm Sarah Stevenson, an independent planner and commissioner based in Te-Whanganui-a-Tara, Wellington.

Nightingale: We'll do some health and safety messages, Mr Ruddock.

Ruddock: Ngā mihi Commissioners. For those of us who are joining in new today. There you go. For those of us who are joining today, for facilities the toilets are located just outside of the double doors to the Council Chamber, down the hallway, left, right again through the double doors, and then just to your left. If the fire alarm sounds please head towards the exit located behind the commissioner seats, through the glass doors. Do not re-enter the building until the all-clear is given by staff.

If you require assistance in an evacuation situation please advise me. As for an earthquake - drop, cover, and hold. Do not evacuate unless instructed to do so. Wait for shaking to stop and then follow the instructions of the Hearing Advisor and the Safety Wardens.

For microphones today, please ensure that you are muted when not speaking. For those in the room, the microphones on the desk are turned green to indicate that they're turned on but not live. Red indicates they're on and live, and only three mics can be live at a time, so if your mic is the fourth one it will flash red until someone else turns theirs off.

All speakers should introduce their name before each instance of speaking, such as 'Joshua Ruddock' for transcription purposes. For online speakers, viewers joining online will have their camera and microphone locked to mute. We will unlock these for speakers during their scheduled timeslots.

The Hearing Advisor will ring a bell to indicate certain time points. One ring indicates 10 minutes left, two rings indicate that the submitter's timeslot has ended. The panel may choose for the submitter's timeslot to continue following the two rings, if suitable. Thank you so much.

Nightingale: Thank you, Mr Ruddock. Are there any procedural matters? Are there any changes to the schedule that are needed today?

Ruddock: No, Commissioner. I believe the schedule will continue as printed.

O'Callahan: Good. One thing I said I'd come back to you on in the morning, was a question I think of Commissioner McGarry around the Insufficient Data Summary Table. I have updated that as I suggested I would, to just reflect the revised recommendation around the metals attributes in rural and forested catchments where there is no data in the table at the current point in time. So I have updated that, and the yellow highlighted ones are the points that we're still working on, and in my rebuttal evidence I talked about coming back to you in this hearing or Hearing Stream Five with some guidance, and really the ones that are highlighted in yellow, we're just looking for confirmation. I'm looking for confirmation or any advice that the science team can provide to you, that will assist you in understanding whether the [15.39-18.57 voice break].

Ruddock: Testing, testing, testing. Is that okay? Good, cool. Apologies, Commissioners. We can continue now.

[00.20.00]

Nightingale: Commissioner Nightingale. Thank you for the updated Appendix 3, Ms O'Callahan. As you know, there are some submitters, including Wairarapa Federated Farmers, who have said where there is insufficient data and we don't

know where we're starting from, their relief includes removing some attributes from Tables 8.4 and 9.2. I guess I'm just thinking, if it's Hearing Stream Five where the Council is proposing to finally come back to us with, I guess their final proposal for the baseline, what do you consider might be the implications for submitters?

I guess we don't know what we don't know at the moment, but because the baseline then, obviously for some attributes the TAS has to be set in relation to that, and then also the national bottom lines. Do you think that having that information for Hearing Stream Five is going to be adequate time to allow that to be properly considered?

Greater Wellington Regional Council – Mary O'Callahan

O'Callahan: I think we can possibly tick off more of these in this hearing stream. We just probably need some time in the hearing agenda to cover it. It wasn't subject to questions yesterday until right at the end, so we didn't come back to you. I mean, I think we'll just try and find some time to cover it off.

There are some attributes where I'm recommending they are deleted, and I agree with the Federated Farmers because they're not essential. There are ones that are on this list still and highlighted in yellow that I think that the submitters can assume the Council will be retaining, and where we're trying to give you some confidence that they have been set at an appropriate level. So that's about expert opinion that probably what they've been set on, particularly where they've been set to A state, is more than likely to be reflective of the existing situation, where they're digging into depths of information and Dr Greer is probably going to be able to talk about some other information that is not the Council's monitoring that exists. And that's the idea, is to give some confidence around that, and it's taken a bit, unfortunately, to get a really clear alignment on what the Council thinks is important to monitor ongoing, and all these things have impacts on their budgets and so forth as well.

But I think, for the benefit of the submitters, they should assume that you will be getting expert opinion that says that either the setting that's in the PC1, that it will still have no data, potentially, in the baseline state, or we might be able to reference some other data similar to the existing or the current state data that we've put in there. We'll just see what we manage to pull together. But in the worst case scenario, we may end up with A state settings with no baseline data and we'll have either given you confidence that that's suitable, and then you'll have the option, I mean the submitters have the option to present what they understand to be their experience with that waterway and then have the option to either remove the attribute, set it more lenient if there's concern that it could be too stringent, or adopt what the Council ends up with recommending.

We're completely aware, I'm certainly completely aware and sympathetic to the submitter's concern, but some of these attributes are really, the way in which the Council needs to meet them is probably through action planning rather than regulatory measures in any case, albeit they still have costs for the Council.

[00.25.10]

Like some of them, and Dr Greer's better to talk to this than me because I might get it wrong, but some of them might require riparian planting or other changes.

Particularly the Fish IBI, we're looking at presence or absence of fish so those sort of physical changes to the rivers might be what's required there. The river or their margins to be able to support the fish habitat. But if you want, Dr Greer could give you an update now if that's helpful.

Wratt: Commissioner Wratt. Question, just in terms of the visibility of this document that you've just tabled. Would that go onto the website so that the submitters can see that as well?

O'Callahan: Yes. All information that we're tabling, Mr Ruddock is uploading to the website.

Wratt: Thank you.

Nightingale: I don't want to get… I know we're focussing on coastal today but just, I noticed that.

O'Callahan: I think there probably will be some time tomorrow morning. I think there's probably quite a generous amount of time allocated to that topic, so you could park it till tomorrow, and Dr Greer's going to be here tomorrow.

Nightingale: Okay. Maybe wait till then. Maybe no need to answer it then, but I just noticed that copper and zinc in quite a few of these urban, maybe not, actually maybe it's more rural, but is not proposed to be monitored, and just what we've heard so far in terms of metal concentrations, and I know we're going to get into that now, but the metal sediment balance as well. I'd just be interested in understanding that a bit more.

O'Callahan: Where I was when I wrote the rebuttal, was that the science team had told me that they were not planning to monitor it. I've since been talking to Dr Valois and Dr Greer and we have now got a combined view that the Council needs to monitor that, because otherwise the plan provisions, we're trying to manage stormwater discharges in relation to planned and unplanned greenfield development in the absence of an objective that that relates to, it all sort of falls apart really.

And if the Council's wanting to be considering the water quality on new development, they're going to need that information. They're not going to be able to go along to a consent hearing and not know what the baseline information is that they're seeking for it to be not degraded, and that's what the NPS requires. Urban development can't come along and degrade freshwater anymore under the NPS, so we need the data, they need to monitor it. It's not as difficult as, say some of the dissolved oxygen monitoring, as I understand it. They're monitoring those sites for other attributes, they just need to stump up for a bit more lab testing.

McGarry: Commissioner McGarry. Just so that we have it in the back of our minds, Ms O'Callahan, thank you very much for tabling the tables, what they might look like in terms of the band setting. Is it your preliminary view that they would or wouldn't be included? Have you got a view on that as this point?

O'Callahan: Yes. Dr Greer has tabled that. I need to have a look at it and come back to you on that, but I can do that tonight and come back to you tomorrow in terms of how we would represent that.

McGarry: Commissioner McGarry. I appreciate that. We're just looking for a preliminary view. You might move your position through the hearing, but it would just be nice to know your view.

O'Callahan: That's no problem.

[00.30.00]

Nightingale: I think then we'll pass over to you, Ms O'Callahan, to take us through the coastal objectives. Thank you.

O'Callahan: It's 5:47 I think, Mr Ruddock. Next one. Yes, that's it. We're now looking at the Coastal Objectives, and you'll see on the beginning there's a lot of red text and red tables, so there's a fair amount of change proposed here on the coastal Objectives through my 42A report. I'll just sort of talk through those.

The key one in terms of the structure is to pull out the enterococci objectives separate from the ecosystem health ones. Dr Melidonis, been working with her on the ecosystem health ones, and Dr Wilson's here today to talk to us about the human health ones, the enterococci. The key reason for pulling it out into a separate table is because the Council monitors at specific locations for the enterococci, and they essentially have the same type of role as the freshwater primary contact. They're the places where people swim and have other forms of contact, recreation with the water, so that's where the Council's going to monitor it.

The difficulty with the coastal is the objectives as notified applied everywhere or nowhere in particular, because they don't have the monitoring sites the same as what we have for the TAS, where they're monitored at a specific location, and that is the nature of the coastal area. For most of these attributes they are being sought to be managed everywhere, but for the human health they're sought to be managed in the specific locations, so that was the advantage with bringing forward in two separate tables.

I've also done a fair bit of rewording of the text of the objectives, and I'll just talk through that. There was previously a requirement in the objectives for the coastal water quality to be maintained or improved everywhere in the way it was drafted. That's not the intention of the water quality improvements in the freshwater environment, so I felt that it was suitable to take the same approach in the coastal area in terms of the significant amount of cost required to achieve both the coastal and the freshwater objectives. It's important that the efforts of the community are focussed on where it needs to be improved and not just improvements everywhere. So that refers to where deteriorated, and that's that word I've used again in the context of where it's intending to mean, in a narrative sense, where the outcome's sought and not met, but without using the NPS language of degraded, which has a specific meaning in that national water instrument.

There's a reference there for the second table, and then you'll see that I've deleted clause (b), which was talking about the high contaminant concentrations around discharge points. This was something we touched on, maybe yesterday. I think Commissioner Nightingale had drawn our attention to, I think policies P5 and P6 just as an example kind of discussion, and they're useful in that one

of them talks about the cumulative effects, and one of them talks about the localised effects.

The problem with having the localised effects or the high concentration around the discharge points, was that that's the local, immediate ecotoxicity effects at the end of pipe basically, and that's not what this objective is about. This objective is about the wider coastal system and the State of the Environment type outcomes that we're trying to achieve for the coast in these Whaituas, so having that in the objective was muddling it, and it is adequately covered in the policies, and it's also covered by s.107 of the RMA in terms of discharge impacts. So it doesn't need to be in the objective, and it created uncertainty as to whether these were end of pipe or State of the Environment outcomes. So they are State of the Environment outcomes in my mind.

[00.35.00]

So that's the reason for that change. I've combined clause (g) and (h) for clarity We had two clauses talking about mana whenua's contact with the coastal marine area. There were some [35.26] trying to understand the difference and I agreed they were unclear as to what the difference was, and it was unnecessary to be suggesting a difference here. So it's been included into one and that is what's in (h).

Now, the wording in (i), that comes from, I think there was a question on the first day of Dr Melidonis about the deletion in the table of the benthic invertebrate diversity and phytoplankton parameters from Table 8.1, and she had made some concluding comments in her evidence, and she referred you to me on that issue in terms of what my recommendations were. I have deleted those based on my understanding of her advice at the time I was preparing my evidence.

We had previously been working on a joint table where those attributes had been deleted, and the intention was that the table came out of her evidence and then I was just going to recommend one version of the table in mine. I think probably what's happened in doing that, is her recommendations are just slightly misinterpreted by me, and she will address those this morning. There's still a need, I think it's still appropriate to delete them from this table and turn them into a narrative content. What's probably not quite right in terms of subclause (i), this was intended, I thought the recommendation was just that they would apply, this was just for the open coast areas, so most of the attributes in there are not relevant to the open coast, they're really about the harbours that we've got in these two Whaitua, so I thought these other attributes were for just the open coast, but I think that's actually incorrect. I think they have some relevance in the other locations as well.

I will need to come back to you once I've heard Dr Melidonis speak today and make sure we're understanding that, but there is an intention to have narrative objectives similar to what's in (i). They may just apply more broadly than just the reference to, "For coastal areas not covered by 8.1," might be the thing that I need to change, but we'll just wait and hear from her on that. The intention is that those invertebrate communities are relevant everywhere, and probably in the context of a consent application it's important to understand them, but it's not something that… And the Council monitors them in and around all different

places, I think, but I've just got to get that right in terms of that last one there. That's still a little bit of a work in progress so bear with us on that.

The other key issue is that… Just on that, I think it has been slightly awkward for myself and Dr Melidonis on this because the WIPs were not consistent in what they recommended and the attributes, but what the scientists, I think, have indicated is that the extent to which they're relevant in one Whaitua is the same in the other so that's been part of the confusion with this, so just trying to work with the different base material.

The one difference that is intentional in the tables, the original Table 9.1 for the coastal objective, is that there is a sedimentation rate objective for Porirua. This is not a factor for the Wellington Harbour. Wellington Harbour has great flushing as I understand it, and the sediment is an issue in the Porirua Harbour.

[00.40.03]

Those numbers, of course they have changed, and that relates to accommodating that the original numbers didn't account for just natural geologic sedimentation that would happen in the absence of any humans, so we needed to remove that from the target. We're not trying to remove all humans from this harbour and its catchments, so that's the intent, or my sort of plain English understanding of what the changes to those numbers means. Dr Melidonis and others will talk to that. I warn you now, it's some reasonably complicated science to get your head around so I'm sure you'll look forward to that.

Then the next point I'm talking about here is the new Tables 8.1A and 9.1A, and aside from pulling them out into separate tables with specific monitoring locations, of course I have also recommended some less stringent targets, on the basis of, there are some locations that are not expected to be achievable by 2040 in terms of the large amount of change needed, and the fact that that change is to occur largely within the freshwater systems that are discharging into that. All the pipe networks in the case of Wellington Harbour and a number of places.

Those ones have been pushed out to, well the target that I've drafted here, and there's probably other ways of expressing it if relevant, and perhaps there might be a preferable way. It really is intended to have the same effect as where I've changed the timeframe for the freshwater TAS to 2050 and 2060. I didn't do that when I wrote this because this was earlier. My solution, in the absence of numbers, was to say, "We'll achieve halfway what you need to do by 2040." So it's probably better that they all have the dates changed, and then they can come into the interim target objective that I've written, albeit that's only written for freshwater at this stage, so there's some…

Sorry, this process is all very iterative and as soon as I get something written there's some more information that transpires, and that there's another way of doing it. But for the purposes of this, it's really the same impact, I think. My conclusion is that it's difficult to meet… There's four sites, I think or something. Now what have I got? Just from memory. I'm struggling to remember them. There's three in Porirua. I think that's right. The three sites in Table 9.1 where I've said 50% of improvement towards meeting 500, and then in Wellington, Whanganui-a-Tara, there is the two sites in the harbour, so it's a dive platform where you see people jumping off on a nice summer day, for the Wellingtonians,

and then down by Shed 6, which is another popular spot for office workers to go for a bit of a dip on a nice day.

They are obviously all high, important use sites but they're very difficult and very expensive sites to get to that standard. Then there's one at Ōwhiro Bay which is a coastal site, open coast, so that one is also identified as being a significant amount of improvement is required there. Philosophically, I think while they're very important sites, it's important to bring as much of the region up to scratch as we can in this first step, and that's really part of the thinking that I had in terms of trying to get a material improvement to these difficult ones in that time.

[00.45.13]

You heard Dr Greer talking about the fact that all of these improvements, they will make it safer, even if you're getting all the way to the target in the first sort of step, and that will be the case in the coastal environment as I understand it as well. That's the guts of the recommendations from a planning perspective for the coastal objectives.

McGarry: Commissioner McGarry. I know, and I can't remember which submitter, gave an example of how that 50% might work. If a site had 2,000 enterococci and took off the 500 and leaves you 1,500, and then it's 50% of that? So that would be the reduction you'd be looking for? I think that was the kind of example the submitter gave. Is that how it would work in practice?

O'Callahan: I'm not seeking to prescribe how it needs to work. I think there is probably different ways that you could interpret it. It could be in terms of the amount. You could work out the amount of the pipe network that needs to be fixed and perhaps call that 50%. The scientific number might not be the only way of doing it, and I think it would be useful to have some input from the likes of Wellington Water to understand that, if that's an easier or a more practical way of doing it. I'm not sure. But it's an outcome.

We can prescribe it if that's what people want, but I think it would be useful to understand the implementability of going partway, how they would see it working. I'd be most interested in hearing, rather than always coming back to the Council to try and define these, let's try and see what's actually going to work for those that need to do the work and understand that, because this is a huge engineering project.

McGarry: Commissioner McGarry. I'm just thinking, if the Table 1A remains in this form, then to me it's a 50% improvement of that number, and how they get there, there's flexibility as to how they get there, but in terms of somebody trying to see whether or not that has been met at, I'm not sure what the date is again now.

O'Callahan: 2040.

McGarry: 2040, wouldn't you just go back in terms of a benchmark and look at what the current state was, and then where you've got to at that point and whether there's been a 50% reduction in that current state number? I'm just not sure how you could judge it any other way. If Council came forward and said, "We've done 80 kilometres of pipe replacements here," or whatever, but the number itself hasn't changed, they wouldn't have been meeting the TAS would they?

O'Callahan: It's not a TAS, it's a coastal objective.

McGarry: The objective.

O'Callahan: I think it can be defined in many different ways, and all I'm saying is that I think there are other considerations that would be useful for the panel and for myself to hear about. There might be other ways of describing it and I'm open to that. You might have a different view. That's fine. But in any case, people might be more comfortable with a longer period and an interim target, but the interim target might be written. I think I have written the interim targets in a similar way. In my mind there's two ways you could look at it, and I think both might have some validity, and the default will probably be the science, but it's not necessarily the way that makes it easy to do the delivery because then everyone's trying to get tied up in a whole lot of monitoring and modelling to work out whether they're going to meet it, when at the end of the day, what they're trying to do is fix kilometres and kilometres of pipes.

[00.50.05]

Nightingale: Commissioner Nightingale. Ms O'Callahan, I was just looking at Objective 018 and the Operative, which I understand is not going to apply if the coastal Objectives WH.O3 and P.O3 proceed and are adopted. I think this may have been covered perhaps in… I'm just trying to recall some of the other provisions and parts of this Objective 018. So in particular, "Significant contact recreation freshwater bodies in sites with significant mana whenua values identified in Schedule C." Can you remind me where that… So if Objective 018 will no longer apply to Whanganui-a-Tara and Te Awarua-o-Porirua, where has that part of the objective been picked up?

O'Callahan: Mary O'Callahan speaking. I think that Scheule C is... Essentially, so the operative objective only requires improvement in the Schedule, the, "Significant contact recreation for freshwater bodies in Schedule C," in B sites, whereas Plan Change 1 requires improvements based on the grading systems for the TAS. So it essentially requires it everywhere that it's needed.

The operative objective is more of a narrative that doesn't kind of have particular implementation. Well, it has some level of implementation associated with it, in that it requires, if say you're looking at the E. coli matter or enterococci, it requires that to be improved, where it's a Schedule C site, for example, within a reasonable timeframe.

[00.55.18]

So it's an unspecified timeframe to the greater extent. Other than there's a note. "If this Plan Change hadn't been notified by 2026." So it requires that improvement and it doesn't have quite the same implementation in terms of the rules and policies that link the network consents for the wastewater and pick up the dry weather leakage that PC1 has.

Nightingale: Thank you. The Primary Contact Recreation Objectives in Tables 3.1, 3.2, 3.3, so these are all replaced by the tables in PC1.

O'Callahan: That's right.

Nightingale: I know we talked about Schedule C in the first hearing, and I think-

Kake: Can I just jump in there. Commissioner Kake speaking here. Just really wanting to get some clarity on that. So with respect to Objective 18 and 19 in the operative plan, where Schedule C is essentially triggered for lack of a better word at the moment, that trigger isn't under Objective WH.O3 or P.O3?

O'Callahan: Correct.

Kake: Just an additional question then around that. With reference to Schedule B, so it's currently under Objective P.O3 and WH.O3, just wanting to get some clarity around the inclusion of that Schedule, and is it because these are coastal areas as opposed to freshwater bodies per se, which we've been discussing over the last two days? So that trigger-

O'Callahan: Sorry, can you say that again?

Kake: It is under something and it's not under something. Sorry, I just didn't catch which provisions you were referring. The previous two days we've been talking about Schedule B being struck out, and it's included in Objective P.O3 and WH.O3, and I just want to understand, is it because WH.O3 and P.O3 are coastal objectives?

O'Callahan: It's simply because there were no submissions seeking that.

Kake: Okay.

O'Callahan: That it be clarified or removed, so I didn't have scope to make the change.

Kake: So going back then, I think to the original question around Schedule C, and without jumping to policies and rules as such just yet. At the moment there isn't a trigger for sites of significance in these objectives, which are SOE Objectives we've heard.

O'Callahan: For Schedule C? No. No, there's still references to Schedule C in other provisions of the operative plan and policies seeking their protection. So it still is relevant to a consent application when you're in a Schedule C area. So there's like Policy 47. I'm just trying to work out if there's still objectives that apply with it. I haven't done a specific analysis on it. I don't recall because it hasn't been raised in submissions specifically. I'm just trying to understand if there are any other objectives with a remaining reference to Schedule C, and I'm not sure that there is.

[01.00.00]

Kake: That's okay. I think it's important, I suppose, for us as the panel to understand, just with respect to Objective 18 and 19 in the operative plan, as Commissioner Nightingale has pointed out, it doesn't seem to be in the Whaitua's specific objectives. Thank you.

O'Callahan: I agree. That's something that hasn't. I'm happy to have a look at that and understand, just check the nature of those scheduled sites. I am aware of some of them. I mean, for example, I'm pretty sure that Te Awa Karangi is in Schedule C. I'll look at it and just understand if there's a gap there. I'm not sure.

I can confirm that there's still policies that are seeking to protect those aspects, I guess. The difficulty is, is that it was doing a similar exercise as what the TAS do. It was trying to prioritise areas for improvement, and the issue is perhaps, we don't want to have these two regimes going, competing to be what the priorities are. If the priorities are based on the NPS philosophy of improving where degraded. That's what the National Policy Statement for Freshwater requires, and so that's a different concept to what was in this earlier iteration of this planning document.

However, there may be a gap in terms of Schedule C, and I just need to check all the nature of the Schedule C. If they're all water bodies then there might be a policy gap in terms of at the objective level which could be addressed.

Kake: I think it will come up again during the day, and potentially over the next two more days, three. With respect to the objectives that have set in these Whaitua and the attributes that have been defined in the tables, and the ability to measure these attributes, we're talking about philosophical debates now, which I won't get into, but just acknowledging and noting again that the NPS-FM does have reference to monitoring under mātauranga Māori, and so that basis in terms of a narrative measurement I suppose, just trying to understand where that might fit within some of these tables or on the plan as we progress through these hearings.

O'Callahan: It's not something I'm not open too, it's just that it's not something that's been on the table for me in responding to submitters in submissions, so I'd have to look into it.

Nightingale: Commissioner Nightingale. Ms O'Callahan, in paragraph, this is of your 42A report, paragraph 215, 2-1-5, and actually this might be a question for Dr Wilson, who I think is here? Yes, hi. Good morning. Ms O'Callahan says here, "As I understand it, both 200 and 500 cfu are regarded as being suitable," thinking [01.04.58] later, but is that your expert opinion as well?

[01.05.04]

Wilson: Mōrena. Dr Wilson. These are values that are defined in the Recreational Water Quality Guidelines with associated health risks, so they're the basis of where those numbers have come from and would be considered potentially suitable for swimming.

Nightingale: Okay, potentially suitable for swimming. Thank you. Just because I see in Table 8.1A, which has the objectives enterococci, and the targets are all 200 or higher, other than the 50% improvement ones. I'm not completely sure why in some instances the current state is below that and then the target is… Is that again, yesterday we heard about some of the… There's some uncertainty about the baseline information, and then a follow up to that would be, are these current states, is the plan to update them throughout the hearing as more information becomes available, or they are what they are?

Wilson: Thank you. Dr Wilson. Yes, I can speak more to this when I do my presentation as well, but in general the approach was to simplify the values that we use, the targets that we use, and set specifically at values that exist in the Recreational Water Quality Guidelines, and they link directly to particular risks of gastrointestinal or respiratory illness. And so, if you chose numbers that were in between those, it's not quite as clear what the link to the human health risk is. A

simpler approach, so yes we could have. One approach could have been to apply the current state as the target and it could not exceed, but it was getting a little bit complicated with different numbers for every potential site.

O'Callahan: Dr Wilson, I can't wait till this afternoon to ask this question. How does the 200 and the 500 relate to the shellfish food gathering limits?

Wilson: Dr Wilson. They don't at all. That's correct. So the indicator for the suitability for shellfish gathering is faecal coliforms, which Forest & Bird, I believe, and EDS submitted on. However, I do discuss in my evidence, it's a highly unreliable indicator and I referenced a report by NIWA and Cawthron, and another author on there, apologies, Landcare Research, and they concluded that it was a highly unreliable indicator of the suitability of shellfish, and the health risk of people eating those shellfish, so I concluded that it wasn't, I didn't consider it appropriate to include faecal coliforms in here, just because it's so unreliable.

Nightingale: Commissioner Nightingale. Ms O'Callahan, you might have addressed this already, but I just had a note here. Guildford Timber had asked why in Objective 025 of the operative plan, sites with significant values, why the note does not reference Tables 3.1 and 3.3 to say that those tables don't apply to Whaitua?

[01.10.00]

Nightingale: I think they only raised that in relation to Objective 025. Is that a point? And I'm sorry if you have addressed that. I might have missed your response on that.

