TANK Collaborative Stakeholder Group

Meeting Twenty-Four - Record

When: Friday, 4 November 2016, 10:00am – 4:00pm

Where: Te Taiwhenua o Heretaunga, Hastings

- Note: this meeting record is not minutes per se. It is not intended to capture everything that was said; rather it is a summary of the proceedings with key comments noted. *Text in italics indicates a response from HBRC to questions posed during the meeting.*
- *Where additional information has become available subsequent to the meeting (such as answers to questions unable to be answered in the meeting), this is included in red italics [as up to 6 December 2016].*

Meeting Objectives (slide 6)

1. To understand groundwater quality and current management regime
2. To adopt an objective for managing sediment loss and indicate preferred options for meeting the objective
3. To identify threats and opportunities that might result in changes to water quality and quantity and which may need a management response.

AGENDA ITEMS

1. Welcome and karakia

2. Agenda and early discussion

- Housekeeping matters covered.
- Apologies were confirmed (see attendance table above).
- Meeting being recorded but will not be available publicly. It is recorded for the purpose of assisting in compiling the minutes.
- The meeting agenda (3 key items: groundwater quality, sediment, future considerations) and objectives were outlined.
- Ground rules for observers confirmed.
- Engagement etiquette was covered.
- Open floor for TANK members for notices and announcements

3. Item # 1 – Meeting Record 21 (slide 7)

The meeting record (with a small number of minor corrections made to Item 11) were confirmed.

One query was raised in relation to the absence of "impact of slope" as a matter raised by the TANK Group under Item #4. This is something that will feature in national regulations and the stakeholder had expected to see it covered in the minutes, in particular noting the need for more information. *This will be looked at in-part at today's meeting so any questions arising in relation to slope can be explored then*.

4. Item # 2 – Jet boat trip (slides 8-9)

Desiree confirmed the field trip is on, thanked those who have already RSVP'd and encouraged others to do the same. Everyone is to meet at the Clive boat ramp, to launch at 10am on Sunday, 20 November. From there the boats will travel to the Waitangi Estuary and then up to Whanawhana. A

bus will transport the Group back to Clive. An exemption to travel above the speed limit in the estuary is being sought.

The Jet Boat club have instructed everyone to bring warm clothes including a hat, footwear that can get wet, a packed lunch and water bottle. If it is cancelled, Desiree will send a group email at 7.30am on Sunday morning. Please let Desiree know if you want to be contacted by other means.

Action items

24.1 TANK Group members to RSVP to Desiree for the jet boat trip and the function afterwards.

24.2 TANK Group members to send Desiree ideas for where to stop on the jet boat trip.

24.3 TANK Group members to let Desiree know if they can't access email on Sunday morning and want to be contacted by phone.

5. Item # 3 – Groundwater quality (slides 10-28)

Mary-Anne spoke to an introductory slide outlining the content and format for this agenda item. This session will cover groundwater state (2009-2014) and trends (1999-2014), values-attributes using the same approach used for surface water, and a review of the current provisions in the Regional Plan related to groundwater quality followed by a