O'Callahan: It's Mary O'Callahan here. I think, sorry I'm just looking at all of these documents. I think that Objective 025 is dealing with ecosystem health and outstanding water bodies, and so it's only referencing the tables from the objectives that relate to the ecosystem health aspects of water, I think is my guess. I'll just check that. Yeah, so 3.1. What was the other one that was not referenced? Because 3.1 and 3.3 aren't referenced in the objective to start with.

Nightingale: It does say including, but yes.

O'Callahan: So the purpose of that objective, the objective's just trying to define what a healthy, functioning state is, and the tables, for ecosystem health and significant, you know, what's important for outstanding water bodies, and their significant values. Those values relate to ecosystem values, and Tables 3.4, 3.5, 3.6, they're all helpful in defining what a healthy, functioning state for those water bodies looks like and means.

Because those tables don't apply in the post PC1 world, the note, as I understand, was added there to make sure that it wasn't then being applied sort of by stealth to these outstanding water bodies. There is actually no need to have the reference. An ecologist can help define what those words mean in the absence of those tables. That's something that I recall was added in through the Environment Court mediation process on the NRP.

Nightingale: Schedule A is freshwater bodies.

O'Callahan: Yeah, so Schedule A lists some outstanding water bodies across the region.

Nightingale: Then Table 3.3 is about coastal [01.14.16] and Table 3.1 is just freshwater, and I understand you're saying it doesn't matter if Table [01.14.30] to the freshwater bodies of the two Whaitua post PC1?

O'Callahan: No, I'm not saying that. The 3.1 won't apply because there's an icon on those, on that Objective 18. Essentially, this is an icon on this one, on the reference to Table 3.4 to 3.8.

Nightingale: Okay.

[01.15.00]

O'Callahan: It's effectively an icon on just part of that objective.

Nightingale: Yes, okay. I see.

O'Callahan: Does that make sense?

Nightingale: Yes. So then, actually what Guildford Timber are seeking, it applies doesn't it?

O'Callahan: It makes some sense. Yes.

Nightingale: The table doesn't apply anyway.

O'Callahan: That's right.

Nightingale: Okay. Great, thank you.

McGarry: Commissioner McGarry. I'm looking at paragraph 2, 3, 4 of your report, Ms O'Callahan. You've just used the term in there towards the end of the paragraph, "Any improvements needed to address localised toxicity issues via the existing PC1 global consent process. I just wanted to be quite clear what you were referring to there. Is there currently some kind of global consent application in under the provisions of PC1 from NZTA?

O'Callahan: Mary O'Callahan here. I'm not sure if they've got, where the status of their consent application, but the operative plan has rules that set up a network consent process for the state highways, so I can take you to that rule that's probably helpful. I'm not sure if they've lodged or if they've had it granted or any of that, but I know that a process is envisaged by the operative plan rules, and that's carried through albeit with more reference to these objectives in PC1. I can direct you to the rule that is in PC1 and the one in the operative plan if that's helpful, but I'll just need a couple of moments to find them. Do you want me to find them?

McGarry: Sure.

Stevenson: Commissioner Stevenson. Are they PR8 AND PR9?

O'Callahan: Sorry. Mary O'Callahan. I'm just trying to find the operative plan one at the moment. There's policies as well, so there's Policy P85 in the operative plan. What's that one there? They're essentially in the operative plan in the same regime as the local authority stormwater networks, and I'm just trying to find them. They have a first and a second stage process. The first one is all about the

monitoring to understand the impacts in the localised area, and the second one is about the longer term consent. So the rules in the operative plan are Rule 52 and 53, and in Plan Change 1. Commissioner Stevenson, which ones did you find?

Stevenson: [01.18.47]

O'Callahan: That will be right. Sorry, I'm just in the other Whaitua chapter. Let me just find those ones. P8, P9. Sorry, PR9, PR8. Is there two in each? Yeah, I think there's two in each chapter. Sorry, I think Dr Greer might actually know the status of their consents if you're interested in that.

Greer: Dr Greer. Yes, it's covered in the evidence of Mr Bosworth and Ms Locklear [01.20.02] for NZTA, and they state that they have a current five year, Stage 1 consent that expires in 2027 so it must have been granted in 2022.

[01.20.14]

O'Callahan: My understanding is both the local authority networks and the state highway ones, they've sought on a global basis for the networks. I'm not sure the extent of them, if they've got them on the region for region or the catchment or what.

Nightingale: Commissioner Nightingale. Ms O'Callahan, just while we were looking at this Rule PR8. Just to ensure I'm understanding how this all fits together with the coastal objectives, would you or Dr Greer mind talking through this requirement in this rule for, "A reduction of copper and zinc commensurate with what is required in the receiving environment to meet the coastal water objective in Table 9.1." The coastal water objective is for, let's take Te Awarua-o-Porirua, is at the moment for copper and sediment, zinc and sediment, and we've got the levels set out there.
Would you mind explaining this whole commensurate point that you cover in your evidence, and also, I know we're going to probably come to it with Dr Melidonis, but how that balances with the sediment rate? Because as I understand it, you don't want to have too much of one because that doesn't flush out the metals. Is someone able to talk that through?

O'Callahan: I'm happy to give a little bit of context on that, and then I think probably it will come to the end of my understanding, but it's always a good place to start with what I understand. First of all, in terms of the coastal objectives. The coastal objectives for the metals, there's numbers in there that they are actually representing maintenance. They are possibly a bit like the… There's current state recorded there and there's a target that looks like it's actually allowing a greater amount of, say if you're looking at copper and sediment, it looks like it's allowing a greater amount, but that's to deal with sort of natural fluctuations and differences between sampling etc. So they're requiring maintenance. They're not requiring a load reduction specific to the coast, but they do require quite a bit of effort to achieve maintenance.

Nightingale: Sorry, just on that, because I did want to actually ask about that. Is that why, in your Section 42A you've recommended striking out the maintain because better information is available.

[01.25.03]

You've got the current and you've got the target, which as you say is higher, that indicates maintain anyway, so you might as well replace it with the more specific information?

O'Callahan: That's right. I'm responding to all the submissions about insufficient data where I can first of all, so yes. And I think that having the level in there is helpful for people to understand there's a number in there, and there's effort required for maintenance, and if you think about, say the state highway for an example, the contaminants coming off the vehicles will continue to increase as traffic increases, unless someone manages to take them out of the vehicles.

Nightingale: It's the brake pads, isn't it?

O'Callahan: It's the brake pads, I believe, but hopefully there's a technology solution I'd say, because there should be. Anyway, I mean there's other ruse [01.26.10] that can be erected, so presumably someone out there is inventing the solution for the vehicles. So that aside, they need to be installing treatment to be able to maintain. Then that's not necessarily the case if the highway or the local road discharges to freshwater, because the Target Attribute States do need to be improved in a number of locations, but for the coast they do require maintenance.

The harder sedimentation issue is another issue, and that is complex. My understanding is when PC1 was notified, that the science was indicating a concern that if you take some sediments out of the system, that will lead to a concentration of metals in sediments, but that was a problem. My understanding from the scientific evidence, and this was evidence of Dr Wilson, is that those levels of metal… So that's the load reduction in the table in Policy 24, had that 40% load reduction for the metals and that compensate, also I guess offset the effects of the environmental improvement of removing the sediment from the system. So, if you understand, there was an environmental improvement and then the plan was asking people to offset some other effects of that improvement. That was a bit unusual.

So the work, the scientists have looked at it again and there's different ways that you can assess whether or not there's a problem, and Dr Wilson sets out three options. You don't have your metals, you could have it essentially what was in the operative, in the notified plan, that they're not allowed to accumulate as a result of that environmental benefit, or that they… There was something in the middle and I can't really remember that was about.

Wilson: Accumulate at the same rate as current.

O'Callahan: Allowing them to then accumulate at the same rate as current because these metals are in the soils and there's a level of naturalness about that, or that you don't worry about them if they're not causing any toxicity effects. So I adopted the latter in my recommendations. There's not a case in my mind for regulating sediments just on the basis that they're accumulating, there needs to be an effect that's associated with that in my view, and that effect wasn't going to be toxic.

Then also moving to these from a straight maintain to a maintain within a band. So essentially what those numbers in Table 9.1 represent is maintaining within

the band of how you define levels of metals in sediments. The scientists will have to explain what those bands mean. I can't do that.

[01.29.58]

Those numbers allow for that level of small but not toxic accumulation that will arise, is predicted to arise through modelling as a result of, if the community manages to achieve this slowing down of the sedimentation rate in the harbour through the sediment controls.

Nightingale: Commissioner Nightingale. Thank you. That's very, very helpful. The only other thing was just the, or am I getting my provisions mixed up? The commensurate point.

O'Callahan: Yes, the commensurate report. The commensurate intention is that, if you've got, and we're talking about metals, they're quite easy to understand. If we're talking about stormwater metals, if you are the operator of the local authority network you'll have a proportion of metals that you're putting into the system and if you are the state highway operator you'll have a proportion and there'll be other bits potentially coming from maybe other sources, but probably not any material ones.

Commensurate doesn't mean, in this plan, how much of the problem is your network. It means, if the TAS requires a 20% improvement, you need to do a 20% improvement on your discharge.

Nightingale: Commissioner Nightingale. Sorry, just the TAS or does that apply to the coastal as well?

O'Callahan: If an improvement was required, that would apply in the coast as well. But in my example around metals it's a maintain.

Nightingale: Maintain.

O'Callahan: But there is still those localised toxicity effects that, they will need to be, the likes of the local authority networks and the state highway networks, my understanding is they're still needing to be improving to address their localised toxicity effects at sort of the pipe end.

Nightingale: Yes. At the pipe end but then at the point in which it's in the coastal receiving environment it's not as much of an issue.

O'Callahan: I think we might be getting beyond my understanding, and I'd have to defer to Dr Melidonis then.

Nightingale: Okay. I mean, we can come to that when you present. Sorry, I'm very conscious of overly simplifying what's really complex science, but is there a risk of having, if the efforts to reduce sedimentation, so not metals in sediment but reduce sedimentation through all of the land use activity improvements and other things that are happening, is there a risk that things will get out of kilter, or will the monitoring show if there's a problem and we're getting overly high concentrations of metal to the point where that could then have ecotoxic impacts, or does it happen much slower than that?

Wilson: It varies a bit. Dr Wilson. Very good question. There was the question that was posed in the Whaitua process. If you're reducing sediment, are you going to end up with an overabundance of metals? Through the modelling, and I'll speak to this in a bit more detail as well, but through the modelling Mr Oldman did, it showed that, even under a worst case scenario, which is very unlikely to ever happen, where the sediment loads reduce by 40%, and if metal loads continued to be the same as they are now, the increase in sediment metals in 2040 didn't result in any notably different ecotoxicological effects. If that answers your question.

[01.35.00]

Nightingale: Commissioner Nightingale again. Given we know that in the urban environments metals in the stormwater system are an issue, and things will eventually end up in the coast in the survey, is it just…? The current state in Te Whanganui-a-Tara, the levels, they're well below the target. Is that just because I think someone talked about it being a very dynamic and high energy system, so they just get flushed out? What's the?

Wilson: Dr Wilson. I'm assuming Dr Melidonis will also speak to this in part, but yes that's correct with the metals and Mr Oldman's modelling also took into account when things are re-suspended and flushed out of that system as well, so a naturally lower loading of copper, for example, in that system and lack of accumulation.

Nightingale: So they go somewhere but they go out into the territorial sea and they just… We don't… I mean, I know it's-

Wilson: Dr Wilson. Yes, that's correct. And also just generally are relatively low loading in that system as well, so the conditions are unfavourable to accumulate those. So the rate at which the copper, for example, is going into that system isn't resulting in a lot of accumulation in sediments as it's being flushed out and worked around.

Nightingale: Thank you, and sorry for getting into the science and that, but I just thought while we were looking at that provision it was good to talk that through. Thank you.

Maybe just one final question from that provision, well PR8. When you come down to the matters of discretion, I always looked at probably no issues in satisfying the copper zinc consideration there, but then when you come to enterococci matters to achieve coastal water objectives. So what there would you expect the NZTA or TA, who's discharging into that stormwater network, what sort of things would you expect to see as part of their consent application? I mean, that could be a question we ask them, but.

O'Callahan: I think this is probably a question for a future hearing topic. I'm not sure about the reference to E. coli. This is in the stormwater stuff and E. coli's supposed to be in the wastewater network. I mean, obviously it's not, it's misbehaving, but if we think about the wastewater scenario, and perhaps the wastewater rule, we can talk about the commensurate there because obviously the coastal objectives require a significant amount of improvement in places, so they will drive an outcome right up the catchment, and they need to. So it's the same thing, it's commensurate with the load and it's easy to just assume that all the wastewater's coming from the network, but it might not be.

Nightingale: But if the water tank's not. [01.39.59]

[01.40.00]

O'Callahan: Yeah. But again, it's the proportion of change that's needed that you need to demonstrate in your consent application. If we're going back to the question from Commissioner McGarry around the 50% improvement, we can't lose sight of the fact that no one consent applicant is expected to meet these objectives, so from their point of view it might be their contribution and how they measure their contribution, which might be in pipe length or it might be in some other way.

Even in the situation where probably 90 plus percent of it is coming from one discharger, it's still the expectation isn't that that person, that party has to meet the objective. The objectives are the State of the Environment, the consent applicant and their consent is about them demonstrating what their commensurate contribution is and how they're going to do it. [01.41.26]

Nightingale: Sorry, I was just waiting to see if you were… No, that's great. That's a good example, I think, of that objective we were looking at yesterday, WH.O9, because here, and that is since you've got a specific rule, so where the consent applicant can show that that rule is fully satisfied, then that activity will be considered to be consistent with the TAS.

O'Callahan: Yes, and that's the risk if you don't think about it like that. That somebody might be expecting a consent applicant with a big amount of discharge to actually be able to say that they're going to meet it, and that's not the intent. The intent is that it's everyone is going to try and meet that where they need to. But the plan's deliberately trying to be a bit more prescriptive than the likes of that 018, which just has a general kind of wishy-washy, "We'll try and prioritise improvements here." This is what the NPS is envisaging, is rules as limits and getting it admitted to.

Nightingale: It could be quite difficult for Council though, if these consent applications, these global consents, are coming in at different times, and say you've got one TA, they're saying, "We're satisfying that rule." But if the Council isn't satisfied with one of the matters of discretion then they would need to assess the impact of that discharge on the achievement of the Target Attribute State, but if that global consent application is coming along quite early and all the others are going to follow a few years afterwards, working out the commensurate, the reduction in load that that particular applicant would need to make. It's all case-by-case, isn't it?

O'Callahan: Dr Greer might be able to offer a bit more thoughts around how you work out what your commensurate is. Ultimately, you're only going to know if you meet the objectives when you've set the scientists out there to take the samples and you're getting some consistent results. But really, what you're looking for is the trends as you're going through that process and seeing the change. But then there'll always be a bit of a lag between changes, improvements made, and what you'll pick up in the monitoring anyway.

[01.45.02]

Greer: Dr Greer. We're quite lucky in that we generally have two consent holders spread across base water and the stormwater across the entire PC1 area. There's

probably two approaches too for consenting. One, is the Council to establish the load reductions that are required when a plan becomes fully operative and provide that information to consent holders, and I think that would probably be the most straightforward way to do it, and then consent holders have the opportunity to refine them after that if they feel necessary.

However, because there is really only one of them, especially when it comes to wastewater, that shouldn't lead to disagreement between applicants lodging at different times. But I would also envisage that the load reduction is pegged to the baseline, not when they apply their consent, so that there isn't just unnecessary confusion being added by the load reductions being calculated from different times, because that could be confusing. So potentially, there's some implementation guidance that needs to be released by Council once the plan becomes operative for stormwater and wastewater applicants.

Nightingale: Thank you, and that actually comes back to what we started this morning with, which was the baseline data and getting that done as accurate as we can through this process.

Greer: Dr Greer. And for the coastal environment in Porirua, we have reasonable estimates of the load reductions required for enterococci through the CREST modelling undertaken by John Oldman and then the freshwater load reductions that are required for the rivers.

Nightingale: Thanks for that. We're probably at time, aren't we Mr Ruddock? I think that was. Ms O'Callahan, the commensurate point, that's in a policy is it, it's not-?

O'Callahan: It's not in the rule, it's not in the objectives, no.

Nightingale: Not in the objectives.

O'Callahan: It's in the rules. I'm not sure if it's in the policies or not. I can check that.

Nightingale: Thank you. I don't mean to jump ahead to things that are not part of this hearing stream, but I am really interested in understanding how these will work in practice.

That's all the questions we had. Are we up to Dr Melidonis? Yes. Good morning, welcome, and I think you're presenting both before the morning adjournment and after, so we'll let you just indicate when you come to a natural point you'd like to stop, and we'll take the break.

Greater Wellington Regional Council– Dr Megan Melidonis

Melidonis: Kia ora. Thanks, Commissioner Nightingale. I will probably be able to present my entire slide pack in these 10 minutes and then the rest can be open for questions after the break. Josh, would you please move the slide. The slides haven't been keeping up with the discussion, I see.

I'll jump straight into the sedimentation rate. It's a bit difficult to separate these conversations from looking at it from an objective perspective and not discussing the detail around it, and I see some of that is scheduled for tomorrow

so we'll overlap, and we might just cover it all today. But just in order to be able to explain why certain values are in tables or what their objectives mean, I think it's important to give a bit of outline of the sedimentation rates and a bit of the science behind that. So I'll start with that.

I will refer to Mr Oldman's evidence, and he will join us later today and then he can jump in and answer any of the technical questions contained in his evidence. But just to summarise, the historical deposition rates of 0.7mm per year for the Onepoto Arm, so we're specifically talking about sedimentation rate here in Te Awarua-o-Porirua firstly. The Onepoto Arm and then 1.2mm per year for the Pāuatahanui Arm.

[01.50.02]

We're looking at Mr Oldman's evidence. His calculations show that current sedimentation rates are around three times higher than historical rates, and the Plan Change 1 objectives of 1mm per year and 2mm per year are around 1.5 times the estimated pre-European settlement sedimentation rates.

Then there is another piece of work that was done by NIWA. This contrasts slightly with what I've just mentioned. Their sediment load estimator predicts a natural sedimentation rate of 0.8mm a year in Porirua Harbour overall and suggests that the current sedimentation rate is conservatively at least five times the natural sedimentation rate expected for the estuary. So when looking at these two estimates, I consider Mr Oldman's to be the most robust, because it's taking into account more detailed information specific to different harbour arms or inlets, and they consider local historical sedimentation rates rather than national modelling.

So on that basis, I consider the following coastal sedimentation rate objectives to be consistent with the best available guidelines of inclusion of the ANZG, the guidelines 2018, which states that the most effective way of assessing sedimentation rate is to include, or at least consider, the national sedimentation rate in the overall sedimentation rate, so in addition to the current sedimentation rate. Estimates presented in Mr Oldman's evidence is 3.2mm per year for Pāuatahanui Inlet and 2.7mm per year for the Onepoto Arm.

Then looking at the slide, it presents two tables from my technical evidence, my primary evidence. Table 6 shows five-year rolling means for the Onepoto and Pāuatahanui Inlets and they are calculated over different periods. So those are five-year rolling means, which is the recommended methodology for looking at sedimentation rate to encompass different rainfall regimes and high rainfall events that might otherwise skew the results. That's an average across the five-years.

As you can see from Table 6, the Onepoto Arm from 2013 to 17 is showing not accretion but more erosion with a negative value, and when you move towards 2016 onwards, which is highlighted in red, it's indicating that there is accretion in the Onepoto Arm that's being measured by our sedimentation rate plates, which is annual monitoring, Council monitoring. When looking at the row below that for the Pāuatahanui Inlet, it's almost a reverse trend, but not as dramatic. You see the red shading from 2013 to 21 is indicating that the sedimentation rate is higher than 2018 onwards, although it's only the period from 2018 to 22 that is relatively lower and then the sedimentation rate appears to be increasing again

from 2019 onwards. So we don't yet know where that trend is going but based on some of the rainfall data and taking climate change into consideration, we would expect that to continue increasing over time.

When looking at Table 7, there are two periods listed in the rows. That's 2004 to 2014, which indicates the modelling period which Mr Oldman will speak to in a bit more detail, but that's basically the period and the data on which the modelling is based. And 2020 to 2024, which is the bottom half of the table, is the most recent monitoring period for the five-year rolling mean calculation from Council monitoring.

[01.55.01]

When looking at the modelling period, the WIP, the notified, excuse me, the Plan Change 1 documentation lists 1 and 2mm per year SAR for the Onepoto and Pāuatahanui Inlets respectively, but when considering the ANZG guidelines, and including the natural sedimentation rate, that would then shift to 2.7 and 3.2, which would then have a resultant effect on the load reduction. So it really does show a substantial difference in the load reduction calculations, with the current Plan Change 1 values showing 47% for Onepoto Arm and 38% for Pāuatahanui Inlet, where if the natural sedimentation rate is considered, that is changed to maintain the current load. So quite a substantial change.

Then looking at ecotoxicological effects of metals. A lot of this has actually already been discussed through your questions, so just to highlight that a sediment load reduction of 40% will require metal load reduction of 40% to maintain the current rate of sediment metal contamination. However, through this discussion you will be aware that that doesn't necessarily result in an effect that might be felt or might be meaningful in an ecological sense.

And briefly, just response to submissions regarding the objectives. There is relief sought for inclusion of coastal turbidity and water quality objectives within the plan. I do not believe these to be scientifically justified, mainly due to the mixing and dynamics of coastal environments and estuaries where measuring turbidity doesn't necessarily reflect the quality of the water throughout the year. If it's not continuous monitoring it's very difficult to draw conclusions from that. In addition, it's also a naturally occurring phenomena where in shallow estuaries the sediment is quite mobile and moved around by storm events, high winds, tides, etc. We believe there are more appropriate measures for the effects of sediment than measuring turbidity in the water column, such as what we currently measure in terms of sedimentation rate and muddiness and percentage of mud in samples at specific monitoring sites.

There was a question around nutrient levels. There was relief sought to include nutrient monitoring. Sorry, that was for water quality in estuaries and coast, I think. But we use other measures for understanding nutrients. Some as indicators such as macroalgae cover, and then also we look at the qualities of the sediment to understand how it might be affecting the invertebrates living on the sediment.

Finally, responding to a submission questioning whether the sediment metal levels are indeed high at point source outfalls. We have done two targeted investigations. One more recently in 2023, to understand what sediment metal levels are, not just at our State of the Environment monitoring sites but also at targeted areas close to outfalls or point source outfalls.

[01.59.55]

And found that zinc concentrations and high molecular waste at PAHs, so that's more where zinc is more related to housing and development, the PAHs are more related to industry or to vehicles, and those were found to exceed guidelines at most sites sampled in both 2009 and 2023, but other than that most of the other sediment metal concentrations were quite low.

And that concludes my presentation for today. Thank you.

Nightingale: Great. Thanks very much. We're going to have questions, but we'll take the break now and come back. Have to be reasonably quick, so we'll start 11. I'll just see if we think we might need more than this time. We'll come back at 11 then. Thank you.

[Break taken – 02.01.14 – 02.28.27]

Nightingale: Hello everyone. Welcome back. Dr Melidonis, thank you for your presentation. We'll see if anyone has questions. I have some but I'll see if someone else wants to go first.

Wratt: Commissioner Wratt. Thank you Dr Melidonis. That was a very concise summary. Thank you for your evidence before our break. I'm just interested that the WIPs identified those lower sedimentation rates. I understand your rationale around coming up with the higher rates, but I just wondered what drove those lower rates from the WIP committees?

Melidonis: Thanks Commissioner Wratt. Megan, sorry, Dr Melidonis. As I understand, the 1mm per year SAR that was published in the WIP was consistent with the Porirua Harbour catchment strategy and was considered to be achievable through the modelling that was done.

[02.30.02]

Sorry, let me just start again because I'm not explaining this too well. The three scenarios that were put forward for modelling, when Dr Greer looked at those and considered the coastal objectives, it was understood that under the most stringent or conservative scenario, water sensitive scenario, that those rates were achievable, however when looking at what those scenarios required, it would be very difficult to implement some of that management, so there was a bit of a mismatch between what is considered achievable through modelling versus what's considered achievable realistically, and then when looking at some of the sedimentation rates in the five-year rolling means, they were above what was considered to be achievable, so even naturally they came very close to what was considered to be achievable in the WIP, and in some cases only with a 0.3mm per year difference between the natural sedimentation rate and current. So that doesn't, I mean considering that Porirua Harbour is a receiving environment for an area that's considerably developed, so there's a CBD around Porirua, there's the activities happening around the catchments, it's not really conceivable to set it at a natural or close to natural sedimentation rate without considerably hampering future development and also considering current activities.

Wratt: Some of the information that you've now brought into your recommendations, was that available at the time the WIPs went out?

Melidonis: Dr Melidonis. The sediment core data was available. It hadn't been assessed as such because the modelling that was initially used to consider natural sedimentation rate was national modelling, so it did include specific areas but not the level of detail that is required in my opinion for setting targets in specific estuaries. Some of that data was available but not considered. It was only when Mr Oldman compiled, well did an assessment of those WIP reports, collated all the information. As far as I'm aware, that was the first time all the local information was considered.

Dr Wilson also pointed out that the ANZG guidelines didn't exist at the time of the WIP so it also brought new evidence to the table and new information that we can lean on to inform an objective of this nature.

Wratt: Thank you for that. Good explanation. Thanks.

Stevenson: Commissioner Stevenson. Thank you Dr Melidonis. Tautoko Commissioner Wratt's comments. Succinct. I'm interested in mahinga kai recovery. We've explored this a little with Tim Sharp, but noting in your rebuttal evidence you say the targets around sedimentation have been softened, pardon the pun, would they still provide for mahinga kai recovery?

Melidonis: Thanks Commissioner Stevenson. Dr Melidonis. It is challenging to consider restoration across entire inlets and estuarine systems. In many cases it's a very specific or localised issue.

[02.35.05]

So whereas we have a sediment load coming into the estuary, it's not settling in one particular place. The CREST modelling shows that it's being moved around, well it gives us an indication of what we might expect in terms of sedimentation rate and sediment moving around the estuary in response to tides, and hydrodynamic modelling shows the same.

It would be more appropriate to consider localised restoration in some of these areas by first doing an assessment of whether the pressures would maybe inhibit the growth or recovery of certain specifies. But in my view, a more localised approach needs to be taken so that we can understand where the areas of concern are, because we don't necessarily currently monitor specific shellfish beds, we monitor State of the Environment sites which may or may not have mahinga kai species. But it really would require an assessment of areas of importance and then focussing on restoration of those. But where these objectives are important is to reduce the overall sedimentation so that what's being moved around the estuary is not potentially landing up on one of those mahinga kai sites and wiping out restoration efforts.

Stevenson: And follow up, Commissioner Stevenson, probably to Ms O'Callahan. Would it in your view then be non-regulatory methods or action plans that would capture mahinga kai activities?

O'Callahan: My apologies. I haven't been specifically following the response from Dr Melidonis. Can you just summarise. It was about whether the sediment would enable the mahinga kai to re-establish in terms of the harbour? Is that the line of questioning?

Melidonis: Dr Melidonis. Yes, it's correct. We were also talking about ecological restoration of mahinga kai sites, like shellfish beds.

O'Callahan: So the question that I've received is, does that restoration sit within a non-regulatory method? I think if it requires a specific action to be done in the absence of a regulatable, a proactive activity to be done, that doesn't relate to an activity that requires a resource consent to authorise or a land use activity that can be regulated, that sort of thing, then probably it does fall into non-regulatory. So I'm just struggling to understand how else that would work.

Sevenson: Commissioner Stevenson. Thanks. That's just the confirmation I wanted. It will probably sit in a non-regulatory area somewhere. Thanks.

McGarry: Commissioner McGarry. If I could maybe just try and rephrase the issue a little bit differently. When I look at the table and I see it's now populated with numbers, but most of it seems to be 'maintain the status quo' and then the focus, or there's just science justification for doing that is the ecotoxicity sort of levels that pick up from Dr Wilson's work.

But I guess from the perspective of mahinga kai, if we're just maintaining the current then what we're seeing currently is mahinga kai isn't thriving in these environments, and I'm sure that's due to a number of pressures, including harvesting as well as contamination. So I guess we reframe the question as to, how does maintaining the status quo support the outcomes sought by mana whenua to restore mahinga kai in the harbours?

O'Callahan: I think that's first of all a planning question. Just to confirm that the maintain is the setting that's come from the WIP.

[02.40.00]

Melidonis: Thanks, Commissioner McGarry. Dr Melidonis. From our monitoring data it does not appear that sediment metals are affecting benthic macrofauna, so species that also include mahinga kai. It's more sedimentation that is an issue in some areas. Also, high nutrient loading or localised sediment metal effects. When looking at the objectives and the improvements that might be sought through those objectives, improving point source outfall water quality, in my opinion would go further and make more of a difference in improving localised mahinga kai sites than the objectives of copper and zinc in sediment included in the plan.

McGarry: Again this might be a planning question. Commissioner McGarry. By maintaining we're unlikely to see any change in that. So your response was really that a point source focus, which would be more through a consent process, to address localised impacts on areas where it's identified that mahinga kai could be restored is the approach, rather than through the sort of ecosystem wide objective level. Is that what I take that response?

Melidonis: Commission McGarry, yes. I think you've understood me correctly. I also just wanted to point out that, when looking at the national condition ratings and the bandings for assessing changes in estuarine health over time, the levels that are included in the Tables 8.1 and 9.1 are either consistent with very good or good levels of ecological health.

McGarry: In terms of the sedimentation rates, and I'm looking at your Table 6 when I ask this question. When I look at the Pāuatahanui Inlet and then I put together some of the responses on Day 1 of this hearing stream which were about the large storm events of 2016 and 17, and when I look at this I wonder whether the real drop is when those years drop out of the five-year rolling average. That those very high years, suddenly in 2018 those years aren't in that five-year rolling average. Could that be what's driving this, what appears to be an improvement in environment, but it's actually really just part of how it's been calculated? Statistics.

Melidonis: Commissioner McGarry, thanks for the question. Dr Melidonis. Indeed, it does depend when monitoring starts and what was occurring at the time. For example, in Onepoto there was very high sedimentation at the time of commencement of sedimentation rate monitoring, so for the initial period it was viewed as an erosion event or a period of erosion, whereas obviously if monitoring had commenced after that period of erosion it would appear to be a period of accretion. So yes, the statistics would have to be interpreted with the view of what was happening at the time, and we have considered this in the technical evidence.

[02.45.00]

McGarry: Commissioner McGarry. So your consideration of that in the technical evidence, how does that translate? The figures are still just the five-year rolling average, aren't they? Those events are captured in those periods. I guess, my question is really asking, how do we see the difference between those, what I would say they're almost skewing the data, aren't they? Because I know they're happening and they're happening all the time at an unknown frequency, but if you look at that, a trend can be very much driven just by those very large events using that five-year rolling average. If you could translate what you were saying to how you've considered that and how that's been factored in.

Melidonis: Dr Melidonis. We also calculate a ten-year rolling mean and in our technical reports we consider both. The five-year rolling mean has been selected for the objectives because it's considered that it doesn't skew the results in terms of high rainfall events and erosion events. The modelling considers a greater period of time and Mr Oldman can speak to that. There was a bit of discussion as to whether the ten-year rolling mean or five-year rolling mean should be used, and it remains the five-year rolling mean because it was determined to be a measure that does not skew the results in terms of excluding or including high rainfall events.

McGarry: Thank you. Because the Onepoto would show us a [02.47.17]. Could that be why it jumps then into the very high levels 2016? Again, those two large events – 2016, 2017.

Melidonis: Dr Melidonis. Initially in the Onepoto you see those three blank unhighlighted cells which is indicating the erosion from the initial measurement, and then in 2016 quite high rainfall. I think it was three events back-to-back is what we understand to have driven the increase from 2016 and onwards.

McGarry: Commissioner McGarry. So if we had the benefit of a 2021, 2025, another row off, another column off this, would that likely to then go down, once we're getting past those large events of 2016-17?

Melidonis: Dr Melidonis. We have those data. They're just being written up by our consultants at the moment and we'll be able to provide that in the next two months probably. I can't answer that question right now, but we'll have the information shortly.

Wratt: Commissioner Wratt. Just looking at that chart again. There is that high level of sedimentation has been maintained through in 29 to 23 and 2022 to 24. I mean, that seems to me to be a significant timeframe after those 26, 27 events.

Melidonis: Dr Melidonis. Once the sediment is in the system it's quite difficult to shift it, so some of it does shift out of the system and into the open coast, but once it's settled it's more likely to recirculate or move around the estuary rather than get flushed out. Dr Oldman is going to speak to that later in the day in terms of circulation within the harbour, but that's probably an indication of the sediment that's come in and then not been flushed out.

[02.50.07]

You do see accretion and erosion at certain points in time but it's very dependent on where the site is. Some of our monitoring sites are close to the mouth of the inlet where there are high tidal currents and they shift sediment out to sea more readily than, for example, in Pāuatahanui where there's less flow.

Wratt: Commissioner Wratt. So is that saying that those sedimentation rates actually are re-deposition sediment that's already there in some of your monitoring locations? Not necessarily new sedimentation that's coming into the harbour, into the estuary?

Melidonis: Dr Melidonis. That's correct. It doesn't differentiate between newly deposited sediment and sediment currently in the system, so it could be either.

Wratt: Commissioner Wratt. But wouldn't you expect that to balance out? Because if you're having re-settlement of sedimentation then it's got to come from somewhere, so you'd have a reduction in sedimentation somewhere and an accretion somewhere else?

Melidonis: Dr Melidonis. It's not that easy.

Wratt: Not that simple?

Melidonis: It's not that simple, but now with the CREST modelling tool we can run different scenarios and understand what might happen under different loading. It gives us the ability, even though it's a model and it's not real time sort of monitoring data, it gives us an indication of what we may expect under different rainfall scenarios or land management scenarios. But it's very difficult to tease apart the sedimentation rate data and say, "This sediment's moved to this specific area and shifted from, say, one sub-catchment or sub-estuary to another.

Wratt: Commissioner Wratt. But aren't those, the data in that table, is from monitoring not from modelling?

Melidonis: Dr Melidonis. Yes. The data in Table 6 is from monitoring from the sedimentation plates that we have in the estuary.

Greer: Dr Greer. Can I just jump in with a point of clarification here. On Monday we talked about events. The actual date of that second event was not 2017 it was around August to November 2020, corresponding with the flooding implement and the thousands of slips around the region.

Wratt: Thank you. That's a helpful clarification. Thank you, Dr Greer. Thanks.

McGarry: Dr Melidonis. The other part, component to understand is the muddiness parameter, isn't it? That that's giving us an idea of the fine particles that are resuspended and are moving around the system before they're flushed out to sea? Are they quite hand in glove those two measures, in terms of sediment deposition and muddiness percentage?

Melidonis: Thank you, Commissioner McGarry. In the Tables 8.1 and 9.1, we have muddiness reflected as extent of mud across the intertidal. So that's a measure of what fine sediment is present in the intertidal that potentially is being deposited through river deposits, whereas a percentage of the sample is also a measure of the amount of mud, but it's more localised. So the percentage mud across the intertidal gives us an idea of the extent of the deposition from the rivers or the catchment, and the percentage of sample is used for other reasons as well, for other applications as well. For example, when we're looking at the sediments we sometimes need to understand the particle size distribution to understand, to normalise certain measures and to also calculate different statistics in terms of amount of carbon etc.

[02.55.14]

So from a science perspective, we take those samples for those reasons as well. The percent of sample looks at also the topmost section of sediment, so it's different to a sediment core where it goes deeper, but it's looking at the most recent inputs. When you pair that with the percentage of mud across an intertidal area, it's sort of putting into perspective how large the impact might be at that site. So they're very site specific measures as with sedimentation rate, and I do acknowledge that there are challenges when averaging these across entire inlets because they are very site specific measures.

McGarry: Thank you. Just on a completely different tact. Anyone else still on sediment? We could stay there. I was going to go somewhere completely different.

Nightingale: I have some sediment questions.

McGarry: Yes, let's stick there.

Kake: Kia ora. Commissioner Kake here. I do have questions related to sediment, but I think you've touched on a few key important matters that I just want to address as well.

Just taking a step back, just so I can understand the process a little bit further. The maintain target came from the WIPs and we heard earlier in the week that when some of these targets were set, I'm conscious that Ngāti Toa in particular wasn't involved all the way through, or they said they've stepped away to maintain their own statement. The question, I suppose, is when that maintain target was set with Ngāti Toa in the room, I suppose, or mana whenua in general,

and then sort of a similar question which is science related in particular to your evidence, is just the selection of the Onepoto Arm and the Pāuatahanui Inlet, just so I'm understanding it correctly, it's the localised…? In order, from the scientific perspective, to measure these targets, these attributes, they need to be done at a more localised level in these particular locations, and that's why those two - Onepoto and Pāuatahanui were selected in the Porirua Harbour?

Melidonis: Thanks, Commissioner Kake. Dr Melidonis. Not entirely clear on your question but just to clarify. Our State of the Environment monitoring sites were placed not necessarily in areas where we expected degradation, but more to measure environmental response over the long-term. So they are indeed sites that we acknowledge are not reflected by the current state depicted by our monitoring programme, as I've acknowledged in my technical evidence when referring to point source clause [02.58.59] etc. So that's the first point. That they were placed in specific areas for the purpose of understanding change over time. A lot of them are close to important catchments and sources of sediment, and indeed the freshwater monitoring located in some of the rivers, the three rivers in Porirua Harbour, reflective of our concerns around sediment inputs.

Then in terms of Ngāti Toa's involvement in the WIP. I think Tim Sharp did speak to that on the first day, so I think he gave a good summary of what happened at the time.

[02.59.58]

But just to say that we are working closely with Ngāti Toa on the Cultural Health Monitoring Programme, and we are linking up our water quality monitoring with some of the sites on their Cultural Health Monitoring Programme list to make sure that we are not duplicating effort and that we are focussing our efforts, not just in the right locations in terms of science but also the actual on the ground concerns of where contaminants might be entering the system. I don't know if that answers your question.

Kake: Yeah it does, and it does help just to clarify the next question which I think you've sort of answered, but in the WIP Implementation Programme for Te Awarua-o-Porirua, there is, I suppose, just a reference to a particular site which is Rangituhi WMU, and just looking at your map and your evidence it is just adjoining the Onepoto Arm I'm seeing. I suppose, just in terms of my understanding and clarification, and we can talk to Ngāti Toa as well, but this is a particularly important site due to the proximity of the marae and mahinga kai and mahi tapu in that particular catchment, that Rangituhi catchment. That's correct? Okay. So in that respect, the work happening in Onepoto Arm, because they're adjoining essentially, there is a flow-on effect. Excuse the pun.

Melidonis: Dr Melidonis. I can't speak on behalf of Ngāti Toa but just currently working on some of the monitoring with them, I do understand there's high concern around water quality in that area because of all sorts of cultural and recreational activities that take place or used to take place in that area. In terms of our monitoring cycle [03.02.26] Tītahi Bay, which is kind of just north of that, I have heard that that site in the past, prior to our monitoring programme being initiated, was of quite poor quality in terms of sedimentation or sediment quality.

So also acknowledging the aspirations of us and mana whenua to improve sites. Also, consider historical sediment quality and environmental quality so that we

focus our efforts on areas that potentially naturally receive some, potentially if you're talking about nutrients, some impacts from riverine high nutrient systems.

From my conversations it's my understanding that that is one of the sites that is potentially not in scope for improving sediment quality because naturally or historically it was known to be a site of poor sediment quality, and then when you're talking about poor, it's also a question of what measures you are using to classify that as being poor because I understand sediment, anoxic sediment that appears black in colour, also has its uses in terms of cultural practices. So when I'm talking about poor I'm talking from a scientific perspective.

Kake: Thank you. I think that helps with my understanding. Just a final question, just with respect to the Tables 8.1, and this might be a [03.04.43] question. Table 8.1 and Table 9.1, and given the evidence that we've just heard, the Wai Tai unit in 8.1, and then I think it's the open coast unit in 9.1 on the tables there.

[03.05.02]

They've been struck out. I'm trying to find what the other one is called. Is it because of what we just heard with respect to the more localised monitoring required in these particular areas of the coast?

Melidonis: Dr Melidonis. Basically, I hand my point to add to my answer here from a planning perspective, but from a scientific perspective, in Wai Tai or open coast there's generally dynamic mixing because of wave action and the nature of the coast. The expectation is that the environment is more impacted by natural phenomena than by inputs coming from the land. I mean, that's a generalist statement so obviously it does depend on the specific area in question, but generally in the open coast that mixing is a bit more forgiving in terms of inputs that might be coming in from point source or riverine inputs or land derived inputs into the marine environment.

When we took that into consideration and looked at the different parameters included in the tables, most of them were really of concern when talking about point source or localised inputs, which I understand is covered elsewhere in the plan. Ms O'Callahan.

O'Callahan: Yes. My understanding from Dr Melidonis's evidence is that they're not relevant to the State of the Environment measures in the open coast, and the Council wouldn't be looking to monitor them on that basis, but they are relevant in the context of the specific discharge, but there's not sort of a concern about degradation in those open coast areas from the land use inputs basically. So it's only if there's point source discharges, which there are. The treatment plant do discharge. And sorry, that's from an ecological perspective so there are still enterococci issues in the open coast, and I talked about Ōwhiro Bay being a particularly problematic location.

But generally there shouldn't be problems in those areas, but that's why I've tried to move that into the clause. In P.O3 I've tried to move that content into a narrative objective, and as I said, I still need to do some work on that, but we've still got, all of those other narrative ones are there to manage those point source discharge in a normal or traditional kind of coastal objective sense. So we've sort of got the old and the new. The old sort of, there's an objective of what a

consent applicant needs to meet here in the words, and then there's the State of the Environment stuff in the table, which is limited to sedimentation in effect for Porirua, and then the human health stuff in the other table.

Melidonis: Dr Melidonis. Just to add to that. In Table 8.1 there's a column that includes other estuaries. What I'm referring to here is the open coast in the context of beyond the estuary, so there's still scope to include estuaries of concern, like Ōwhiro Bay in the actual estuary, rather than on the open coast.

Nightingale: Thank you. Commissioner Nightingale. On that, I saw in the Te Whanganui-a Tara WIP they talk about Te Whanganui-a-Tara outer harbour as having D as the current state for deposited sediment.

[03.10.10]

I thought that that seemed really quite different from what your evidence is. Is that again just different modelling? Sorry, not different modelling but an approach to monitoring that has caused that? I don't know if you need a reference to the WIP but it's-

Melidonis: No, that's okay. Thanks, Commissioner Nightingale. Dr Melidonis. As part of provision of science information to assist with the WIP process, we did put together a Coastal Assessment Report, and I can check now, but as far as I remember, what is included in Te Whanganui-a-Tara WIP is generally consistent with that coastal report we put together. It would depend on which parameters you're talking about exactly, but that area is quite impacted by sediment from the Hutt River, so in terms of that measure, I wouldn't be surprised with a D rating. But I do have it on my laptop, and I can double check for you if the other parameters are concerning.

Nightingale: Commissioner Nightingale. I'm still just struggling, and it might be because of how it's been measured and the statistical analysis, but in Table 8.1 for instance, current state for Te Whanganui-a-Tara Harbour has no data. Apart from Mākara, everything is at maintain, and I guess that's a very different message coming out of the WIP, which is that things that are happening higher up the catchments are impacting the coastal environments.

My lay reading and understanding is that what's coming out of both the WIPS, Te Awarua-o-Porirua and this one, is that, yes sediment does need to be reduced in the coastal environment. It's not just at the point sources and addressing it as it's coming into the rivers. So I guess, if our recommendations are that it's largely maintain other than improve for Mākara, it's largely maintain, it just feels like it's just a very different result from what I think are the clear messages in the Whaitua Implementation Plans.

Melidonis: Dr Melidonis. There are some substantial changes put forward by Ms O'Callahan in terms of Te Whanganui-a-Tara and Mākara Estuary in Table 8.1, so when looking at the amended table the metals in the sediment are set at a very good rating, a good or very good, which currently indicates maintain, but that's with an acceptable band because you can't really get better than very good, so that would make sense.

[03.14.55]

In terms of muddiness, the aerial extent of mud, it's not actually applicable in Te Whanganui-a-Tara, because although technically an estuary, it doesn't really

have its own intertidal soft sediment area where it is applicable for Te Awa Karangi for example. So some of the estuaries are maybe feeding into the deep basin estuary of Te Whanganui-a-Tara, and the same goes for sedimentation rate. So really, for Te Whanganui-a-Tara we're more talking about percentage of mud in the sample and the metals in the sediment.

When looking at Mākara, the copper and zinc in the sediment in the amended table provided in Ms O'Callahan's evidence lists the metals as not applicable under the context of that not being a high growth area or an area where there's very many houses and vehicles moving around, so it's not deemed an important parameter to measure in that context. No data for muddiness, but the target that was set through the WIP still coming through and still reflected there is a very good measure.

I would say in Plan Change 1 it's maybe reflected as maintain, but in the amended table there are some improvements to be sought.

Greer: Dr Greer. Can I just jump in here to clarify something. The WIP identifies the baseline state for both the inner and outer harbour as D, but also sets the target as D, which is why it was [03.17.11] transcribed that WIP objective into a coastal objective as maintain.

Nightingale: Commissioner Nightingale. That's what they call first steps I think, and then longer term, which I can't immediately see what that time period is, but longer term. Sorry, just going to quickly… This is the table on page 74 of the WIP. They don't have anything indicated there for a longer term.

Greer: Dr Greer. The targets were set off the First Steps G column for freshwater and coastal with the longer terms, I believe, representing Wai Ora. So they're the very far out objectives.

Nightingale: Commissioner Nightingale. Ms O'Callahan, I see that, this is a question we had from Council on day one about how the NPS-FM and the NZCPS need to be read together, and I think it's Policy 22 of the NZCPS is a policy about sedimentation and that hasn't identified any particular issues. I think these provisions give effect to that, but I did wonder about Objective P.O3(a) which talks about, sediment entering the harbour catchments either via fresh bodies or directly are significantly reduced, and I don't have a particular, I don't think that wording is in the Te Whanganui-a-Tara objective, and as I understand it, these provisions are about managing the impacts on the coastal receiving environment from activities that impact freshwater bodies. So just a query about the word 'directly' in that objective.

[03.20.00]

O'Callahan: Mary O'Callahan speaking. There is a related clause in WH.O3, which is about the sediment inputs to Mākara estuary, that's identified as the issue for sediment for Te Whanganui-a-Tara. But my understanding of the coastal objectives is they are the coastal objectives in terms of the interrelationship with NPS-FM, but they are also the coastal objectives in their own right under the NZCPS, so they are replacing the existing coastal objectives as well in terms of ecosystem health and the water aspects of the coast in terms of water quality. So this is both. These will be the objectives that apply to a direct discharge of sediment, but they also

influence what's coming from the freshwater, or the riverine environments is the language that Dr Melidonis uses. Does that answer your question?

Nightingale: Yes, that's really helpful thank you. So then, I guess if it is managing direct inputs as well, is it based on the science an objective is only needed in terms of Mākara estuary, not in terms of the other coastal environments for Te Whanganui-a-Tara. But is it captured by the chapeau maybe?

Wratt: Commissioner Wratt. Can I ask a question which I think is aligned, and a little bit it's a statement of summarising what I'm thinking this is meaning, is that in Te Whanganui-a-Tara and in the Wellington Harbour, the inputs from the river, and the Hutt River in particular, aren't really an issue in terms of the environmental quality of Wellington Harbour. The quality of water in the river is an issue for the river in the river itself and in its tributaries in terms of freshwater quality, but it's very different from in Te Awa in Porirua where you've got inputs from the streams feeding into the Porirua and Pāuatahanui Inlets which are impacting on the quality of the estuary. Am I coming to the right conclusion there?

O'Callahan: That's been my conclusion, so let's hear from Dr Melidonis.

Melidonis: Thanks, Commissioner Wratt. Dr Melidonis. There is naturally occurring sediment in Te Whanganui-a-Tara and coming down the Hutt River, so that would happen naturally under forested conditions, so it's important to take that into consideration, but then the sediment load coming down there, current day sediment load, is well above that natural load, so there is indeed an effect.

The organisms that we have monitored, the benthic and fauna in Wellington Harbour are still in a relatively good state despite the muddiness you say of the sediment. This is generalising over the entire harbour, but definitely those organism appear to have adapted so there's quite good diversity represented at the sites we monitor in Wellington Harbour, and as I said, it appears that some of the more, usually sensitive organisms can cope with that amount of sediment.

We don't monitor in the intertidal or very close inshore in Wellington Harbour so that is a bit of an unknown, what's happening at those sites, but generally we're talking about deeper sites. So I wouldn't go as far as saying that there's no impact.

[03.25.00]

I would potentially propose considering additional sites for monitoring in the intertidal to understand how sediment might be effecting organisms there, but then also considering some of the areas around the harbour are beaches that are naturally low in diversity in any case. So it would be potentially considering sites close to the mouth of Wellington Harbour and also taking into account we do have sites in the estuary in Hutt River, which is quite heavily impacted, so that gives us a reflection of how the sediment coming down the river actually impacts the estuarine fauna.

Wratt: Commissioner Wratt. The estuarine, there's nothing in here really is there about the Hutt River estuarine environment?

Melidonis: Dr Melidonis. We do have those data, and in previous iterations of this table I included an extra column for Hutt River, or Hutt Estuary should I say. So we do have data, and it is one of our monitoring sites, long-term monitoring sites.

Wratt: Commissioner Wratt. And there could well be mahinga kai issues, even if the organisms are adapting in some places you could still have issues with mahinga kai, food gathering, and not being suitable for human consumption.

Melidonis: Dr Melidonis. Yes, that's true. Especially considering that most of our sites are deep sites – 20 to 30 metres, which wouldn't necessarily be the ones visited for mahinga kai.

Nightingale: Commissioner Nightingale. So that would fall into 'Other Estuaries' in Table 8.1 with a maintain target?

Melidonis: Dr Melidonis. Yes, that's correct. It's currently listed under 'Other Estuaries' and the reason for the 'Current state' column in that section of the table is a little unclear to me. I guess it's just to be consistent because it's not that there's no data for other estuaries, it's more that it's not applicable. Because it's across a whole bunch of estuaries it's difficult to list. I mean, it's not possible to list current state so I suggest potentially taking out that column of 'Current state' for 'Other estuaries.'

O'Callahan: So just going back to Commissioner Nightingale's question. I think it was, "How do these objectives work?" Was it? Or, "Have we got enough here for the point source discharges?"

Nightingale: Commissioner Nightingale. Might need to wind back. You have looked at these provisions in light of the NZCPS and Policy 22?

O'Callahan: Well look, probably one aspect of context with this is there's actually very few submissions on the coastal objectives. I've already mentioned that I didn't have scope to make it in line with the other ones. There is hardly any submissions on this, and it's not like the freshwater provisions when you can bring in new issues as the panel or matters that are raised in the hearing. This is a Schedule 1 issue.

In a lot of regards it's not perfect and I've struggled a bit. If I had my time again I'd maybe draft it differently. Because it's come from the point of view of the WIPs, and just the whole monitoring of the coast in this State of the Environment way, it's all just a lot more complex than it appears to try and make it work well.

There's certainly no scope in submissions trying to have the objectives more stringent than what they are, which is at maintain. So you might have an interest in worrying about this D, but I haven't found any… I haven't obviously looked at that issue specifically, but I can't, from my working on it, recall if there's any scope that would enable that sort of a decision to be reached.

[03.30.00]

I'm certainly happy to look into it, but I think that's certainly my sense for it.

Nightingale: Commissioner Nightingale. I mean, there is of course the general requirement that these provisions do give effect to the national direction including the NZCPS, and that's a statutory direction, and I think it's either Forest & Bird or

EDS might have had a broader submission point about consistency with the NZCPS.

O'Callahan: I think their main submissions, from recollection, was to seek the reinstatement of the Operative Coastal Objectives.

Nightingale: Probably leave it there, but where I was just generally going, was that I still, and maybe I just need to review the material on this again, is that I'm still struggling to understand how, where we know that there's sedimentation issues in higher, up in the catchments, and the PC1 has put in provisions to manage those activities causing that, how we then end up in a, "It's all okay in the coast," sort of. There's something I'm either sort of not quite understanding, or?

Greer: Dr Greer. I think it's important to understand that the D in the coastal environment is not the same as a D under the NPS-FM. This is not an exceedance of the national bottom line. Perhaps Dr Melidonis could describe what a D actually looks like in the environment and potentially identify whether it is representative of significant adverse effects or a more stringent threshold.

Melidonis: Dr Melidonis. Then I direct you to Table 3 of my primary evidence, and that gives a reflection of what a D looks like. It's banding of poor, and there are measures. I'm sort of describing that in terms of all the parameters we've been discussing today. Just also want to point out that in some areas there might be a banding of D, but it might also be a natural sort of driver. So in places like sandy beaches or gravel beaches, macrofauna, so macroinvertebrates, might be rated as D because the diversity is low, but that's naturally occurring. So that's where it gets a little confusing when you're just looking at numbers and bandings, because that narrative is not really captured.

In some situations in the WIP there were improvements sought within a band, and maybe that's not so much reflected in the maintain, so I guess it would be helpful for Ms O'Callahan to just respond as to whether those improvements are included under maintain even though it's not shifting across a band, so I think it's not necessarily saying it's going to be maintained at a specific level, but maintained within a band as such, so still scope for improvement. But correct me if I'm wrong there.

O'Callahan: At the moment my drafting… Mary O'Callahan. My drafting doesn't provide for that but it certainly, I think that would be within a scope to make that clearer, because originally these all talked about maintain or improve, and now on there on a consenting sense, that's a bit of a nonsense because the consent applicant's going to just have the option of maintain. But if there are specific attributes where we're seeking an improvement within a band and we can describe what the band is, then that would be within scope to capture in here, but I would need to understand your evidence, Dr Melidonis, better to work out where that would need to go in these tables.

Greer: Dr Greer. Just to note that an improvement is implied through the freshwater targets for the Hutt River and the Mangaroa River as well. In relation to the visual clarity there's an estimated load reduction required for the Hutt River from current state of around 6%.

[03.35.00]

Nightingale: Commissioner Nightingale. Yes, at the bottom of Table 9.1 'M' is maintain maintenance in the state of a target, and I actually did have a question about whether it was clear to a plan reader what that meant, but I'll leave that with you. We've discussed that.

The difference, Dr Melidonis, from the 40% load reduction which came out of the WIPs and was originally in the… It was in the notified PC1 wasn't it? Yes. To a zero now, and that's what, other than Mākara, I think?

Melidonis: Dr Melidonis. Across the board. Was in response to changing the sedimentation rate, the SARs, when considering Porirua Harbour at least, and then by calculating the work Mr Oldman did in calculating sediment loads. I think it may become clearer when he presents later today.

Nightingale: But the difference between the two, so the 40% to now the zero, which again as I understand it, Ms O'Callahan is saying is still supporting an improve for Mākara even though… Zero load reductions but improved for Mākara, and that's because of differences that's come out through the modelling and taking into account the natural sedimentation rate which varied from what came out of the WIPs.

Melidonis: Dr Melidonis. In my evidence, the change from 40% to zero is reflective of Porirua Harbour, and as far as I understand there's still proposed load reduction for Mākara, but I'll refer that to Dr Greer.

Greer: Dr Greer. Yes, there is a site pretty close to the estuary and it's probably the only inputting water body that require, I think, a 38% reduction in sediment load to meet the freshwater TAS.

McGarry: Commissioner McGarry. I just wanted to, I think you've responded really well to the additional parameters all wanted by EDS and Forest & Bird, and I accept what you're saying there, but I'm very conscious that chlorophyll-a is sort of our only measure of understanding the risk of phytoplankton blooms. So my question really is, by not having that as a parameter, how is the risk of phytoplankton blooms, how is that monitored in the State of the Environment way, because I'm just looking back to the objective. Obviously, the new one added there now is, "(i) No increase in the frequency of nuisance microalgae blooms."

So I do accept what you say about the scientific justification, but I just don't understand how taking that off the table and putting it into a narrative and how it would then be monitored.

Melidonis: Thank you, Commissioner McGarry. Dr Melidonis. I guess Ms O'Callahan can comment on a narrative versus a parameter that's included in the table and what that really means for consent applicants etc, but just in terms of phytoplankton being dropped from the tables and included rather as a narrative, that was to put it into further context in terms of where it might be useful to monitor phytoplankton, because including it in the table, it was very difficult to communicate that.

[03.40.01]

It's potentially only useful to monitor it in certain situations or certain areas, for example areas that might be impacted by point source discharges or estuaries that experience riverine mouth closures. So putting that context into the table was quite difficult.

If we included it in the table we'd have to list quite a few different estuaries and potentially additional areas of monitoring, so that was one of the reasons for putting it in as a narrative. So not dropping it entirely, and still acknowledging that it's useful, particularly maybe in closed estuaries or areas that do experience nutrient water quality problems. It's a nuance there.

Ruddock: Sorry, apologies commissioners. Just be aware, we're running 25 minutes overtime on this particular speaking slot, but continue.

McGarry: Commissioner McGarry. So do I take from what you were saying, it being more of a localised parameter, so if a consent applicant was to go through the process and that objective, and then it might be appropriate that they monitor outside in a reasonable mixing chlorophyll-a in the receiving waters to make sure that the nutrients aren't in fact causing localised effects. Is that how it would be measured from the narrative?

Melidonis: Dr Melidonis. That's correct. I also, just before the break I wanted to draw your attention to bank invertebrates because I recall that was a question from earlier and we haven't yet discussed that. So happy to discuss it after the break or at the next slot, but that's correct. You have understood my sort of explanation correctly in terms of phytoplankton.

Nightingale: Move on. Sorry, Dr Greer, your last comment about 38% load reduction monitored near the Mākara Estuary. Where is that? Is that in your evidence, or?

Greer: The last number I can remember off the top of my head was 38%. It was the focus of Mr Blyth's Second Statement of Evidence, and it will be in the amended tables under the policy number.

O'Callahan: It will be 4.

Wilson: It's under that. Let's see. It will be WH.4. I remember correctly. It is under Table 8.5 in Appendix 2 in Ms O'Callahan's rebuttal. Mākara Stream at Kennels, which accounts for 92% of the Mākara [03.43.46] catchment. Page 361.

Nightingale: Thank you. Then for Mākara monitor then in the estuary itself, it's a narrative of improve with no numeric.

O'Callahan: There was a numeric in the notified version of PC1.

Nightingale: Yes, called a 2.1?

O'Callahan: Two to one or something. I don't actually list them 2:1.

Nightingale: 2.1.

O'Callahan: I can't actually understand what that means, so you'll have to ask a scientist. But that's been suggested to be replaced with 'improve' and I understand it's

probably related a bit to the muddiness targets that are there for Mākara Estuary, but perhaps Dr Melidonis could explain the 2:1 and why that wasn't suitable.

[03.44.55]

Melidonis: Dr Melidonis. The 2:1 measure, I understand was inserted due to the lack of information around natural sedimentation rate, and it's inconsistent with the measure included in Table 9.1, so a more appropriate measure is an actual value, and since that isn't available right now it was adjusted to improve. Because Mākara Estuary is included in the table because of concerns raised through the WIP and by the community, it's probably advisable for us to monitor baseline state or current state for that estuary, which is usually a process over three years, to understand sedimentation rate and muddiness. But that work would have to result, or would be decided on after this process really, of Plan Change 1, and what the directive is.

Nightingale: Commissioner Nightingale. Thank you. So really the best that we can do for now is an improve target and maybe in a future plan change when there's more data, we could look to have a numeric target in there.

Melidonis: Yes, and the direction of improve will need to be demonstrated in terms of the trend analysis.

Nightingale: Thank you. Any further questions? Otherwise we'll move on to Dr Oldman. Thank you, and sorry to keep you waiting but it's obviously all very related. Do you need introductions or are you happy that you know who we are?

DHI Water & Environment – Dr John Oldman

Oldman: I'll just introduce myself.

Nightingale: Great.

Oldman: I've got to get used to the technology. Kia ora everyone. I'm John Oldman. I work for DHI. I'm lucky enough to be based in the Eastern Bay of Plenty in Ōhiwa, and my background is in understanding the effects of discharges into the marine receiving environments.

Am I in charge or is Josh?

[03.47.47]

Oldman: Okay. My evidence summarises the previous modelling that I've done for the TAoP in 2019, and additional modelling carried out for the PC1. That modelling quantifies how catchment derived sediments, metals and pathogens are transported from the catchment outlets and into Porirua Harbour. The models underpinning the work have been calibrated against available observations, and the modelling includes appropriate current day baseline loads to define the current state of the harbour in terms of the contaminants considered.

We can use the link to catchment and marine models to allow us to understand the effects within Porirua Harbour of future land use scenarios to be quantified. So we essentially build a virtual land use scenario, and we quantify the effects

of that within the receiving environment. The TAoP considered it business as usual and a water sensitive scenario, and additional land use scenarios have been considered for PC1.

For pathogens, baseline load reductions within individual sub catchments have been applied, so Table 7 of my evidence, and the predicted changes in pathogens at key sites in the harbour have been determined. This data is then used by Dr Wilson to assess what pathogen load reductions mean in terms of changes and attributes at these key sites.

For sediments, the work carried out for the TAoP provided an understanding of the variability of the predicted deposition within the harbour. So this variability relates not only to the magnitude of the load delivered during individual events but also the sequence of tides, winds and waves that occur immediately after an event. Figures in my evidence, Figure 4 in Appendix 1, illustrate this. The panel on the bottom there just shows the predicted deposition for different events. We modelled five different events including an annual simulation.

[03.50.00]

So we can see there's a common pattern there in terms of where significant deposition occurs, but for individual events the pattern does change over time, but we see common areas where we're seeing accretion, so the blue, and then deposition in the brown, and the darker brown showing the areas of the highest deposition that occurred during those different events.

To provide a useful metric of the effects of land use change on Porirua Harbour deposition, estimates of basin-wide sedimentation rates from the more detailed model outputs have been derived. Modelling carried out for the TAoP shows there is a clear relationship between sediment load coming into the harbour and these basin-wide deposition rates despite the highly variable spatial nature of deposition. We have that relationship there in my evidence. So we've got a sediment load that's come in during an event, and the predicted basin-wide deposition. It's a very linear relationship.
Results from the TAoP work were used to inform the development of the PC1 basin-wide sedimentation rate targets of 1 and 2mm, and these rates were based on an estimated mean annual sediment load for the period 2005 to 2014. This period was used for the TAoP because it was deemed to be representative of the climatic drivers of sedimentation and generation within the catchment. That's looking at the variability of rainfall and subsequent runoff that happens within the catchment.

For context, and as has been discussed already this morning, the estimated natural sedimentation rates within the harbour are 0.7 and 1.2, and by natural sedimentation rates, we mean this is a representative value of pre-human, native forest rates prior to any large scale catchment changes.

Subsequent analysis of the sediment load data, rather than the drivers of sedimentation for PC1, determined that a more appropriate long-term sedimentation load should be derived for the period 2004 to 2014. The figure on the bottom here just shows the annual sediment load delivered to the harbour from the catchment modelling from 1975 through to 2016. The highlighted areas between 2004, 2014, the average for that period is very close to the long-term average, which is the dashed line.

So we can see, depending on where we were on that timeframe, looking back over the 10 years, we would be discussing a different sedimentation rate. The mid-80s, very low sediment loads. We would have been measuring much lower sedimentation rates. Then the 2004 - a big event. 2006 - a big event, and then subsequent to the 2016 there's been another sequence of different events in terms of sediment load coming into the harbour.

Using the load deposition relationship, the basin-wide deposition rate for this long-term annual sediment load, 2004 to 2014 load, we would estimate a deposition rate within the Onepoto Arm of 2.6mm per year and 3.2mm per year in the Pāuatahanui Inlet. Then conversely, we can say to achieve the PC1 target basin-wide deposition rates, a 40% sediment load reduction from this long-term sediment load would be required.

Drs Melidonis and Wilson discussed the estimated deposition rates from my evidence along with the observed rates from monitoring data and harbour-wide survey information, to discuss the appropriateness of the PC1 target sedimentation rates.

Finally, in terms of metal accumulation, we can make estimates of metal accumulation within the harbour based on the predicted sediment deposition, and knowing the relative load of metals that are attached to those sediments. However, there are many complex chemical and physical processes that determine how metals bind to sediments and move between particulate. They're bound to the sediments, and in dissolved form, so in the water column.

The metal model applies a global particulate-to-dissolved loss term to the catchment derived metals. This accounts for particulate dissolved partitioning within the streams.

[03.54.57]

So we have a load of metal, some of it attaches to sediments, some of it is moved to the water column and it's ultimately flushed out of the system, and then there's also a subsequent loss from the sediment back into the water column within the harbour itself.

The metal model mixes these new sediments, the new sediments coming in off the catchment, and their associated metal load with their underlying, older sediments and evolves the surface layer of metal concentration over time. For the PC1 work the metal model was calibrated against observed data.

So there are many different combinations of deposition rate and relative metal loads that lead to quite different outcomes over time in different areas of the harbour. There can be a slow buildup over time when deposition rates are low, so within the subtidal basins we see very low deposition rates, and metal which has been associated with those sediments is slowly, slowly building up over time.

Close to the catchment outlets metal concentrations are often close to equilibrium. That's when the incoming sediment and metal concentration is very close to the underlying concentrations. If you like, it's at a saturation level, and so over time there will be very little increase in these areas.

Sources of both high sediment and metal loads are important in terms of the overall accumulation of metals within the harbour, so mapping the deposition from such sources provides an understanding of when and where metal concentrations may reduce over time given the land use change, including different levels of reductions in metals and sediments.

Appendix 2 of my evidence provides maps and tables of future metal accumulation in the harbour, which is used by Drs Melidonis and Wilson to determine the potential ecotoxicological effects of the metal accumulation estimates. We just have the two maps here. On the righthand side is the predicted current day zinc concentrations within the Onepoto Arm, and on the left is the deposition map. You can see it's not a one-to-one mapping. Some areas where you have high levels of deposition have lower levels of metal, and that's to do with the relative loading and where that sediment has come from. Then we see the hotspots around the catchment outlets, and there may only be relatively small deposition rates there, but because of the proximity of the intertidal area to those catchment outlets, we see those hotspots of metals.

That's a summary of my evidence.

Nightingale: Questions for Mr Oldman?

McGarry: Thanks, Mr Oldman. Just an overall one to start with. Given the inputs into your modelling and the calibration that you've undertaken, what's your level of confidence in the modelling that you've done?

Oldman: Mr Oldman. Going back to the original report for the Whaitua work, the model predictions matched very well against a range of observations. We looked at variations in water levels, currents that have been measured within the harbour and modelled currents. So we're confident we've got the exchange of water coming in and out of the harbour and into the two arms, which is a key driver for what happens with contaminants. Then the calibration of the settlement model was against the available sediment plate data, so we looked at the plate data that was available in 2018-2019, and there's a big range in terms of erosional science and accretional science, and the model matched those very well.

So in terms of some of the models that I have run over the years, I'm very confident in terms of the performance of the model.

McGarry: Thank you. Just a couple from your evidence. The first one's at paragraph 17 where you put out there the three land use scenarios. Where other witnesses have worded these it's been 'business as usual,' the second one's 'improved,' and the third one's 'water sensitive.' When I read your description it's a little different. Is there a reason for that?

Oldman: That might just be the naming of the scenario since the Whaitua work. Greer.

Greer: Dr Greer. It's my understanding that an improved scenario was not run for the coastal modelling. The exact reasons why is unknown to me.

McGarry: Commissioner McGarry.

[End of recording 04.00.00]

Hearing Stream 2 – Day 3 – Part 2

McGarry: There is a difference here, and not just a description?

Greer: No. In terms of the naming they're equivalent to a baseline, a BAU, and a water sensitive urban design scenario, whereas in freshwater there was a baseline, BAU, improved, and water sensitive urban design.

McGarry: Thank you. In paragraph 21. I'll just scroll there. Commissioner McGarry sorry. You've got there your Table 2 - Probable Effects. I just wondered where those thresholds were sourced from, Mr Oldman?

Oldman: Are these for the metal accumulation?

McGarry: Yes, the zinc and copper thresholds.

Oldman: Those were derived as part of the Whaitua work, so they're different to the current thresholds which Dr Wilson has addressed or will address. It was part of the technical panel that was on the Whaitua in terms of, we're doing metal modelling, what thresholds do we want to look at? I think at that point there wasn't the ANZECC guidelines.

[00.01.25]

Oldman: Yeah. But for whatever reason, the Whaitua committee technical team picked those thresholds.

McGarry: So they weren't derived just, Commissioner McGarry sorry, around the table? They've had expert advice into those thresholds?

Oldman: Yes, that's my understanding.

McGarry: Thank you. My final one is paragraph 25 of your evidence. I'm just wanting to really understand. Metals, when they're bound to sediments and then they hit the marine environment, they precipitate out into the water column and become dissolved again, so I'm really struggling on the tables, this whole dissolved levels in the river and then the sediments and the build up there. So I just want to understand. Do they remain in solution from that point once they hit the marine environment? What's the process for there, to then come back in the sediments? I might be asking the wrong witness, but I'll ask anyway.

Oldman: There's a lot of chemistry and physical processes that go on, but essentially when metal and sediments are generated within the catchment, some of those metals attach to the sediments, so the chemistry in terms of the electron charges and all that, which I don't pretend to understand, means that a certain portion of all the metals which are generated in the catchment are on the sediments, which we can then model sediments and we're modelling where they end up.

Then there's another process where the metals which are attached to sediments transfer into the poor water, so the water between sediments, and then they go up into the water column, and that transport into the water column depends on the overlying dissolve content of metals as well. So that's the process, and in the metal model we know there's a certain amount of particulate metal which has to be put in, dissolved, and flushed out of the system to calibrate the model. If you just say, "All the metal that's attached to sediments ends up in the sediments," the predictions are going to be way too high. So we're saying, "60% of metals that are generated within the catchment end up in the dissolved form either in the freshwater system or ultimately in the marine system, and then they get moved around in the water column and ultimately flushed out of the system." I hope that answers the question.

McGarry: It's very complex is what you're saying is the answer. So the other 40%, you just said 60%, the other 40% you assume end up in the sediments?

Oldman: That's correct. Yes.

McGarry: Great. That does help. Thank you.

Nightingale: Commissioner Nightingale. Mr Oldman, your model for Te Awarua-o-Porirua, and as I understand it others in the Council team then took that model and applied it to the more dynamic, high energy coastal environment of Te Whanganui-a-Tara. Is that?

[00.05.09]

Oldman: I'm not sure of that process. I mean, I've not been involved in the other marine receiving environment developments here.

Nightingale: It might be something Dr Wilson talks to.

Greer: Dr Greer. No. That's not case. In Te Whanganui-a-Tara some of the Porirua modelling informed the freshwater component of the expert panels and then that freshwater component fed into the marine expert panels, but the modelling that Dr Oldman did, did not factor into that at all. That was all about contaminant loss, it's not how it moves around in coastal environments.

SLR Consulting - Dr Peter Wilson

Wilson: Dr Wilson. Just to add to that a little bit. Potentially where you picked up on that was I did look at some of the changes that were predicted in Porirua to suggest how much change we might expect in Te Whanganui-a-Tara in the absence of any modelling. So there is a very weak relationship there, but it certainly wasn't translated in whole.

Nightingale: Thank you. Commissioner Nightingale. And Dr Wilson, it's *your* evidence, isn't it, that takes Mr Oldman's four scenarios? We've had the 42% reduction in sediment loads to achieve the target rates, and Mr Oldman modelled four scenarios, and then is it *your* evidence that then takes that and says, well what does that actually mean for PC1?

Wilson: Dr Wilson. Yes. Looking at what effects on the ecotoxicology and then translating that through to potential or to targets for sediment metals.

Nightingale: And also sedimentation targets for the coast?

Wilson: Dr Wilson. I didn't look because I didn't deal with sedimentation in my evidence specifically but was involved in those decisions as such.

Nightingale: That was Dr Melidonis? Yes, okay. Any other?

Kake: Kia ora. Commissioner Kake here. I'm trying to find the graph in your evidence, Figure 3 that you had on the screen, just with respect to the peaks, I suppose, for lack of a better word. Trying to see, and I suppose just understand how the modelling took into account some of those climatic events. We've heard a little bit about the intensity of particular rainfall happening over this period of time, so in 2004 we saw quite a significant peak. Are you able to just talk a little bit about that in terms of that graph there and help us understand some of those peaks?

Oldman: Yes. Mr Oldman here. I'll just go back. We're referring to that figure. For the Porirua Whaitua work, we looked at the individual events and also we said we want to run a simulation which was representative of a mean annual low. So by doing that we address, we start to look at how variable is the predicted deposition within the harbour, or one particular event. So you might get one event which might be three days of very intense rain and a huge sediment load, but could be close to the mean annual low, and the predicted patterns that you see for that are quite different. You get that initial deposition near the catchment outlets and then subsequently there's that movement either down into the subtidal basins or to other areas of the harbour.

We're modelling what happens in the long-term to say, "We know it's just not the week after a big event, subsequently a big event like the 2004, it could two or three years for sediment to get back to an equilibrium level within the harbour. So you've got large amounts of new sediment on the intertidal areas, and every time you get a storm event, a wind event, that gets resuspended and moved around. So there's that constant movement of sediment.

[00.10.00]

By running the five different harbour scenarios, not land use, so we've essentially run five different events, and we can then identify that variability within the two arms of the harbour. The model itself is telling us which areas where you're always seeing deposition, if you like, which areas they're transient, and then which areas are generally accreting. So that then feeds into providing that understanding of the two arms as a whole.

I mean, it's been reduced down to a basin-wide deposition rate but the information within the model is there in terms of, where do we see that variability? Where do you want to see an improvement? So the model's there and then that marries in with the observations, which are not basin-wide, so we have spot measurements where we've got actual observations. So it's just building up that understanding of the whole system, if you like.

Kake: Thank you. I think that helped me understand it a little bit better. It kind of comes back again to the question around how this relates to the planning framework, and I'm not sure, Ms O'Callahan, is this a planning question or not but just trying

to perceive where those climatic events, I suppose are captured in these objectives and policies, and making sure that some of these surges are being accounted for somewhere and the modelling identifies that. But it is a numerical evidential basis, I suppose. Just trying to understand how that might link back to some of the narrative objective. [00.12.00] climate change.

Oldman: Mr Oldman here. So that's where the discussion is around, do we look at a five-year running mean versus a ten-year running mean? Because you don't say, "2005 all of a sudden we need to do a whole lot more in the catchment because we've had one big event." We know historically there is that variability and that's when you hand it over to the planners and the science team to say, "On the ground, what does that mean? What do we do? Where do we want to get to in terms of an objective and what can be achieved in the planning space rather than the virtual space models?"

Greer: Dr Greer. Just to comment on how those events are factored into the notified version of PC1 with the load reduction still sited in. The load reductions factor in those events and they form part of the relationship used to calculate the relationship between load and sedimentation rate as well. So they are considered in that component, but obviously then we [00.13.13] those load reductions are no longer in there. But they have been, because they're part of the load reductions, they have also informed the provision development process, so the extent to which lands needs to be retired is based on those load reductions. So they are embedded into the whole PC1 process.

Nightingale: Commissioner Nightingale. As I understand it, not only the load reductions but, I think Mr Oldman you talk about hotspots, so where elevated zinc, copper for instance, where that has been exposed, would that also feed in, Dr Greer, to the provisions? Sorry.

Greer: Sorry about that. It was me.

Nightingale: No, no, no. Sorry, I was just asking if not only the load reductions but the hotspots that have come out for zinc, copper in urban areas, that would have also informed the provisions. Probably more the ones that are in future hearing streams about where land use activities need to change to address those.

Greer: Yes. So anything that was factored into the Whaitua scenario modellings, which included event based sediment loads, were used to inform the provisions that are part of PC1 which are designed to achieve the target attribute space. They're not split out in any way, you can't see how they're managed directly through PC1 but they're just part of the evidence base behind the provisions.

[00.15.00]

Nightingale: Thank you very much, Mr Oldman. That's very helpful. We are obviously over, but I see that we have Dr Wilson in. Sorry you've been waiting some time, but we have you back after lunch, so it might be that we roll.

[00.15.29]

Nightingale: It might be that we cover your marine ecotoxicology evidence after the break, if that's okay? I'm sure we will catch up time, Mr Ruddock. Thank you very much everyone. Have a good lunchbreak and we will be back at 1:30.

[Lunch break taken – 00.15.48 – 00.58.15]

SLR Consulting - Dr Peter Wilson

Nightingale: Kia ora. Welcome back. Dr Wilson, we've read your evidence in chief and your rebuttal evidence. Would you like to go through your two evidence statements one by one, or? We'll leave it over to you how you'd like to present.

Wilson: Fantastic. Thank you. Wait for Josh to pull up my slides. Be just after. Back one.

Ruddock: [00.59.10]

Wilson: Yeah, spot on. That's working now, thank you. I'll start with marine ecotoxicology. We have talked about this a little bit already, but through the Whaitua process, as was identified, it was assumed that any reduction in the catchment sediment loads that were required to meet the sediment accumulation rates in Porirua Harbour, were likely to result in a commensurate increase in sediment metal concentrations. Essentially, if you reduce the amount of sediment going in and left the metals at the same rate, you would end up with a higher concentration of sediment metals in the harbour. So that's where Mr Oldman's modelling came in, and this piece of work that I was involved in, the scope was essentially looking at that topic, around what are the potential ecotoxicological consequences of sediment load reductions without also reducing metals?

[01.00.09]

As I mentioned, Mr Oldman conducted the CREST modelling which he's described fantastically so I don't need to try and stumble through that, but that was where he modelled a number of those scenarios where the sediment reduction occurred, and then looking at different scenarios where metals were either kept the same or reduced to 40% as well to match the amount of sediment reduction.

What the modelling found was that in all scenarios, and by that I mean based on the current state, the current loads of metals and sediment, and then the ones where you've got the reductions in metal loads, all of the concentrations of sediment metals in the harbour are going to increase with the current inputs, and even when you reduce sediment and varied those metal loads.

When looking further into that there were no changes in the ecotoxicological risk to marine fauna, even with those increases. So the increases of sediment metals were generally very small and didn't cross any bands as such, or ecotoxicological thresholds to be more specific. The one caveat to that is in the Onepoto Arm for zinc. The current state value is right at the boundary of a state band, so I haven't really considered that's a meaningful state change, basically I wanted to highlight that one.

Ms O'Callahan has described this morning that I concluded that there are essentially three scenarios that could be chosen based off the findings from the modelling and my interpretation against the ecotoxicological thresholds, and that's to maintain the current sediment metal concentrations, which would require a greater reduction of the metal loads than a sediment reduction load. Then the second one is to maintain the current trajectory, the small increase in

metals over time, and that requires the exact same reduction in metal loads as sediment loads. So in this scenario, if reducing the sediment loads by 40% you should also reduce the metal loads by 40%, and that will continue on a small upwards trajectory of sediment metal concentrations.

The third scenario is maintaining the ecotoxicological risk, which is essentially staying within bands. And although we haven't specifically used bands, we've used numbers which represent the upper end of these bands, and they tie into ecotoxicological thresholds. The ones used in here are from the ANZG guidelines and the top of the B band. So the B, the yellow one there, is the default guideline value, and we were talking about potentially finding some narratives on that as well, and that threshold there is concentrations below, which is a low risk of unacceptable effects occurring.

The C band, so the orange, are concentrations at which there's an increased risk of toxicity related effects occurring, so not guaranteed to be adverse effects but maybe. Then the D band or the highest threshold, which we don't see in any of these results for these mean ones here, are concentrations at which you might expect to observe toxicity related adverse effects. So thankfully we don't see that. Off the top of my head there probably is in some of the 95th percentile results of the modelling.

That sort of concludes my marine ecotoxicology component. Would you like me to proceed with the enterococci slide or would you like to ask some questions about metals to start?

Nightingale: Thank you. I feel like we have covered this already, and you helpfully answered some questions earlier so we might then-

McGarry: Commissioner McGarry. Thanks for your [01.04.50] pretty clear. I guess, in my mind I wonder what those small increases mean for the long-term goal at 2100?

[01.05.05]

Your evidence does kind of address that, but I guess over time we've just got to continue on this trajectory of small increases?

Wilson: Yeah, thank you. Dr Wilson. So in my evidence, as you probably spotted, Figure 1, I believe, I looked at those concentration increases over time, looking at the Onepoto zinc concentrations which are generally the highest concentrations around, and with the worst case scenario where there's a 40% reduction in sediment, but there's no reduction in sediment metals, the next ecotoxicological threshold wouldn't be met until 2089. So that is quite far out. But you're right, at that current trajectory they eventually will exceed ecotoxicological guidelines.

McGarry: I guess this is one for you, Ms O'Callahan. How does that work with the overall goal of reaching Wai Ora in 2011 when we'll have this one, basically we'll move over a threshold, or is this just where we need to focus on the life of this plan and not have our eye to the long-term? Because we're clearly not maintaining there, we would be allowing for a small increase over time.

Greer: Dr Greer. Just while Ms O'Callahan's getting her answer, Mr Oldman might be able to comment on equilibrium concentrations and the fact that it's not an infinitely going up curve.

Oldman: Mr Oldman here. When we talk about those increases over those long timeframes, that tends to be in areas where we've got very low levels of deposition, so the subtidal basins for example, that's where you're going to get that slow increase over time, but near the catchment outlets we're not going to see that significant change at all. So we're saying, around those there will be the increase that we're measuring today. It's not going to get much worse than that, but the zone where that hotspot might increase over time.

It's all about the time scales and this spatial extent of where you're seeing change. So it's not everywhere just going up and up and up. That's the complexity of the metal modelling, that it's all at different timeframes within different parts of the harbour, which I guess from a planning point of view is quite difficult to deal with, but it's not saying we're just on this upward trajectory everywhere to everything being red.

McGarry: Commissioner McGarry. So your modelling, Mr Oldman, doesn't just assume that everything goes in the bucket and stays there, it's that sediment transport that continues to move some off, so there's always some moving out of the hotspots and into the deeper parts, but regardless of that being factored into the model, there's still that small increase. Is that correct?

Oldman: Yes, that's right. And the rate of increase depends on the level of deposition. So where you've got those small levels of deposition, it's going to take decades to get to some significant increase, but as Dr Wilson has said, it's not all going to be red essentially.

Wilson: I might just add. Dr Wilson. The modelling that was conducted and the calculations I've done, or the comparisons I've done, were against that 40% reduction in sediment which, based on the new proposed sedimentation rates, wouldn't be required to meet that. So in essence, the required sediment load reductions would be lower, which also means that the metal accumulations will be smaller. So basically, the effects will be less than what have been assessed in here.

Wratt: Commissioner Wratt. Just definition of ecotoxic. If something's ecotoxic then it's impacting on the growth of the organism or organisms, but it could still be not ecotoxic but still not suitable for human consumption. Is that correct? I guess I'm again going back a bit to the mahinga kai question.

Wilson: Dr Wilson. That's correct. I haven't assessed consumption of food in this assessment.

[01.10.03]

Wratt: Sorry, you're saying you *haven't* assessed consumption?

Wilson: Not for ecotoxic. This is purely the effects of the metal concentrations on this [01.10.11] or the behaviour and survival of the fauna.

Wratt: Thank you.

Greer: Dr Greer. Just to go further on that though. Copper and zinc are generally not toxic to humans when eaten. It's far more common to be deficient in copper and zinc than it is to have internal loads that you're at the point of experiencing your

own toxic effects if you eat contaminated shellfish. Normally when you're talking about flesh testing for mahinga kai species, you're talking about things like DDT, Endrin, organic pesticides more than metals, except obviously mercury, arsenic, those sort of bioaccumulated heavy metals and metalloids.

McGarry: Commissioner McGarry. In a nutshell, we could try, and if it wasn't zero and it remained at the 40% reduction, really what you're saying is you could put a lot of effort in to try and reduce those coming into the freshwater system, and at the end of the day it's not really going to make much difference at all to the marine environment in terms of whether you're affecting critters, and in fact we could take that a bit further and say, it's not really going to even accumulate at a much greater rate than doing nothing. And that's the decision for us, isn't it? Do nothing or do this.

Wilson: Dr Wilson. Yes, that's correct. I've noted in my evidence that a likely scenario, if you were to reduce the sediment load by 40%, you'll probably get somewhere under 15% reduction in metals just because of those associated being bound, which is fortunate because removing dissolved metals themselves is really, really difficult to do. So if we had to target and remove those over and above it's a really hard thing to achieve.

Nightingale: Commissioner Nightingale. Dr Wilson, in your evidence in chief at paragraph 26, the bottom of page 9, I just want to just ask you about that, the last part of that sentence. You talk about, "Metal load reductions for Porirua that do not allow for an increase in risk from current but also do not require reductions beyond what is necessary to achieve the PC1 coastal objectives." Initially, this was a while ago when I first read this, I had made a note here for myself, "Why not do more than what is necessary to achieve the PC1 coastal objectives?" But since then a better understanding of cost and achievability and feasibility. But are you also saying that, because the ecotoxicological effects are such that it's actually not necessary from that perspective either?

Wilson: Dr Wilson. Yes, essentially. I mean you can see from the table that's presented in my presentation there, the guidelines are generally in green. Certainly copper is presenting no risk to fauna so certainly not worthy of spending any time or effort, I would suggest. Then zinc is potentially on the edge of being problematic in the Onepoto, but yes, the level of effort to deal with that specifically is probably quite significant, and whether that's something to prioritise. I mean, it's not for me really to determine.

I guess that not requiring reductions beyond what's necessary is applying that level of pragmatism. If you came from a purely science perspective I'd probably say everything should be in the green, but there are other practicalities around that, and you can't remove those metals from the sediment. You kind of have to reduce inputs and wait for that to decrease over quite a long period of time.

[01.15.00]

Nightingale: Thank you. I know we're looking here at the coast but it's very different in riverine environments, isn't it? Especially in the urban catchments these metals… Am I recalling that correctly? We definitely want reductions going into freshwater bodies of these metals.

Greer: Dr Greer. Yes, there are some urban streams that require reductions in copper and/or zinc concentrations to meet their Target Attribute States. But not so much in the Porirua catchment though based on the current state assessment provided in my statement.

Nightingale: So the ecotoxicological impacts there, they're different. They effect the fish and the environment in the freshwater body environments differently, to the point that, yes, we want to address them.

Greer: I'm not a coastal scientist so making that comparison is difficult, but no. Metals in freshwater bind to sediment and effect benthic invertebrates in the same way as they do in the coast, and dissolved concentrations of copper and zinc have direct effects on animals that live in the water column in the coastal environment the same way that they do in the freshwater. I believe there was a, the differences in the ease of measuring the two is potentially why they've chosen different approaches.

Wilson: Dr Wilson. I'd like to point out that the sediment metal concentration guidelines are exactly the same. They are the same ones used in marine and freshwater. They don't differentiate those. And in part just there, is a lot less ecotoxicological information on sediment metals on fauna, and so when you're looking at these thresholds they've actually looked at the effects of them on a range of species that include those from the marine and freshwater environments, so they're relatively conservative guidelines as well.

O'Callahan: Can I just respond to one thing just to make sure; it's on the mind. We're dealing with here, these metals, a risk arising from some environmental improvement from the sediment reduction, so we're dealing directly with the risk of activities that generate these metals. So the evidence bar to be able to have to regulate those activities that do generate the metals to compensate for the fact that we're regulating to reduce the sediment, in my mind that needs to be a higher bar as well. So I think it's just keeping that we're not dealing with the direct effects of the metal polluting activities, we're dealing with the impacts of reducing the sediments in the system.

Nightingale: Commissioner Nightingale. I was just checking. I guess a fundamental point I just wanted to check is, there is still very much a need to reduce metals in freshwater environments?

Wilson: Dr Wilson. Yes, that's correct. It's just, I guess, now there's a bit more focus on the marine environment because you get that deposition and retention of sediment, so the problem lasts longer generally in marine environments than in a freshwater environment with sediment metals.

Greer: Dr Greer. So there is no need to reduce metals to the extremes in the Porirua catchment. They are all currently meeting their Target Attribute States.

McGarry: Commissioner McGarry. Just if we could maybe come to sort of practical thinking about, say the hotspot at Porirua Stream outlet there where you see quite high levels of copper and zinc in a deposition zone. Under PC1 that won't change, will it? In fact, it will just slightly increase over time. Is that correct?

Wilson: Dr Wilson. Based on Dr Greer's response that no reduction from the rivers is required.

[01.20.00]

That's correct; however I understand there would be implications for the wastewater network and the stormwater discharges which similarly contribute zinc and copper into that environment. So improving the quality of quality of stormwater discharges and then you're sort of crosslinking in contamination that way, similarly, should result in improvements.

O'Callahan: That's just not reflected in the objectives specifically, that's reflected in the rules and the policies that require the addressing of localised effects, and the fact that both the operative plan and this plan are getting those network discharges onto a consenting platform. In the past there was no consents for any stormwater in Wellington. They've come into this consenting regime in the NRP and then that's further enhanced through the rules and provisions, and where we need them, the target attribute stats for the rivers.

McGarry: Commissioner McGarry. Understood. We've had quite a discussion over that at lunch. It is taking this, sort of the table... You've had a long time to separate these things out in your mind between State of the Environment monitoring and those where the object is where the rubber will hit the road in a consenting framework with localised effect.

O'Callahan: I've taken way longer than you guys. Don't worry.

McGarry: Because you said this morning about, "Localised effects would be dealt to through Section 107," and I nearly asked you another question about that, and then as I've reflected on that, that's because from where you're coming from, in the future all of these point source discharges, including stormwater outlets, will have consents and therefore Section 107 will be applicable, whereas in the past I was sort of thinking, 'Not every discharge point will go through a 107 assessment.' But it will in the future.

O'Callahan: It has already. But the information… Well, how have they gone through already? I don't know how they've passed Section 107 already, because the whole point of the first stage of these global consents was to effect the information in order to undertake the Section 107 process. They've given them a consent to get them in a platform where they can then collect the information and then understand what they actually need to improve for their long-term consent.

There's legislation and all these kind of policies which often in the real world don't necessarily work. The first thing you've got to do is get people into the system.

McGarry: Commissioner McGarry. So bear with us, we're very much alive to trying to keep our heads around those that are State of the Environment type level, and those that will be addressed more as a localised effect on a consent by consent basis. And I guess this morning's discussion's been good for all of us, because we've probably put things like the phytoplankton bloom risk, mahinga kai, and some of those things that can only really be addressed on a more localised matter and not on an estuary-wide basis.

O'Callahan: Potentially. Yes.

Nightingale: I think we're probably ready to move onto your second topic. Thank you.

O'Callahan: I think I've already addressed what I was going to address on this.

Wilson: Dr Wilson. I will just skip over those two slides, which are the new Table 8.1A and 9.1A, which introduced enterococci targets for those specific recreation sites. I'll just talk in general to my summary slide.

The human contact. It's informed by the Ministry for the Environment and Ministry of Health, Recreational Water Quality Guidelines. So since the proposed PC1 we've included the current state for all of the recreation sites that are monitored by Greater Wellington Regional Council. And for each of these recreational sites I have recommended that having an objective of less than 500 enterococci per 100mL is appropriate. It's appropriate for any site that's used for contact recreation.

The lower the concentration of enterococci, the lower the risk of gastrointestinal and respiratory illness.

[01.24.58]

We have applied a level of pragmatism to this as well because with a similar line to the metal discussion, if you're coming from a pure public health or personal risk thing, you would say, "Everything should be as low as possible," but there are the complicating matters. So in applying the pragmatism we've looked at sites were higher targets are required, and as I've mentioned, these are still considered suitable for swimming.

If you look at the LAWA website for example, where all the information's published, where there is a value of less than 500 enterococci per 100mL it's created a long-term grade of fair, and then the ones below that are sort of good and very good. So that's where I gain the information of considered suitable for recreation.

As I've also discussed a little bit today, Ms O'Callahan has provided her recommendation for a number of sites where substantial reductions would be required to meet 500 enterococci per mL is at 50% improvement, and it's I think just to recognise the low likelihood of being able to reach that by 2040. There was discussion around whether the timeframe could be moved out or whether the value is changed. From my perspective, it's not really a science issue as such. It takes into account the economic constraints and logistical constraints at those sites. So in part these can be sort of interim measures and further improvements sought in subsequent plans. I just flag that the numbers saying a 50% improvement towards a 500 target isn't directly linked to those human health outcomes like those other values of, say, less than 200 or less than 500 enterococci.

There was a submission recommended that lower targets were recommended for Wai Tai in open coast sites, and in general you would expect the open coast to have better water quality, however the recreational sites included in the Greater Wellington Regional Council's monitoring programmes are those located sort of in the open coast that they measure, are located generally at the mouth of

estuaries or near the mouth of estuaries, or in little urban embayments that are sort of exposed to wastewater discharges.. So I didn't think it was appropriate to apply such conservative targets to those and generally the 200 was appropriate for those.

I note that Commissioner McGarry made some queries about faecal coliforms earlier today, and I'm probably anticipating a few more questions around that, but my recommendation was to *not* include that due to its low reliability as I'd mentioned, but I am happy to talk about that more if any questions come up. Thank you.

Wratt: Commissioner Wratt. Can I ask you to expand on the low reliability of the faecal coliforms?

Wilson: Dr Wilson. Yes. Give me one second please to find that place in my evidence. My evidence, paragraph 38, I noted, "The reliability of faecal coliforms as an indicator of the suitability of shellfish gathering has been questioned over time." And that report that I mentioned, it was commissioned by MfE but it was prepared by staff from NIWA, Landcare Research, Cawthron Institute and Environet, concluded that while faecal indicated bacteria, while faecal coliforms provide valuable information about contamination, the link to the quality of the shellfish and its actual suitability for consumption is very low. The link between the faecal coliforms in the water and the pathogens in the flesh didn't relate very well together and so it wasn't a good indicator of whether it would be suitable to eat or not.

The other point I guess I'd like to make, is that faecal coliforms is a really massive group of bacteria, and within faecal coliforms is E. coli, which is one species. Enterococci are a whole other family of bacteria. It's another group that sits over here that are generally measured in the ocean because they don't die off to salt water as quickly as E. coli so provide better indicators. But basically the Recreational Water Quality Guideline for the suitability for shellfish gathering is really, really low and conservative. It's a median value of 14 faecal coliforms per 100mL, and as you see, we're struggling to get to 200 enterococci, which is equivalent to about 500 E. coli in that risk type approach.

So the requirement of applying that to locations is probably quite difficult as well to meet that, which when you're applying that pragmatic approach of, if it's a lot of effort to do that but it's also unreliable, is it kind of worth it?

[01.30.09]

Wratt: Commissioner Wratt. I guess the assumption is that there's no other suitable measure.

Wilson: Dr Wilson. No unfortunately, and I'm not aware of any other Regional Council plan, or any coastal plan applying a different approach. There may be some that have the 14 applied in certain locations but we don't have any national guidance on better indicators for that.

As I've mentioned in my evidence, MPI are also involved in shellfish gathering and they have their surveillance programmes where they're monitoring for algae which might indicate that there are paralytic shellfish poison producing species around. So they have that surveillance programme around, and you might see in

the news that every summer there's usually somewhere where they put bans or suggest you don't collect shellfish from there, because there's a high chance that you would get shellfish paralytic poison from there.

I guess, where I was getting to, is that the food safety part is a bit of a shared responsibility between the agencies as well. It's not, I think, solely sitting with Regional Councils.

McGarry: Commissioner McGarry. It's a bit of a gap, isn't it, is what you're telling us?

Wilson: Dr Wilson. Yes, unfortunately so. I mean there's a big gap in the science at the moment about what we could measure to reliably indicate whether the shellfish are safe for consumption.

McGarry: But there's also a gap. Because what you're saying, I mean looking at the numbers in the current environment, what you're saying is, the current way that we're living and developing and discharging into freshwater and marine environments, no matter what, we probably would never get there, would we? To some kind of limit where you could harvest shellfish.

Wilson: Dr Wilson. I mean my understanding is there are, I'm more familiar with the Waikato Region where I grew up in and looked after the Coastal Recreational Programme there. There were locations that had higher levels of faecal bacteria, for example, for swimming, and there were shellfish populations around and we're not aware of complaints of people eating them, for example. That's very anecdotal, but I think it just comes down to that low understanding and relationship between what's in the water, what ends up in the shellfish flesh, and what could actually make someone sick. I think it's just a bit complex.

Greer: There's a potentially more relevant issue for food gathering in the urban areas, and that is probably regardless of the concentration of E. coli or faecal coliforms. These areas are impacted by wastewater overflows, so they are contaminated by raw sewage. Not across the entirety of the harbour, I understand, but particularly in front of Porirua City itself. Porirua Stream has hundreds of overflows a year, that then goes back up into that area. So potentially assigning a target value for the value of collecting shellfish, may not actually capture the true risk itself.

McGarry: So again, just trying to understand this link between the State of the Environment and, I guess the gap would be filled during a consent process, that if you had an outfall where your point of discharge is, if there were mahinga kai, shellfish gathering beds, or some other kind of food gathering site, then you'd have to do your assessment of your contribution, I guess looking at the background receiving environment, and what the change is.

Because again, it comes back to the narrative. I'm just checking back again to that narrative, which was really about the diversity, abundance, composition, structure, condition of mahinga kai species. Again, this one has increased. Am I right, Ms O'Callahan, that that's where those…? As I say, there's a gap there, isn't it? We're not managing for food harvest or collecting.

[01.34.58]

We haven't got an outcome there. So I go back to this narrative one, and then I think, 'Will that only be applied on a case-by-case basis?'

O'Callahan: Mary O'Callahan here. Are you talking about the likes of WHO.1 and P.O1? O3 sorry.

Wilson: Dr Wilson. If I may just jump in as well. If I was, for example, assisting a client in applying for a discharge consent, we certainly would be looking at that receiving environment, and if mahinga kai species were in there, we would have to demonstrate that we were avoiding adverse effects on them. They would essentially fall under sensitive species or high value species, sorry.

McGarry: So in essence, that would just come under the normal consenting requirements under the RMA, so Section 107 or whatever.

Wilson: In part, that's my understanding. I mean, I'm not actually aware of having to demonstrate that you would not be… I've never considered the consumption part, but then generally it's because we're not dealing with discharges with E. coli. Primarily it's usually stormwater discharges which aren't affecting them in that way.

O'Callahan: Did you want a response from me on that one? Let's look at Porirua, check the wording there. It's seeking to, "Achieve the coastal water objectives, and by 2040 the diversity, abundance and condition of mahinga kai has increased, so mana whenua have access to healthy mahinga kai." That is, I guess a narrative outcome, and whether these objectives will actually, or the other objectives will deliver that, or how that's going to be achieved, I haven't really turned my mind to specifically.

But I guess if you were dealing with a consent situation and it was going to have an adverse effect on mahinga kai, they wouldn't be able to identify that it had an increase, so there might be an opportunity for maybe supporting that through some sort of an offset or something if it couldn't be done in the particular location, if that wasn't a great location for that, or it might be somewhere else. But I guess a project that had adverse effects on any existing mahinga kai would be unable to meet the requirement for increasing conditions.

Greer: Dr Greer. If I can just add to that. I don't think that that objective in itself actually covers 'safe to consume.' The populations of the mahinga kai species could be improved and made more healthy without necessarily making them safer to eat, or safe?

O'Callahan: Safer. [01.38.18]

Greer: They are a bit different. I think it's probably (g) or some other clause in here which potentially is more relevant for the safe to eat side of the equation.

Wratt: Commissioner Wratt. What about objective PO.3(h) which talks about, "Mana whenua and communities can safely," blah blah blah, "including food gathering."

O'Callahan: Mary O'Callahan. I think in another place where that was addressed I have edited it to say, "More safely," but this is probably, well this is possibly an opportunity to fix that here. I think that was on maybe W.O2? I don't know. I feel like I've done it soonish. It looks like I've done that on WH.02 but I haven't

on P.O2 for some reason. They're different. There were different issues, and the submissions were different, but I can have a look at that throughout.

[01.39.48]

O'Callahan: Well, yes. I mean, what we're going to want to apply, it's a two-edged sword really.

[01.39.59]

If we're not going to get to be able to achieve safe, then we shouldn't be setting an objective for that, and it does sound quite a risk for Council to be suggesting that they're going to get to that, given that we haven't got any provisions or targets directed it.

Greer: Dr Greer. Yes, collecting shellfish near raw wastewater is unlikely to ever be safe until that raw wastewater is removed in its entirety.

McGarry: Commissioner McGarry. It probably holds true for stormwater outfalls too.

Greer: If that stormwater is heavily contaminated by wastewater, yes.

McGarry: Commissioner McGarry. Because even with (c) that's quite a problem isn't it? I mean, this is why we keep sort of trying to theoretically apply some of this theory to a situation, because if I was an applicant, I don't know how you would get through (c) either, increased. The [01.41.01] in communities has increased. I mean, it doesn't even say it's provided for or the contribution, it's just a very, increased.

Wilson: Dr Wilson. Can I just clarify that when you talk about faecal bacteria, generally that isn't particularly adverse to shellfish or mahinga kai, it is a risk to people interacting with water and potentially consuming the shellfish. I understand you might be talking about other components as well but just wanted to clarify that.

Kake: Commissioner Kake here. I've been thinking about this one too quite a bit, maybe at night. And if again you take a step back and look at the wider environment of these harbours and what the objectives are essentially trying to achieve, there will be these localised areas that will be assessed through the consenting regime, and just acknowledge the triggers, I suppose, that exist in the plan.

I think, just stepping it out with respect to the schedules in particular for mana whenua, and how these can be assessed still, through the consenting regime that is provided for through the plan to an extent with respect to activities that will go through a 104 process. But going back to the concept of mahinga kai and where it originated from, the concept under the NPS is a lot broader than just having these kaimoana, these species, being abundant in these particular locations. It's the broader aspect and the holistical concept of having a mahinga kai provided for.

So if I see that in the objective, it is steering towards that wider outcome. In my view, that's how I'm interpreting it, I suppose. That may differ from a mana whenua perspective, and I'm not going to speak on their behalf, but I suppose that's the dilemma we've got to deal with as the panel. I'm not sure if that helps. It's not really a question, I suppose, it's just a statement of my view. And just

trying to understand how these narratives in the objectives, in particular PO.3, WH.O3, sit with respect to the tables. Thanks.

Kake: I think there is just one quick question sorry, while we're on entero… Are we on enterocoroc? What's it called? That one. There is a question raised in the submission from Ngāti Toa, just with respect to the plain English definition, and I think you've answered it quite well in your rebuttal. So the concept of enterocorocdomines. Sorry, I'm not saying it right.

Wilson: Enterococci.

Kake: Okay cool. That thing. It's made up of all these other things, right?

Wilson: That's a small group of bacteria. It's a number of bacteria.

Kake: Okay. And that's bad.

[01.45.00]

Wilson: Yeah. They are used as indicators, so like E. coli they're sort of equivalents. They're indicators, so they themselves don't necessarily make you sick but we measure them because when they are present, typically other pathogens, things that can make us sick, are present. Because it's really expensive and difficult to measure the exact things that would make us sick, like giardia and cryptosporidium, those kind of things. They're fairly good indicators but they're not perfect. Sums up a lot of things.

Kake: Just a quick one then. So on that, fairly good but not perfect, is that why enterococci has been taken out of 9.1? The table 9.1?

Wilson: Dr Wilson. No, that's been pulled out into 9.1(a), so it's been applied specifically to sites rather than [01.46.00].

Kake: Sorry, there's another table. Thank you.

Wilson: No, that's fine.

Nightingale: Commissioner Nightingale. Dr Wilson, do you know, I'm looking at the "Enterococci is a problem in Te Awarua-o-Porirua." I'm looking at Table 9.1(a). Are there wastewater discharge points, in particular the Waka Ama levels, the waterski club, rowing club, are very high, and that 50% improvement target. Is that improvement towards meeting 500? So the target is 50% of 2,680 in terms of the Waka Ama is my understanding of that.

Wilson: Dr Wilson. Yes, we toyed with a few different approaches for figuring out what to do with these sites that would require a really substantial reduction, and we had proposed potentially just larger numbers, but as I've mentioned, they don't link back directly to human health outcomes and so essentially I made it difficult it put it onto Ms O'Callahan as to how to address that.

Nightingale: So sorry, I interrupted my own question. Do you know if there's a wastewater outfall near that Waka Ama?

Wilson: I'll leave that to Dr Greer. He's a bit more familiar with that location, if that's okay.

Greer: Dr Greer. Big time. Yes. I believe that into the Porirua Stream itself over the 10 years assessed in my rebuttal evidence, it received close to 8,000 wastewater overflows.

Nightingale: Right, yes.

[01.47.56]: For how many years?

Greer: 10. I don't even think that considers the direct to coastlines along that alternate shore. That's the ones that goes to Porirua Stream which discharges nearby the Waka, which goes back up into the arm of the Onepoto near the Waka Ama.

Nightingale: Commissioner Nightingale again. So the commensurate point again. We looked at it with stormwater, so I just want to understand this in terms of the wastewater rule. And actually, sorry I've turned to [01.48.31-01.49.33].

Greer: Dr Greer. Mr Oldman, Dr Wilson and myself have all actually worked on this through rebuttals. Mr Oldman has modelled the freshwater load reductions that are required to achieve the E. coli TAS and their effect on the coastal enterococci targets, and the output of that was that the 92% reduction required to achieve the notified TAS for the Porirua Stream was insufficient to achieve the notified coastal objective for the Waka Ama site.

[01.50.15]

I can't remember by what extent, but to get halfway there would presumably be around 45 to 50% of the E. Coli load, but I'm not entirely sure of the shortfall between what the E. coli TAS does compared to what is needed to achieve the-

Wilson: Dr Wilson. I have that here. The TAS scenario, I believe was a 92% reduction, and the other reduction's around 60% required to get there.

McGarry: Commissioner McGarry. Is it too simplistic to think, having visited that site and heard about the overflows and seen the big tank that's been built there, is it too simplistic to think that that would require about a halving in number of overflows to the river, or is that just too simplistic?

Wilson: Dr Wilson. The reductions I'm talking about are purely based off the current state, so the 95th percentile. All of the measurements they've made over the last five years at that site. I guess something that's useful to point out, is it doesn't mean that that site is always unsuitable for swimming. Over the last five years from all the samples collected, the Waka Ama site was suitable for swimming, so it would have had enterococci concentrations of less than 280 which is the single sample number that they use, so different to the long-term targets we're using, so 62% of the time that site was suitable for swimming. That just demonstrates at those sites specifically, is when they exceed the limits they really exceed the limits, which is what pushes that 95th percentile number really, really high.

In saying that, the Waka Ama site had the lowest number of samples suitable to swim out of all the monitored sites. The rowing club, as you've mentioned, similarly has high enterococci concentrations, but it was suitable for swimming

78% of the time. So you can see how these really high exceedances, these wastewater overflows, really, really affect those statistics and its mobility.

Greer: Dr Greer. I can actually provide the actions that would have been considered by the economists and their analysis. If you would like to achieve that 60% reduction it would be reduced overflows by 60% and reduce dry weather leaks by 77%, or the alternative is to remove all overflows. Reduce overflows by 60%. and reduce dry weather leaks by 77% or remove all overflows. And that scenario has been assessed as the lower option for the Porirua TAS, the MRI option for the Porirua TAS by David Walker.

McGarry: Commissioner McGarry. Obviously, the building of the big storage tank is going to help to some degree, so us questioning Porirua City Council about what their expectations of an action like that, would be helpful to give us an idea of how far along the road that would take them towards that target you've just suggested.

Greer: Yes, certainly. I don't think the Regional Council can provide that information, so it'll be good for them to do it.

McGarry: Thank you. Commissioner McGarry. Back to you, Dr Wilson. Just to understand what you said earlier on, and I think it was actually this morning and not on here, you were talking about the gap between the 200 and the 500, and that's really just because you've used known values of the risk at those two points, and without doing a QMRA Assessment, that's kind of as good as it gets. Is that correct?

Wilson: Dr Wilson. One second please.

[01.55.00]

It's in part the general approach that I've taken, I guess with the metals as well. So essentially there are bands provided. We haven't listed bands as such, we've always listed that upper part, upper threshold of the band, but the values used, 200 and 500, are directly from the Recreational Water Quality Guidelines and they are the thresholds and the groupings that they have. So at a concentration, enterococci, like the long-term one of 200, that's where there's an estimated gastrointestinal illness of 5%. And then when you go up to 500 enterococci per 100mL, there's up to a 10% risk for gastrointestinal illness. So that's where those numbers link up with the risk.

McGarry: In terms of doing a QMR type assessment, that's something you more likely would see when the operator would be applying for a consent for a point source discharge, and they would do some virus testing presumably and then give you that kind of assessment, so you'd know more about the risk than just reading off a table, "This is a number. This is the associated risk." Is that right?

Wilson: Dr Wilson. Yes, that's correct. Although, I'm not familiar with conducting those assessments myself, I have been involved in projects, and the assessment men have come through. Yeah, they're certainly using the application for discharge, and it usually is a way of getting around the issue where sometimes the indicators are only fairly good but not perfect, so those QMRA type assessments provide a more specific risk profile to the likely risk to people, because it is targeting on those actual pathogens, the actual components that would make you sick, not just relying on these broader indicators.

Oldman: Mr Oldman here. That's the process that we did for [01.57.02] and water for the Tītahi discharge. Basically, we provide modelled concentrations and then they did the QMRA on top of that, so measured actual pathogens to find the public health risk for contact, recreation, shellfish gathering. So definitely a process that has happened.

Nightingale: I think, Dr Wilson, that objective P.O3 talks about this objective of having sediment and metal loads entering the harbour arm catchments being significantly reduced. So, based on my understanding of your evidence and also Table 9.1, the copper and zinc in sediment, and as you've explained, it's already quite low and the targets are all higher than current state so it might be more a question for Ms O'Callahan, but is that a problem?

Sorry I can repeat the question. Is that a problem in terms of having an objective that requires metal loads entering Porirua Harbour catchments to be significantly reduced when the targets are saying that, well the targets are in every instance, I think, lower than baseline.

Wilson: Dr Wilson. I can jump in quickly first. Even with that reduction in sediment loads, and then you get with that some reduction in the metal loads, there will still be a reduction under the proposed changes. Even with the reducing loading we are still seeing increased concentrations of sediment metals. So, I guess that's just making sure we clarify the difference between the loading, the sediment, and the metal loading, versus the concentrations in the sediment. But also to Ms O'Callahan to add a comment as well.

O'Callahan: I think that's a good question, good observation. I think that needs to change to just refer to the sediment, because I think it's confusing, because that's the change that's been made is that I've recommended that the metal loads reaching the harbour don't need to reduce.

[02.00.13]

Nightingale: And that wording is not at Te Whanganui-a-Tara, and that's supported by the evidence we've heard.

O'Callahan: Yes. Thank you.

McGarry: Which clause is that [02.00.24]?

O'Callahan: (a) in PO.3.

Nightingale: Commissioner Nightingale again. We don't want to lose that from the freshwater bodies based on what Dr Greer has said. So we do want them significantly reduced from freshwater bodies, right?

O'Callahan: That's dealt with in the freshwater objectives, so it really is just the, "…and metal loads," that needs to come out.

Nightingale: Those are all questions we had for you, Dr Wilson. Thank you very much for your evidence and your patience, because we've taking… Are we up two lakes now? Are we up to Issue 9 with Ms O'Callahan? Have we finished everything

in coastal? I see Dr Melidonis here as well. It's been a very interesting discussion today about coastal.

I think we have all of the scientists in here, but is it your collective view, if I can ask, whether Ms O'Callahan's recommendations for the coastal objectives and including in the tables, are those recommendations going to see these coastal areas and the two Whaitua, the coastal water quality, health and wellbeing, ecosystems, habitats, maintained or improved where deteriorated? Do you think where we've got to in terms of Ms O'Callahan's latest recommendations, do you think that they are going to achieve these objectives?

Wilson: Dr Wilson speaking. With ecosystem health, I guess metals is of relevance more so than enterococci.

[02.02.34]

Wilson: Of course. With metals, as I've discussed, the ecotoxicological risk from them have been shown to be very low and very few changes based on any of the scenarios. So yes, I do agree that the provisions in place are setting things up to support ecosystem health from the metals, sediment metals front, I'll hand over to Dr Melidonis to cover the rest of the ecosystem health topics.

Melidonis: Dr Melidonis. In terms of ecological health, the sediment rate objectives should go far enough in improving ecological health within Porirua Harbour. Previously I mentioned a zero percent load reduction required, but that's under the 2004-14 modelled scenario. So when we look at the current sedimentation rate there is a load reduction required for Onepoto Arm, and that should go quite a way in improving ecological health.

In terms of sediment metals, we spoke about other mechanisms. Improving ecological health at point source outfalls and not so much of a concern across the inlets. In terms of nutrients, that generally isn't a problem within many of the coastal environments around our region. So I'm happy in that respect.

Then we didn't really have a chance to discuss the macroinvertebrates. Just bringing that topic up again. There's a range of different species you can monitor and a range of different habitats when we're talking broadly about coastal. So that could include benthic macrofauna and sediment habitats. It could include intertidal reef, rocky reef and sandy beaches etc.

[02.05.03]

The reason for that being a narrative is because it's a wide range of different habitats in a wide range of different ecosystems that can be monitored, and also with different measures. So there's quite a few different measures that can be used to assess the health of those communities.

Most common for estuaries being Traits Based Index or TBI. That's not necessarily applicable to the open coast, so it's quite a complicated matter. And being in a narrative it's more open to interpretation than specifying something in a table that's only applicable to estuaries. But yes, I do believe that the objectives all result in improvement of ecological health in the coast.

[02.06.19]

McGarry: Ms O'Callahan, it's one for you really. You talked about the words in Objective WH.O3 and I'm looking at P.O3. It came up this morning, I think, with Dr Melidonis, about the coastal areas not covered by the table, and it was about the open coast versus the harbour type environment. But I think those words, they're a problem from another perspective, aren't they? Because, in my mind I've been thinking, the narrative deals with these things and here it is here, but then it says, "For the coastal areas not covered by Table 9.1." I would have thought the factors in those three bullet points are the narrative for all of the areas.

O'Callahan: Yes, that was a point that I made probably before you got your head around this stuff, in that I need to redraft this.

McGarry: So I just wanted to make sure, because I thought when you talked about that, it was just more of the open coast split versus the inner waters, but you're onto that bigger issue.

O'Callahan: Well no. It's the open coast versus the open coast plus more areas. That was what I was trying to understand. And I think, well perhaps it would be helpful if Dr Melidonis just confirmed for the record that we've got essentially four measures there. We've got fish communities and benthic and they're in the first bullet point, we've got nuisance macroalgal blooms, and we've got phytoplankton. Just thinking about the environments of harbours, estuaries and open coasts, which ones apply to each of those, perhaps of the four metrics that we've got here?

Melidonis: Dr Melidonis. Those measures can be applied to all three areas of the coastal environment, so estuaries, harbours and open coast. The reason they are narrative is because each individual location needs to be assessed in terms of the structure and functioning of the area in order to determine which ones would be most appropriate. But yes, they are applicable across all three ecosystem types.

O'Callahan: So I can probably redraft that to either just remove the areas not covered by or just make them all separate points or something. So there's just some redrafting needed there. It could be simple, or I could try and make it a bit more kind of finessed.

Melidonis: Dr Melidonis. Just one other thing to note on the record. That perhaps it might be useful to remove the word 'benthic' from the invertebrates, because thinking about it now, that might exclude intertidal. So perhaps inserting the word 'intertidal and benthic.' I will confer with Ms O'Callahan in terms of how best to reword that. Thank you.

[02.10.00]

O'Callahan: While I've got the microphone, if I can just correct what I was previously saying about clause (h) about, "Mana whenua and communities can safely use." I suggested maybe that 'more safely' needs to go in there. That possibly the reason I haven't put it in there is because it's actually seeking that for a wider range of activities. Some of those activities will be safe for, probably as a result, the ones that don't require the actual primary contact like the paddling or something, perhaps. I can have another look at that and confer if we need to add the 'more' into it, or whether that's okay.

I think probably just the other point to make is that we're not envisaging any new wastewater discharges through this plan change, and in fact they're not possible even under the current NRP. There's really only improvements envisaged here in terms of those core bacterial type discharges. Like I think I was saying yesterday at some point, there is no pathway for new discharges of E. coli in the operative plan, and I'm pretty sure it hasn't been enabled through this one, although I haven't particularly studied the provisions with that in mind.

There's always been in the NRP a desire to transition to land. I'm not sure, I haven't really studied those provisions particularly here and obviously land based isn't something that's been contemplated for this region as I understand it, these Whaitua, but certainly in other parts of the region there's a focus on that. But these are big, offshore, even treatment plant discharges. I'm just pointing out that it will get better. There won't be examples, as Commissioner McGarry suggested of, how would someone's discharge pass that increase. It's intended not to, because it's not supposed to be coming through particularly.

McGarry: Commissioner McGarry. So I guess [02.12.24] is working from the top of the country to the bottom of the country, but the desire's to go to land or everywhere? It doesn't seem to be.

O'Callahan: No, I don't think that's been specifically sorted.

McGarry: No.

O'Callahan: But there may be some moving around of some of these discharges potentially, because that's probably something that the infrastructure providers might be able to do. They might be able to move the outfall to somewhere that's less sensitive. And I think the intention was not to have that really strict, no new discharge policy, because it actually prevents the prioritisation of where you're actually wanting to get it out of. But that's something you'll need to take up in the wastewater topic with the author for that topic presumably will be across that stuff more than me. I'm not thinking about that detail in my work.

Nightingale: Commissioner Nightingale. Thank you very much to the coastal team. Really appreciated you taking us through your evidence so thoroughly. Helping us with all of our questions. I think we moved to Issue 9. Thank you, Ms O'Callahan.

Greater Wellington Regional Council – Mary O'Callahan

O'Callahan: Do you want to just move that. Should be the next slide. Yes, that's it. No, the previous one. We're now onto the lakes. We're in Te Whanganui-a-Tara. The only lakes are in Te Whanganui-a-Tara, and this is an objective with both narrative content and a table of targets.

There were limited submissions on this particular provision, but we have got, where's my drafting? A proposal.

[02.15.00]

I've recommended removing clauses (b) and (c). That's because they were duplicate of the submerged plants TAS included in Table 8.1. That was (b) predominantly. Now (c), I'm probably going to have to go back to my… Sorry, I'm ahead on this. My concern with (c), and there was submissions on this, was

that it was really getting into the realm of the Department of Conservation's responsibilities, which are to ensure that… The Regional Council's responsibilities are about providing the environment for the indigenous biodiversity to thrive in. The actual protection of the fauna itself is a Department of Conservation responsibility. So that one seemed to be getting beyond the role and realm of a Regional Plan to achieve that as an objective.

The next one is the targets for the dissolved oxygen here. It is one of these ones with insufficient data. Here the recommendation has been to remove the A state targets and replace it with a maintenance requirement. These lakes are within, it's my understanding they're a partnership programme between mana whenua and the Council, and its Council reserve land, regional park land they're contained within, so there's not particular activities that are expected to be being impacting by that attribute.

The next one is some drafting amendments to refer to where targets are not met, rather than the reference to degraded here. This is just adopting the language used same as the Target Attribute State provisions for the rivers. Then I think there are some catchment farm areas, and Federated Farmers had a submission seeking to understand how much riparian vegetation was expected around that lake, so I've conferred with one of the Council. It was [02.18.26].

[02.18.29]: Just see. Make sure it's right. [02.18.30]

O'Callahan: The Council's lake's scientist. He hasn't presented evidence. It didn't really seem essential, but the advice was that 20 metres is what you're looking for in riparian planting, so I've just recommended that. My understanding is that's going to be within the regional park land, and there's just a bit of… Other than where physical constraints, because there's parts where the lakes get very close to like rocky shores and paths and stuff so there'll be some places where it's not achievable. That's my understanding, there's a programme to be planting that lake around the riparian area is already underway. So that's the basis of the lakes' objectives.

Dr. Greer, are you talking on this as well?

Greer: I do.

O'Callahan: You do? Yes. Did you want any questions for me, or would you like to hear from Dr Greer first?

McGarry: Commissioner McGarry. Your words here I quite like in (d), and I hadn't picked up on them earlier. I still have this concern about the modelling basically assuming that all riparian planting will be done wherever it's physically possible, and I was debating with you whether there was a difference between practical and possible, and then I see this wording here and think, 'Isn't that what we're trying to achieve?

[02.20.00]

Where physical constraints would prevent it, other than that. I'm on the rivers now obviously, but I'm just wondering, is there a reason why that wording wouldn't be suitable in place of those other objectives instead of 'where practicable' or 'where possible'? It's being a little bit more, where physically.

O'Callahan: Certainly happy to have a look at those other ones. This is obviously a more recent wording that I've come up with from having an understanding of the specific. When the scientist provided his email to me about the 20 metres, there was a long list of what all the challenges might be of listing that, and that was summarising of what they were. It's just coming at it from a different perspective when I had some detail that was apparent. The other wordings of it has been in response to submitters who I possibly either have or I haven't specifically considered the nature of the constraints they're worried about.

McGarry: Commission McGarry. I am just very conscious that it's a critical assumption. By moving to that peri biomass metric as the sort of more simple, it assumes that shading will be 'wherever it's possible.' So I just do wonder if that wording's a little bit more directive than practicable or possible.

O'Callahan: But that's on the Wai Ora objective, isn't it? Or is it? That's on the Wai Ora one.

Greer: Dr Greer. Can I just clarify that. The assumption is that the specific sites will be shaded to meet the periphyton biomass attributes only. It's only light availability at the specific site that drives periphyton biomass, not light availability in the upper catchment. So the assumption, from a scientific perspective, is that the site will be shaded to meet the Target Attribute State. There's no assumption, in terms of achievability, that there will be other stuff in the upstream catchments, because that is irrelevant to meeting the TAS at the site.

Nightingale: When you say site, do you mean the monitoring site, is that?

Greer: Yes. Light availability is a site specific factor driving periphyton growth. Riparian vegetation is useful for other measures and there is a push for it in terms of meeting the sediments objectives, especially in the Mākara catchment, but that's a matter for Hearing Stream 3. But in terms of the periphyton biomass at the specific site, it is really only around that site where the shading is of vital importance.

McGarry: Isn't that site though a representation of what we're trying to achieve across the river? I have a real problem with your answer actually, because I understand what you're saying, yes you can end up with no periphyton right here, but that doesn't actually address nutrients in the rest of the system.

Greer: The riparian vegetation component is for the periphyton. It's not a nutrient control. It's not about stripping nitrogen from shallow groundwater discharging to the stream, or stripping it from overland flow, it's about blocking light at the site. And the assumption, in terms of achieving the Target Attribute State, the amount of riparian vegetation that's needed to do that is just at the site. However, for *sediment* there is an assumption around a requirement for fencing and vegetated setbacks to strip sediment from overland flow, and also vegetation that's resulting from retirement and pole planting on hill country.

Nightingale: Commissioner Nightingale. I thought Dr Snelder yesterday made that very clear connection between periphyton and the nutrient outcomes that are being sought through PC1. My understanding was the same as Commission McGarry's.

Greer: I can't quite remember the context in which Dr Snelder addressed that, but light availability anywhere else other than the site has no bearing on periphyton biomass at our monitoring site, so it's not required for that specific purpose of achieving the TAS at a site. It is important for other aspects of water quality; however we don't need it for nutrient management. We only need it to control for light availability.

Wratt: Commissioner Wratt. I'm struggling with that as well.
[02.25.00]

Don't you want it elsewhere though as well, for periphyton health elsewhere on the river if you're trying to improve the health of all the river?

Greer: That would be an environmental benefit, and that would certainly help contribute to an overall improvement in ecosystem health, however it is not related directly to achieving the Target Attribute State at a specific site.

Wratt: Understood. Can I just. In objective WH.O2 for example, it does have the condition of indigenous riparian vegetation is increased as a general under clause (b). That's around natural form and character.

Greer: Dr Greer. Yes, and that is actually quite separate from shade provision, which would probably benefit from faster growing exotics. So that's actually a different… It all contributes together to a better state of ecosystem health, but when we're talking about a very site specific achievement of the target, it kind of separates out a bit. I'm not saying that riparian planting isn't important, and it's very important for the sediment Target Attribute States likely, but it's just not in relation to the periphyton biomass at the site.

Wratt: Where does that come up in the objectives? Commissioner Wratt. Dr Greer, your comment in terms of the specificity of it, I guess I'm just trying to relate it back to what's in the document and the provisions that we've got.

Greer: I don't actually recall a place where it will say, "Regional Council will plant out its SOE monitoring sites to achieve the Target Attribute State," because that would be, I guess, an unusual objective to apply to consents. But that is the scientific assumption around the achievability of periphyton biomass, because I haven't, when I've said, "These periphyton biomass targets are achievable," assumed anything about out of sight factors. I just got a feeling you thought that that was an applied part of the modelling that had been conducted to date, and it hasn't been.

McGarry: [02.27.34]. Commissioner McGarry. You're right. What you're saying for a site to meet TAS, only that site has to be planted.

[02.27.45]

McGarry: Commissioner McGarry. And I had assumed the modelling had assumed that where possible riparian planting would be established, so you're correct there too.

Nightingale: Professional Nightingale. Ms O'Callahan, the absence of baseline current state data for the lakes, I don't think that's in your new Appendix, the revised

Appendix 3 is it? So it's not something that's, more data is on its way to us through this hearing?

Greer: Dr Greer. I understand that the only attributes with insufficient data was related to lake bottom dissolved oxygen, which I believe has been deleted in Ms O'Callahan's amendments. Oh, it's just set to maintain, sorry. But there were no others.

O'Callahan: I didn't put this in my Appendix 3 because I had previously conferred with Dr Greer about this and thought the solution here was to just set it at maintain, because we don't know anything about it, and it's probably unlikely to have any consent applications coming to it anytime soon because it's Regional Council's area. So it seemed like the pragmatic solution, that might not be as good as understanding the baseline and setting a target, but is it worth stressing over it in this particular instance, where it's unlikely to be subject to…?

[02.30.07]

No one's coming forward. Well, someone must have submitted on it for me to put something here. I'd have to go back and look at those and see where the concern was. I think it was just a general kind of Federated Farmers

Greer: Dr Greer. There is an additional scientific reason for not considering them as well, which is the sole topic of the presentation I had planned for this issue. It's pretty minor as well, which just lends additional support to Ms O'Callahan's statements there.

O'Callahan: Is this what you're talking about?

Greer: Yes.

O'Callahan: Alright.

Greer: It's spelled out pretty succinctly in my Statement of Evidence if you'd like to take it as read and move on with the questions, or if you'd like me to explain it just in person today. There is a high degree of uncertainty around the current state of dissolved oxygen in Lake Kōhangatera and Kōhangapiripiri, but it's important to understand what that attribute does.

There's two dissolved oxygen attributes in the NPS-FM. One applies to deeper lakes, which Parangarahu lakes are not. Then that's around managing direct effects on fish. Then the lake bottom dissolved oxygen attribute, which is included here, is actually about managing the release of ammonia and dissolved reactive phosphorus from bed sediments during anoxic periods. So it's actually a mechanism to control towards meeting the total nitrogen and total phosphorus Target Attribute States that are already in the plan. It's a driver, not an end point in itself.

We actually don't know the extent to which lake bottom dissolved oxygen concentrations are driving total nitrogen and total phosphorus. As more monitoring data becomes available it may become clear that there is a need to manage that attribute to achieve the TN and TP TAS, but the TN and TP TAS themselves provide that justification. They provide a driver to go explore why they're not being met, if they're not being met, find the problems and remedy

them. I don't think a dissolved oxygen Target Attribute State is actually needed for that purpose.

There's also very little science around those thresholds in terms of their relevance. It was developed through the Science Technical Advisory Group for the NPS-FM, and I haven't actually been able to find a technical report to support the actual numbers. It seemed to be a risk based, this is the best available, but it's actual site scale applicability still seems to be a bit uncertain.

McGarry: Commissioner McGarry. Basic question, so it's not compulsory.

Greer: It is included in Appendix 2B of the NPS-FM. It's an action planning target attribute, not a limit setting attribute.

O'Callahan: Is it compulsory to include it?

Greer: I think it is compulsory to include it.

McGarry: That's what I'm driving at, Commission McGarry, is whether it has to be on here at all. Is there any value on it being here other than it has to be there?

O'Callahan: If there's an activity that's going to cause that to increase, then we have a target here. It's to maintain whatever the existing is, and to get a consent application someone will have to assess it, and they'll have to maintain it. So there is a target. It is meaningful. We have got other examples of maintain.

Greer: Dr Greer. It would be incredibly difficult for an applicant to understand their effect on this particular attribute though. It's almost so complicated as to be redundant. There is one farm above one of these lakes, but I think that is the only private landholding that contributes to it. And what's driving dissolved oxygen in that lake is unclear. The impact of a discharge on it is unclear, especially through diffuse sources. I think going through the life of this plan change, it's not going to be particularly helpful other than to drive monitoring, which may identify a problem further down the track.

Kake: Can I just ask, hopefully a simple question as well. Commissioner Kake here. With respect to lakes and understanding the cultural significance of Parangarahu to mana whenua, hence the management plans that are around it.

[02.35.16]

I suppose, I can see through Objective WH.O5, there's particular clauses (e), (f) and (g) which reference again mahinga kai, and I know in your primary evidence Ms O'Callahan, that you don't think at paragraphs 241 and 242, that it's appropriate to include those attributes in Table 2, and that's a similar conversation that we've had previously already.

I think I want to explore your statement here at 242. These attributes or these… The concept of mahinga kai has come through the WIP Programme with mana whenua. In those documents there are some indicators, I suppose, and I think we heard from Mr Sharp yesterday, that you can quantify some of those indicators with respect to taonga species. The point I'm trying to make is that the WIP Programme for Te Whanganui-a-Tara has an indicator there. I suppose that's come from mana whenua with respect to tuna and tuna heke is that concept that

is explored and expressed there. So I'm just wondering if there's, science aside, the attributes in Table 8.2, is there anything in there that relates to taonga species, I suppose is my simple question?

O'Callahan: I can't answer that question. I don't know. This is responding to submissions from EDS and Forest & Bird, and they are reasonable general submissions in terms of trying to reinstate the previous objectives. So I haven't really specifically put a mana whenua lens over this. I haven't had the opportunity to engage with mana whenua through my involvement, albeit I have sought that opportunity. But the relationship with mana whenua is really held by Council Officers rather than me as a consultant.

I understand Council Officers have kept mana whenua, they've probably been keeping mana whenua in the loop in terms of where this process is going and talking to them, but I'm not involved in those conversations. For this particular location there may be a case for it, but I haven't been thinking about that issue in the context of it being something that mana whenua are seeking, and the management regimes they have with the Council around the lake may well be addressing those things and don't need to be replicated in the Regional Plan. They may not be, but I'd simply have no information on that.

Greer: Dr Greer. The lake attributes themselves are really looking at the lake from the bottom up, and almost all the way to the top. It may not have tuna, but it has all the way up to aquatic macrophytes, and they may not be a direct target of the TAS themselves, but certainly you have a package of Target Attribute States there that look for an improvement in lake health, which should have benefits as much as they can towards the tuna populations in the lake. Noting that they are influenced by wider issues as well, not just lake water quality. I believe there's a bar at the bottom of at least one of the lakes that the migration in and out is potentially intermittent.

Kake: Thank you. I think that might be leading to some of the questions I might have from mana whenua tomorrow as well, with respect to this particular one. But I think the question again, just off the top of my head, which may not be smart.

[02.39.59]

The riparian planting around this particular lake and the management framework of it, I'm conscious of what was said with respect to the role of DOC. The mechanisms under the plan are supposed to support that, I suppose, and uphold that with other regulatory activities. I might just pause on some of the questions and wait for some of our mana whenua reps tomorrow. Thank you.

Nightingale: Commissioner Nightingale. I don't know if you've got Map 80 handy or maybe Ms O'Callahan could help. Just want to understand. Which is a map of the lakes within the… Oh sorry, page 80 of the PC1. Yep, 80. Map 80 and then the previous page, Map 79. I mean, it shows the part FMU as sitting quite close to Wainuiomata, and above it is Waiwhetū, the Hutt Valley, but this is sort of just pushing just to help my understanding of how activities are managed, but there's no, if you don't look at are they connected in terms of freshwater connections or is that just managed? I guess the question I'm trying to ask is, is the Council looking to manage just the lakes or is it looking at weather activities further higher up in the catchment can impact the lakes?

Greer: That is a topic for, in terms of just the general land use provisions, Hearing Stream 3, but they have their own surface water catchments, they're not connected to the Wainuiomata River or each other. There may be some… I'm not entirely sure of the groundwater resource in the area, whether they pass together on the coastal bar. Probably not, they look quite far apart. But they have their own surface water catchments, one of which, I believe is entirely in National Park. It looks to be Kōhangatera. There is one farm, I should get an aerial photograph to confirm which one it is, potentially in Kōhangapiripiri that is subject to the rural land use provisions in PC1.

Nightingale: Commissioner Nightingale. Just generally when you're looking at the potential impacts of an activity, is it correct that you would look at that within that park freshwater management unit only? Is that?

Greer: Ideally no, because I know the freshwater management unit is actually just the lake. They have their own part FMU, so you can't quite see them in there, but they don't have a surface water catchment contained within their part FMU. That lake catchment is actually, I think different from the part FMUs in Map 79, but ideally you would manage these surface water catchments, not the boundary of the actual part FMU. You would manage all land for the receiving environments they ultimately discharge into as well as they immediately discharge into.

Nightingale: But you're saying, I don't know if hydrologically connected is the right term or not, but you're saying that basically what is happening further, far away, is not... So when we're looking at, going back to that Table 8.2, in the attributes that are considered important for these lakes, you're not trying to necessarily manage activities that are in a different part FMU, even though the lakes may end up being a receiving environment for those activities? Is that?

[02.45.08]

Greer: No, no, I'm saying I don't want to jump ahead of how the rural provisions work in this hearing stream, but ideally you would absolutely manage all activities that contribute to the lake, or the lake, regardless of their specific part FMU, and certainly external nutrient loadings will have to be part of the management unit. The reason they don't have their own part FMUs, and they've been grouped with the Mākara, is because of an inability to establish a monitoring site in their catchments. Access is not easy for a number of reasons, physical and interpersonal.

Nightingale: Picked up that they were part of Mākara, is that from Map 79?

Greer: Yes. Dr Greer. The surface water catchments are paired with the Mākara [02.46.20] catchment. Dr Greer. It isn't ideal, but if they were separated off we would end up with having no riverine monitoring site in that part FMU.

Nightingale: I see. I'm with you now. It's all the way on the other. Right, Southwest. I see. Which is just about how it's managed as a freshwater unit, nothing about, yeah.

Greer: Yeah Effectively it's being tied with the management interventions that are being applied to the Mākara catchment. But I don't believe there's a consent to farm currently, so they're basically being tagged with the freshwater environment plan requirement that includes a retirement of erosion prone land,

which should contribute to the lakes regardless of the degree to which it's specifically targeted towards the lakes.

Nightingale: Thank you and sorry. So that means, if we look at nitrogen and phosphorus, so if we look at the nutrient outcomes for these lakes, in particular Kōhangapiripiri, nitrogen and phosphorus are currently in a C state and wanting to get to B. And I appreciate that this is the State of the Environment monitoring that we've been talking about.

So in terms of managing rural land use activities that might help to achieve an improved outcome state for that lake, is it right that the Regional Council has said, "In the plan we are going to put some requirements around rural activities, and we think that you know that could have an impact in terms of improving the TAS for the lake." But there's nothing specific that says either that a consent applicant has to meet that TAS or that they need to show that their activities are not impacting these attributes.

Greer: Dr Greer. I feel like we might be pushing heavily into Hearing Stream 3 here.

Nightingale: Okay, sorry.

Greer: But in an ideal world the FEPs for the rural land use in those catchments would be focused on reducing their nutrient losses. I'm unsure of the extent to which those lakes require a reduction in nitrogen loss risk under the rural land use provisions.

[02.49.57]

There is a requirement under the FEP part of PC1, that some farms have to reduce their nitrogen loss risk. I'm just not fully up to speed on what the triggers for that are and whether the lakes fall into it.

Nightingale: I think we've probably all got just a few weeks to get there, don't we, because Hearing Stream 3's not far away. Okay, thank. Are there any other questions about lakes? Sorry, we've gone over, but I feel like Dr Greer probably also covered quite a bit of your technical evidence as well.

Greer: Yes.

Nightingale: So just looking at the schedule.

Greer: I only had one quick comment left, which I believe has already been commented, which is that the attributes in Table 3.5 of O.19, I don't consider there's a scientific justification to include those ones which aren't already in Table 8.2. The main reason being, firstly they weren't in the WIP. There's no WIP driver for them to go in, but also their narrative in that table, because we have no robust measurements or thresholds that could be applied as numeric Target Attribute States, so we'd be kind of putting a narrative in for those regardless. There's also one of them which has been requested, which is macroalgae, which actually doesn't apply to these lakes. It only applies to Lake Ōnoke in the Wairarapa.

Kake: Can I just sort of explore that a little bit and I'll be real brief, and again I think Tim, Mr Sharp addressed it a little bit yesterday. There was an understanding that there was a monitoring programme going on with mana whenua in some of

these areas. I think I'm being quite hypothetical here, but the assumption is that there will be some measures and targets included in those monitoring plans and the frameworks that are produced. The question is, if there's a numerical target in those plans, could that then be used to inform something in Table 8.2 for example?

Greer: Without knowing what they are, what that measure would be, I probably can't answer that. I mean, the establishment of any new robust guideline should be, and if it's something that applies locally, it should probably be considered through assessment of environmental effects when they're lodged with the resource consent application. It's kind of more of a good practice thing. But I'm not aware of a mechanism by which they could then be rapidly adopted into Table 8.2 as they become available. Putting aside the mahinga kai aspect, the idea of having the narratives in O.19 was that hopefully we would get numbers for these attributes by the time we were at this step, and it hasn't happened.

Kake: So just highlighting the obvious then, that's a gap for the Council?

Greer: I can't come in on the mahinga kai side of things. There are key parts of the ecosystem that are covered by those narratives that are not covered by Table 8.2, specifically fish. A high value part of ecosystem health that we have no late indicator that we could really adopt at the moment. So that is a gap. The extent to which it's dealt with through narratives, I can't remember off the top of my head.

Nightingale: Commissioner Nightingale. I'm just skimming through just what was in the Te Whanganui-a-Tara WIP for the lakes. It does talk about sediment, but that's not an attribute that the Council thinks needs to be managed for the lake?

Greer: Sediment is discussed in my Statement of Primary Evidence in relation to Table 3.5, though not in relation to the WIP. There is no measure that we can adopt for lake sediment. There is a clarity measure for lakes, which is called Secchi depth, but that is primarily driven by phyto, well not primarily, it is driven by both phytoplankton and sediment. Anything that gets in the water column obscures visual clarity, so it's not even a direct measure of sediment in lakes, and for that reason we couldn't really come up with a numeric Target Attribute State that could be applied for sediment, despite it being in the Phyto Implementation Programme.

[02.55.08]

Nightingale: Commissioner Nightingale again. Will some of the, I don't know if their recommendations, but they're certainly in the WIP, would they talk about restricting livestock access, riparian planting and managing invasive exotic plants in the lakes? So those are all things that might come out through the Freshwater Action Plans rather than-?

Greer: Dr Greer. I'd imagine a number of those would come out through the farm environment plan requirements of the NRP where they're an issue. We have obviously lost… There was an assumption when PC1 was notified that the general stock exclusion provisions in relation to beef cattle would come into effect in these areas, and that hasn't, and that has potentially left a shortfall there that wasn't anticipated. But the operative NRP has reasonably stringent stock

exclusion criteria on their own, especially in Schedule F1 streams, so there is still some requirements for that.

I understand that the invasive plants situation is attempting to be managed now, and in the past I think it's a reasonably significant bio security issue, the invasive weeds here. I think it's lagarosiphon. They do a spraying programme in the wetland upstream fairly frequently, I believe.

Nightingale: That's the question I had about that, so where there's safe or submerged plants, invasive species the TAS for the lakes is B, and in one of them it's currently C. Does that mean that that is enough to drive some outcome direction requiring…? I mean, something has to happen to reach the improved Target Attribute State, doesn't it? So it must be, in terms of the options, working with iwi, Freshwater Action Plans, whereas nutrients might be more about restrictions on the land use, which we'll hear about in Hearing Stream 3.

Greer: Yes. Though there is, obviously 20 metres of riparian planting will strip out some nutrients as well to the lake, so it probably isn't all one way or the other. The invasive plant thing is very complicated and will require substantial thought, because at the moment they're treating the source of the plants, I believe upstream rather than in the lakes themselves, and dosing the lakes themselves with huge amounts of endothall or other things have got some… You know, chemically treating those plants in the lake themselves is probably, no one particularly wants that. So they're doing most of that management upstream at the moment and that will have to be done through an action planning, but also just a wider part of the Council's bio security role.

Nightingale: But at some point somewhere there will be someone who's reporting back on their steps taken to achieve the TAS?

Greer: Yes.

Nightingale: And these are the things that have happened to help get there.

Greer: Dr Greer. I'm not sure when the action planning presentation is going to be. I haven't been part of that side of things so I can't comment on how it will be reported on or where we're at in the process of developing those action plans.

O'Callahan: My understanding, I think the actual plans are part of Hearing Stream 4, and the content is in the plan change, but my observation is it's very much about… The Regional Plan just sort of says that there's going to be a plan. It says, "We need to do a plan to establish the plan," rather than having the real specifics in there that might have been helpful. They're not there specifically, but there is a plan to have a plan for the lakes. That's method M37, for the Parangarahu Lakes. That specific method.

Nightingale: Thank you. But everything geared towards trying to get to the B state in terms of submerged plants, for instance.

[03.00.02]

O'Callahan: I mean, it really talks about achieving those Target Attribute States. So yeah, if there's other things that need to happen at the lakes then that might need to be picked up on in that, and the good thing is these are freshwater provisions, so

you're not limited in terms of scope of submissions, because I'm not sure what the submissions are like on the Freshwater Action Plans but probably pretty limited, I suspect.

Greer: Dr Greer. There is a dearth of information for these lakes. I imagine the first step of action planning will have to be significant investigation into the exact drivers of why the Target Attribute States are not being met, and a reasonably comprehensive period of intensive monitoring to establish a robust baseline as well.

Nightingale: Thank you. And are there any, sorry I don't have my NPS-FM easily to hand, but there's the compulsory values for lakes, are there any discretionary values for lakes that are there in the NPS-FM? I guess my question is, given the dearth of information, given that doesn't seem like there's been a lot of submissions on this, is the Council confident that all of the right attributes have been identified for the lakes?

Greer: Dr Greer. Yes. The only one that hasn't been set, I understand, is the mid-lake dissolved oxygen, and that's simply because I understand it can't be measured there, simply because of the depth requirements under that table in the NPS-FM.

Nightingale: Anyone else have any questions about the lakes?

Kake: Just one last quick one. Just the riparian margin planting. It came up in your discussion as well, Mary, and just wanting to make sure that I'm seeing it properly. There it is in your evidence. The 20 metre set back. Just trying to find the particular reference to how that particular measure came about, the 20 metre.

O'Callahan: That came about from me contacting our scientist at the Council that is involved in management of the lakes.

Kake: That was involved in the management of lakes. Were there other options other than that 20 metre?

O'Callahan: No. I just needed a number. He gave me a number.

Kake: So you didn't investigate whether a 50 metre setback for instance might be required?

O'Callahan: No. Let me just explain the question I asked him. The submitter sought that it be defined as a number, and perhaps… Look, I don't know the geography, I've never… I don't know it. I'm sure if we need to we might be able to get Elton [03.03.16] to.

[03.03.20]

O'Callahan: I mean we can't. He's online. Look at that.

[03.03.30]

O'Callahan: Christ, I better be careful what I say. Let me just find the email again. Sorry, I just had it before. Because this was dealt with through rebuttals, so there wasn't a lot of time to get things done. Look, I'm sure we can get a statement if that's of

interest, but I just asked for, "How wide the planting is intended to be at those lakes, so I can add it to the objective," and he replied that, "For streams a 20 metre width buffer is typically considered to be best practice amount for riparian values that may help to mitigate water quality impacts from surrounding land uses etc, and lakes are probably a bit different, but I think you could go with 20 if you need something and noting that they'd be larger in most places."

[03.05.00]

So it's drafted as a minimum. The lakes are in the regional parks and most places of riparian vegetation buffer will be much, much wider. That was when he noted, "There's parts around the lakes where the tracks between the lake and the vegetation, and there's parts of the lake where they're naturally devoid of vegetation because there's rocky beaches, shoreline sort of situation. It's a regional park, there's no stock, and there's either currently riparian vegetation or it's regenerating. Other than the roads and tracks, that's what the Council's working towards." That was another one, and that's effective, is what he's sort of saying, from an ecological water quality perspective. If you want us to table some material on that then I'm happy to follow that up, because obviously it's not here in evidence.

Greer: I can speak to that briefly. I mean, 20 metres is wide. 10 metres would be considered a self-sufficient riparian buffer, and I've just got the aerial photographs up in front of me, there's very little of the lake where you get past 20 metres and not hit the existing native vegetation, unless you're in a wetland. There's a couple of bits but it's not going to drive much areas of 20 metres buffer, and I think that's why that's more than what you'd be requiring on most agricultural catchments.

Nightingale: Commissioner Nightingale. We might see if Mr Matich has any views on the wording and then come back to you about that. Thank you. We'll take a break there. Can I just check, does that take us now to the start of Issues 10, 11 and 12? Is that where we're up to?

O'Callahan: Yes, that's right.

Nightingale: Great. We'll take a break now. We could probably come back at, probably four might be enough?

Ruddock: Yeah. Do you, Ms O'Callahan, do you believe that we might be able to cover 10, 11, 12 and Dr Greer's evidence to support in the 15 minutes or would you require longer than that?

O'Callahan: I think we can get through a good portion of it, and I think we've got a good amount of time for tomorrow. There's only four policies really. Sorry, I think there's only three in each chapter. One of them I'm proposing to delete so there's not a lot of questions around that.

Nightingale: Great, thank you. We'll be back at four then. Thanks.

[Break taken – 03.08.17 – 03.28.23]

Greater Wellington Regional Council – Dr Michael Greer

Nightingale: For the final session for today, we are up to Issues 10,11 and 12. Just looking at, actually just for the rest of the Council presentations. Dr Greer, you're talking to this topic, but you're not scheduled to present tomorrow. Is this the end of your time with us this afternoon, or?

Greer: Dr Greer. I'll be here tomorrow.

Nightingale: You'll be here tomorrow. Okay, great. Just that we had more-

Greer: I honestly think we've covered most of the primary context up for me as well.

Nightingale: Yes. And just on that, conscious that we have had a lot of questions, but we really do appreciate the way that everyone from the Council team has responded. It's really deepened our understanding of the science so we can then consider the PC1 provisions in the best way. I think it will really help our understanding for Hearing Streams 3 and 4 as well.

Greer: Thank you. Dr Greer. Can I just make one comment just to clarify something from earlier today? I gave you a wrong steer on the Porirua targets that need to improve for dissolved metals.

[03.30.00]

That was due to the area I identified at day one on page 59 of my evidence, with the scrambling of the table. There is one dissolved metal Target Attribute State that still requires an improvement in Porirua, and it is, I believe, copper at Wai-O-Hara Duck Creek. Sorry, dissolved zinc.

Nightingale: Just so we are clear on that. This is Table 9.2 for Wai-O-Hara, so dissolved zinc. Sorry, I don't see, I see that the TAS-

Greer: Dr Greer. On page 59 I do an assessment, in 59 and 60 of my Statement of Primary Evidence I do an assessment of where the current state meets the Target Attribute State, which is different from the baseline states in Ms O'Callahan's Appendix 2, and splitting through that before to see if there was a freshwater driver for improved metals in Porirua, I was caught out by the formatting errors on that table and I inaccurately identified that there were no drivers for freshwater metal improvements, but there is indeed lone in Duck Creek of dissolved zinc.

Wratt: Commissioner Wratt. On the table, on Table 9 it looks like it's actually copper and not zinc that needs. In the baseline in TAS are both B.

Greer: Dr Greer. Yes. So that's based off modelled data. There was no monitoring data at the time of that baseline. So I presented the current state measured data in my Statement of Primary Evidence and that's what I made that assessment on, whether there was an improvement required to meet the TAS. It's all off current state rather than baseline state, noting that that's eight years old now.

McGarry: Commissioner McGarry. Does that change the object of P.O3 comment that you made, Ms O'Callahan, which was removing the metal loads from A? There's only the one, but-

O'Callahan: Mary O'Callahan. I think you're talking about a coastal objective. Is that right?

McGarry: No.

[03.33.40]

O'Callahan: So yes, it's just talking about. [03.33.48]

McGarry: Yep, thank you.

O'Callahan: It's Table 9.1 not 9.2. Coastal.

Nightingale: No, it is. Sorry, you were just looking at the objectives, so I think it is 9.2.

Greater Wellington Regional Council – Mary O'Callahan

O'Callahan: Yeah. Should I start the presentation?

Nightingale: Yes.

O'Callahan: I'm just checking that you're wanting to hear me talk on all of these? I mean, the next issue is the groundwater issues so reasonably, well happy to talk through it, but really there's just some drafting changes there, which I summarised on the slide there so. Basically, using the NPS language rather than the 'protect' that was in the notified version in the WH.O6 and P.O5, and then just really trying to redraft to clarify what the expectations are for groundwater and aquifer outcomes, because there was a lot of technical words that were thrown in there. [03.35.14]

So I've just tried to rationalise that and then put it into one objective rather than two because it's all part of managing the groundwater. Then just the clause recognising those use benefits after the protection has been achieved. Happy to answer any questions on those.

Stevenson: Commissioner Stevenson. The new clause for social and economic use benefits, that relates to Meridian's relief I'm gathering, or could you expand?

O'Callahan: Mary O'Callahan here. I'll just have to find that in my evidence. So that relates to Federated Farmers, that paragraph 257. They were interested in a clause that provides for sufficient reliability for the needs of communities in the primary production sector, and so I agreed that the objective could recognise groundwater usage, provided that's done in a matter that's consistent with the NPS priorities. [03.36.58] Shall I move on, or?

Kake: Can I just ask a really simple, hopefully simple, Commissioner Kake here, question just in terms of the definition of aquitards and the difference with aquifer?

O'Callahan: Mary O'Callahan here. My understanding is the aquifer is the area of the groundwater, I think, where it's sitting, and the aquitard is the confining layers between them. That's my understanding, and I've had my understandings checked with one the Council's groundwater science team to just make sure I've understood them right, and Google was very useful too.

Kake: Just on that, I suppose, is just the Objective WH.07 and how it is being recommended to be removed. Integrity of aquitards is protected so that confined

aquifer pressures. I think I've just got to get my head around some of the differences between the pressures and aquitards, but they're protected.

O'Callahan: Mary O'Callahan here. In the chapeau of the reworded WH.O6, I have referred to them as 'confining layers'. So, "The groundwater health and integrity, including the confining layers of the aquifer system, are maintained and protected." So that's addressing the aquitard's issue, and then the aquifer pressures is part of the groundwater integrity. Where else have I got that?

Then, "No long-term decline in mean annual groundwater levels." That would be the outcome of aquifer pressures being reduced, is my understanding, and aquifer consolidation. What's that one? Sorry, I should have refreshed my memory on some of this, but aquifer consolidation is where it sort of gets squished, and that can change the levels and can reduce the availability and could affect the pressures as well.

[03.40.06]

Nightingale: Commissioner Nightingale. I think that you say in your evidence that, "Aquifer consolidation can be caused by overextraction," but we know for Te Whanganui-a-Tara there are no water allocation provisions through PC1, but there are in the operative plan. So where Objective WH.O6(g) talks about, "Aquifer consolidation is avoided," there would be corresponding policies and rules that would help to achieve that objective.

O'Callahan: Mary O'Callahan. So there are these existing policies and rules and allocation regime, and they will continue. Whether they achieve all aspects of the objective. I haven't made any substantive changes to the objective. All I've done is try to make it a bit clearer with reduced number of terms in it and a single objective. So the extent to which the existing provisions…

And look, my understanding is the objective really was reflecting the outcomes that are sought, but I believe there's still an intention to review those provisions to check that they do provide what is necessary, and it's probably the things around the ecosystem impacts on this connected surface water bodies, which are probably the issues that might need to be revisited, would be my guess, and it's purely a guess.

There's always been a groundwater allocation regime that has enabled the aquifer to be protected. It's a very key focus for the NRP. I'm just guessing that the matters that might need to be considered, as to whether there needs to be any changes to allocation in that catchment to achieve both this objective and obviously the TAS as well for the rivers. That will follow.

Nightingale: Commissioner Nightingale. Any future changes would obviously need a future plan change, but I can't recall any submitters having issues with the wording, "The requirement for aqua consolidation to be avoided." Do you?

O'Callahan: Yes, I think they did.

Nightingale: Was it Winstones, maybe?

O'Callahan: I'll just try and find that.

[03.43.52]

O'Callahan: They wished, in paragraph 258 there was a request to change that to, "Avoid or minimise," which I recommended objecting because it may not be sufficient to prevent potential effects of aquifer consolidation, which in this Whaitua would be pretty catastrophic for the region in terms of the water supply. That was the issue that I clarified in my rebuttal evidence about aquifer consolidation. I said, "Could be caused by overextraction, and those effects included subsidence, contamination between aquifer layers and reduced abilities for aquifers to recharge the rivers." And then Mr Horrell pointed out that his understanding was that, "The aquifer compaction led to the lowering in the water table," which, that's part of it.

[03.45.07]

So I've just missed off that descriptor as part of the compaction impact. Shall I move on?

Kake: I kind of do, but I also again just need to get my head around some of this, I suppose in terms of the scientific evidence. Just so we're understanding, and taking a step back again with respect to where these objectives came from, they were based on the recommendations from the WIPs?

O'Callahan: I'll have to come back to you on that. I'm not sure, sorry.

Kake: That's okay. Thank you.

Nightingale: Ms O'Callahan, that takes us to Issue 12. Thank you.

O'Callahan: This is the primary contact objective, and we have had some discussion about this. The key changes I've recommended the inclusion of current state data in Table 8.3, and then, the rebuttal amendments were adjusting the timeframe for meeting the primary contact site in Te Awa Kairangi as a consequence, or reflecting the associated timeframe change for the contributing E. coli TAS in Table 8.4, and in response to submitter evidence on that.

This one's just a style. The timeframe's moved from within the text, the narrative text, into the table as for the other objectives, to facilitate one of those primary contact sites having a different timeframe. Dr Greer's got some points on this one. We'll just run over those.

Greer: Just double checking. Dr Greer here. These were all in response to submissions, there's no background here. The first point I make was that submissions suggesting Table 8.3 should be combined with Schedule H1 of the operative NRP are not justified. The two are already perfectly aligned. Every site in Table 8.3 is on a river in Schedule H1, and every schedule H1 river has a site in Table 8.3. Submissions requesting a call was directing the collection of further data for primary contact sites is not necessary, or primary contact sites are currently monitored and have been for some time. Baseline state was just a long time ago which is why some sites don't have data for them.

We already spoke about the swimmable days metric, I believe on Monday, but it's not necessary and it's somewhat redundant. Then, in my opinion submissions requesting the inclusion of a measure of benthic cyanobacteria in Table 8.3 is not scientifically justified. Defensible effects thresholds and proven

interventions that could be employed to manage the potential health risk associated with bacteria do not exist.

O'Callahan: That's our presentation on that issue. Happy to answer questions.

Nightingale. Thank you very much. The timeframes, sorry Commissioner Nightingale, the timeframes for the E. coli, these are TAS? yes, have changed through your rebuttal Ms O'Callahan.

[03.50.00]

This was largely from the economic evidence, wasn't it?

O'Callahan: The economic evidence doesn't specifically address these targets, the primary contact targets, but I've just made the assumption in the absence of any… Dr Greer can probably explain why that's not easy to predict how achievable these are because of stuff that he can explain. But it's the same pipes that are driving or will be needing to be fixed to achieve this standard, and so it's just logical that if you're not going to meet it at the FMU level, that you're not going to probably achieve it at the primary contact. And in the absence of being able to demonstrate to the submitters who were concerned about this, how much it's going to cost or what it's going to take to achieve it, that seemed like a logical consequence to assume that they need to follow each other. But Dr Greer might be able to elaborate on that.

Greater Wellington Regional Council – Dr Michael Greer

Greer: Dr Greer. We actually spoke about this, I think yesterday. But it was generally round, because the monitoring for this is conducted weekly over summer, actually quantifying the load reductions required to achieve this TAS cannot be done in the same way that we can for the E. coli attributes in Table 8.4 and 9.2. So all that we can say is, that for the one site that's impacted by urban contamination, is that we know we need a 23% reduction in the 95th percentiles, but the load reduction to achieve that, and the actions to achieve that load reduction are mysterious.

McGarry: Commissioner McGarry. If you did, that's the reason for excluding it from the economic analysis, is it? Because it would be a double counting, wouldn't it, to put it in there? One, it's a huge cost. But really if you go for the other load, the other reductions required to meet the tables, you're going to go some of the way there anyway, so you can't sort of look at this in isolation. That's what you're saying?

Greer: Dr Greer. The reason it wasn't included in that analysis was the fact that I couldn't model the load reductions, and therefore the actions needed to achieve them. It wasn't around the extent to which Table 8.4 will achieve 8.3 or anything like that, it was simply around the fact that we couldn't generate a load reduction for those targets, so therefore we couldn't generate an economic assessment for that load reduction.

O'Callahan: But essentially it probably would double count it if you did it twice, if you?
Greer: Oh definitely. If you could do it, you would only assess the more expensive of the targets. You wouldn't add them together.

McGarry: Commissioner McGarry. Would it be fair to say that this idea of swimmable days is a bit more of an older concept that they used to use so people could understand in a more lay persons way basically what you're articulating in a percentage sort of risk?

Greer: Dr Greer. I've never heard of anyone use swimmable days. It may have been something that was used prior to me becoming a freshwater scientist, but it certainly isn't referenced in the MfE/MoH Microbiological Guidelines back as far as 2003. I mean, the swimmable days outcome for all attribute states is just the same. I guess there would be no harm in necessarily putting an advice note to say, "This equates to 279 swimmable days," or whatever it may be, however, that advice note would apply to all sites. There'd be no variability in it. You might as well make the same note saying, "A, B, C and D have the same number of swimmable days," but the risk of getting sick between those attribute states is still less. That swimmable days metric hides some of the more granular detail between the Target Attribute States.

McGarry: I suspect, Dr Greer, looking at you, that it might be an age-related thing because I kind of feel like the submitters might say, "This used to be how it was articulated, in swimmable days," but anyway.

Kake: Can I just ask a quick question hopefully? I'm just trying to find the right method as well. Commissioner Kake here. I'm looking at Taranaki Whānui's submission. It's going back a bit, from December, and I know is hopefully speaking tomorrow. In their submission they've referenced Method 45 in relation to Table 8.3. Just trying to find, I suppose, and figure out how that method-?

O'Callahan: Mary O'Callahan here. Are you looking for the method?

Kake: Yeah.

O'Callahan: It's on page 56 of the plan change document and it simply says, "It's a method to work with Territorial Authorities and the Water Authority to identify additional sources of funding for stormwater network and wastewater network upgrades required to achieve TAS, and advocate with central government for additional funding tools and sources."

[03.57.13]: Is that by the coast, is it? [03.57.14]

[03.59.20] Can we put some more paper out?

Nightingale: We're drowning in paper here. Commissioner Nightingale here. All I was trying to see is, Ms O'Callahan, you're recommending an improvement for E. coli in the Wainuiomata urban streams be achieved, Target Attribute State of D be achieved by 2050 so I'm wondering-

[End of recording 04.00.00]

Hearing Stream 2 – Day 3 – Part 3

Greater Wellington Regional Council – Dr Michael Greer

Nightingale: Hearing why at Richard Prouse Park the primary contact site objectives in Table 8.3, and we talked about Richard Prouse Park, was it just yesterday? That has by 2040 to go from poor to fair.

O'Callahan: I think Dr Greer is probably able to explain the geography which explains this.

Greer: Dr Greer. Wainuiomata urban does not impact at Richard Prouse Park. Black Creek comes in here, Wainuiomata River flows here, and Richard Prouse Park is about here. So it's not like not achieving Black Creek's TAS by 2050 will hinder the achievement of the Richard Prouse Park TAS.

Nightingale: Thank you. But from my quick look, I think the others all seem to align. So where, for example you're recommending Waiwhetū Target Attribute State of D now by 2060, Dr Greer, is there a primary contact site that would be, I guess an indicator for that?

Greer: No. That for a number of reasons isn't like a river that people would use for swimming. I'm not saying people don't jump in it, but it's much smaller than the Hutt. So the closest one will be the Hutt River sites, but the Waiwhetū Stream is a largely spring fed stream running through the middle of a suburb. It's not represented by the Hutt River.

Nightingale: Commissioner Nightingale again. And actually, is that the one that Mr Van Berkel was talking about?

Greer: No.

[00.02.31]: No, it was Bridge. [00.02.31]

Greer: I believe he was talking about Speedys Stream, which is on the other side of the Hutt River in, I believe now it's in the Kotu kotu [00.02.40] part FMU. It's hill fed and forested for much of its length, but I believe it has some wastewater overflow issues.

Nightingale: And the Kaitoke, which I know you talk about because it's, I think, the one that's in poor condition but it's high up, like it's away from urban areas. And I think someone, it might be you Dr Greer, says that something's going on at the campground.

Greer: Dr Greer. I didn't want to have to admit this, but I actually got the way that river flowed the wrong direction. [laughter] There is faecal source tracking for that. I just was told by Dr Valois yesterday, and she mentioned that it is largely animals, and that was, I'm like, "Where are these animals?" "Here," and then it turned out that the river flowed in the opposite direction from what I thought it did. So it's not only in regional park. Instead of flowing down to meet the Hutt, it goes all the way through the regional park. So that's a livestock issue. Predominantly Dr Valois informs me, horses.

Wratt: Commissioner Wratt. That's a 'by 2040' and it's got an extremely high baseline, 3,000. I guess, if it's clearly identifiable what's causing it, then it shouldn't be impossible to address by 2040, but it's a big improvement.

Greer: And the spatial area that is impacting it, it's still discrete, so for most of its length it is still in regional park. It comes out of a bit of a regional park into the Pākarutahi Flats, then goes back into a regional park. So it's a reasonably small area. I can't comment on the extent to which those lots in there are covered by the rural provisions, because there's a difference between how site blocks less than 20 hectares are managed compared to how the larger ones are managed, but certainly it would appear to be a discrete issue.

[00.05.06]

But it's my understanding that it's still not the wastewater network.

Wratt: That is a swimming spot though, is it? A swimming hole?

Greer: It's a very popular swimming spot.

Nightingale: Commissioner Nightingale. We touched really briefly on the stock exclusion rules, and sorry I've forgotten, have they been removed? Those regulations been removed, or do the plan provisions-?

Greer: There were two drivers for the stock exclusion assumed under PC1. One is the stock exclusion in Category 2 water bodies that are also in Schedule F1 of the operative NRP. Now under the operative NRP it's a discretionary activity to have cattle access, to have full-time stock access. There's still river crossing exclusions from, I believe this year, so in some rivers that are in Schedule F1, which is a lot of the region, and Category 2, which is effectively the same areas as the low slope land maps in the stock exclusion regulations, they require stock exclusion, I believe, on all water bodies, not just water bodies more than one metre wide.

Those provisions have not been removed, but the stock exclusion regulations, which were assumed to drive stock access with a three metre set back on low slope land, are now gone and there is a shortfall there. And I believe the biggest impact for that was in the Porirua catchment, where there were no Schedule F1 rivers and no Category 2 water bodies. I can, if you give me a couple of minutes and move on with the questions, I can identify if that area is subject to the stock exclusion regulations in operative NRP.

Nightingale: Yes, I think that would be really useful just for reply, because what I'm wondering is, if there is a lacuna, if there's no regulation and there's a clearly identified problem here, Porirua as well as at Kaitoke, and it's a freshwater provision and we're talking about it, could our recommendations include, "Try to address that gap."?

O'Callahan: Just going to note that in Hearing Stream 3, which you will receive evidence on shortly, the stock exclusion in rural land use are addressed in some detail.

Nightingale: Okay. It would make sense for rural. If it's being addressed there then we probably don't need it in the reply, but we'll issue a Minute anyway after this hearing.

Greer: Dr Greer. That would be useful for me because otherwise, without a Minute or a note to address it and reply, it probably will fall off the radar actually.

O'Callahan: To be clear, I think the rule's component is being addressed in evidence, but in terms of stream classification impacts, I'm not sure if that is directly covered. I can't recall. So I think that Minute would be useful, to make sure we do cover that issue.

Nightingale: Commissioner Wratt is taking his note.

[00.08.36]

Nightingale: Do you have any other questions from this table?

McGarry: I'll just jump on while you're looking at it.

Nightingale: Yeah, sure.

McGarry: Commissioner McGarry. Just getting back to the faecal source tracking that we talked about on day one. We've just touched on it again. What I was looking for there is just a brief summary of where the Council has done faecal tracking work. I didn't want to send you off onto a whole lot of work, so I meant to kind of refine a bit more. It's really just for us to have a little bit more of an understanding of any of these sites where that work has been done, where you can sort of say that we do have a bit of evidence here to suggest that this is mainly wastewater, or this is mainly an animal source. That kind of level. Not looking for a lot, but just a brief summary of what the Council has done and maybe what periods of time when it was done. You know, whether it was recently or what year it was done. That's all we're looking for there.

Greer: Dr Greer. Yes, I've just envisaged a table.

Nightingale: Commissioner Nightingale. Dr Greer, with the overflows, is it that the Council knows when they occur, but they don't know when the dry features, you know, flows occur?

[00.10.08]

Greer: Dr Greer. The Councils, from my understanding, there will be undetected overflows I'm sure, simply because some of them are not related to capacity issues, they're related to human factors - people putting stuff down drains, fatbergs, the like, but for the most part, based on Mr Blyth's analysis that he's done for the Whaitua processes, it appears that the TAs know when and how often and how much there has been overflows. It's after the fact. They obviously don't know when they're going to occur. And we do know where the dry work, they know the conditions of the poor pipes, the locations of the poor pipes that contribute to dry weather leaks. But for the most part, those dry weather leaks are just always happening. It's not a, "They're happening now and then they're not happening." If they're leaking, then they're probably leaking until groundwater gets really high, and then they it starts going in the opposite direction. They start getting [00.11.08].

Nightingale: Thank you. Commissioner Nightingale. So then on that, if they know that, so then Regional Council would know where the pipes that are in a poor condition that are resulting in the dry leaks, whether they are upstream of these primary contact sites?

Greer: Dr Greer. Yes. All of the TAs publish their entire pipe network, including the conditions of their pipe on their mapping service. Freely available information.

Nightingale: So then, to this point about prioritisation that we've looked at a bit, so given that these are the places that have been identified as where people are most likely to swim, Wellington Water could, at the direction of the Tas, prioritise fixing the pipes to minimise the impacts on these primary contact sites?

Greer: Dr Greer. Yes. I cover that in my evidence. I note that there's three sites that need an improvement, and of those there is network above two, but one of those sites, which is Richard Prouse Park, the network is only the sludge pipe from the water treatment plants to the wastewater network, which has low E. coli concentrations, which really pushes prioritisation towards, is it the Hutt River at Melling? But that's not that river. That has no impact.

It's that area there. Sorry, we're just conferring on whether the issue of the Pākarutahi flowing the wrong way changes that assessment, and I think it unlikely that it does. It's a rural residential area effectively in the bush. But I may have to confirm. I should probably look at the pipe network quickly before replying and just provide a comment if it is wrong.

Nightingale: Yes, thank you.

Greer: The priority is likely to be that Hutt River at Melling, I think it was.

Nightingale: Thank you, and sorry, I promise I have read your evidence, but still it's taking some time to digest. This was what I was wanting to get to with these questions If that is a priority, which you've confirmed it is, is by 2060 too generous, given that we know that's the issue, we know what's going to help, we know it's in a poor state? Could the work feasibly be done earlier than that?

Greer: Dr Greer. In terms of, I'm assuming they're taking it from a financial position, and I have no knowledge over their financial constraints or how much the upgrades would even cost.

O'Callahan: But we base that, well I base that, on the fact that it's the same pipe work as the- [00.15.05]

Greer: Hutt River at Boulcott.

O'Callahan: Yes.

Greer: Dr Greer. I can confirm there is no network upstream of the Pākuratahi sites. So it is definitely that single site that would drive an improvement from maybe just two Councils potentially, Hutt City and Upper Hutt?

O'Callahan: What I think that the panel just need to understand, Dr Greer, is the two-part FMUs this relates to, is Te Awa Kairangi urban. This is the catchment that feeds into this monitoring site, is it?

Greer: Yes.

O'Callahan: And that's one that I've said, based on the economics for that particular measure of E. coli, needs more time. The question is, how much? I know we can't establish how achievable the TAS is in the primary contact, but can we understand the pipe network that's specifically impacting that, and maybe we could narrow it down, and maybe the Commissioner is right, if we have a bit more time to research that?

Nightingale: Thank you, Ms O'Callahan. That was the question. You've expressed that way more eloquently than I did.

Greer: Dr Greer. I have provided the analysis of the pipe network upstream of the Target Attribute States. So I have that for the Boulcott site which is a little bit upstream? Downstream? Upstream, I believe. So that information can be provided with reply in terms of the length of pipe and grade four and five, in kilometres. Is that what you're, the extent of the potential problem?

O'Callahan: Yes, I think so, but I'm not sure if reply is. I mean it would be ideal if there's an opportunity for the submitters to respond to that, but.

Greer: Dr Greer. I'm looking at the map right now.

O'Callahan: So I've done that completely wrong.

Greer: I could print the screen for tonight and make a map and table it tomorrow if it would be helpful, rather than have it in reply.

O'Callahan: I'm not sure that we're going to be able to do much more than that, but if we get a sense of the scale of that pipe network versus the pipe network that fed into Mr Walker's assumptions for Te Awa Kairangi as a whole, then that might help us kind of get a scale of what we're dealing with here. If we're only dealing with, like if it's hundreds of kilometres as in for Te Awa Kairangi, or if it's dozens of kilometres then [00.18.00].

Greer: It will be very similar to Te Awa Kairangi.

O'Callahan: That's what we're just trying to establish.

Greer: Yes, well I can provide that verbal indication now, that Melling and Boulcott are very close, which is the two sides.

O'Callahan: I think we might just try and just put it in writing.

Greer: Okay. Can I commit to that by Tuesday next week then, rather than try and scramble tonight if you need a level of detail to spatially differentiate the two sites. That might be easier.

O'Callahan: I think that's fine.

Nightingale: Commissioner. The only thing with that, is if then we want to ask Wellington Water about that.

O'Callahan: I think you'll be able to ask Wellington Water directly. You understand the issue. They should have an opinion on it as well because they know the network. I mean, this is a scientist's understanding, but Wellington Water network, they'll

probably be in an equally good position to raise that. If there's a mechanism to signal that in advance that might be useful. If not. I mean, are they the ones that have sought to 2060 or is it the Councils? I can't remember.

McGarry: Commissioner McGarry. Just looking at your evidence, Dr Greer. I think you might have some corrections to make there too, just in terms of what you just said about the river flowing the other way and the assumptions you've made there on the source. I'm looking at your paragraph 179.

Greer: Yes, that may have. Yes, the septic tank system for the campground is on the other side of the site so it does not contribute.

[00.20.00]

McGarry: So if there is any amendment required to your evidence on that, it would be good for you to do us a tracked change version of those paragraphs. Thank you.

Greer: Absolutely.

McGarry: Commissioner McGarry. I've just got one last question, Ms O'Callahan, and it's really just for me to understand, and obviously I can ask the TAs about this, but are there any consented wastewater overflows at the moment in either Whaitua, wastewater overflows?

O'Callahan: I'll have to seek some advice from Council on that. I'm not sure. I'll endeavour to come back.

McGarry: Get your microphone off. Thank you. Commissioner McGarry. Because what I'm trying to understand is, what's operating at the moment is that, anyone has consent, Dr Greer says the TAs know when, where, how often. Presumably, if they don't have a consent they're operating under Section 330 of the Act, which requires notification to the Regional Council. So I just want to understand the record trail as to when these happen, what procedures are gone through in terms of documenting overflows and the like? That's just a little bit of the picture. I don't understand how that works in this situation.

O'Callahan: We know who to contact in the Council to understand if we've got that, but again, this could be put to Wellington Water as well. I think that they might have, don't quote me on it, but I think they might have got an application in for the wastewater overflows. Whether it's been approved or not, I'm not sure. That's my recollection, but it's not something that I've had cause to investigate.

McGarry: I'd just like to know from the Regional Council side, because I think I'm right in this matter. Under Section 330 I think you're required to notify the Regional Council, and then if there's any ongoing effects obviously you've got to do a retrospective consent, which I'm sure it doesn't happen each time. But I would just like to know the internal processes from this side, and I will ask the TAs that, but I would like to understand what the Regional Council's understanding is, what happens in an overflow event.

Greer: Dr Greer. I understand that most of the information held on these is largely within the TAs. Mr Blyth, I believe, had to embed himself in Wellington Water to do the analysis for the number of overflows through Porirua. I would be

surprised if they're making notifications on this, given that it's likely they'd be doing sub-daily notifications.

O'Callahan: I wouldn't have expected there would be a need for consent, because I don't know that the… Yes, I know they happen frequently, but they have to have those ongoing effects, don't they? Or am I just going down the wrong track? I'm not sure, but anyway. We'll find out what we can and report back.

McGarry: Thank you. You're correct, it is if there's significant adverse effects. But, I guess when you've had 7,000 and something in a certain time period, cumulative effects are effects, aren't they?

O'Callahan: Like I say, my understanding, I think consents are in process. There's a lot of engagement between the Regional Council and Wellington Water on that. My understanding is Wellington Water are the ones fronting the consent application on behalf of all the Councils that they're working with on this, but we know who to talk to, so we'll get the advice on that.

Nightingale: Commissioner Nightingale. Dr Greer, why is it not possible to do modelling like we've talking about with sediment and metals to quantify E. coli load reductions or to be more specific about what is needed to achieve the TAS for E. coli?

Greer: Dr Greer. It's not impossible to do that. The problem largely stems from the way in which the Te Whanganui-a-Tara science process was run.

[00.25.00]

They took a very model intensive approach for Porirua Whaitua and Ruamahanga Whaitua. Very expensive processes, partially funded by central government but still a lot of cash went into those. And they decided to try an alternative approach for Te Whanganui-a-Tara, which was the use of expert panels.

What that meant was, that there wasn't a daily time series water quality model available that you could then reinterrogate to work out the loads for E. coli not on an annual basis. So if you were so inclined, you could open up the Porirua source model, and because it calculates E. coli daily, you could work out that the 95th percentile would be over the bathing season from that model. That's not possible for Te Whanganui-a-Tara because that model doesn't exist.

To deal with that for the Table 9.2 and 8.4 attributes, I created daily models for each Target Attribute State site using a simplified approach, and then applied load reductions in different ways until the Target Attribute State was achieved. That approach relies on having data across the entire year and across a range of different flows, and because the primary contact sites is skewed towards six months of the year primarily lower flows, it's not possible to do that same modelling exercise for the primary contact sites.

I have done it for the Hutt River at Boulcott, but even for that it would be pushing the abilities of that modelling approach pretty hard to clip it to just the summer period and calculate a summer 95th percentile from it. I think that would be inappropriate.

Nightingale: Questions? We are out of time. That was all that we had on Issue 12. Have we come to the end of the agenda for today?

[00.27.47]

Nightingale: Yeah, great. Excellent. Thank you very much and we will adjourn and be back for final session of the Council evidence tomorrow before we hear from submitters, which we are very much looking forward to. So thank you very much again to the Council team. Thank you, Mr Ruddock, and we'll finish with karakia.

Ruddock: [Māori 00.28.27]

[End of recording 00.29.09]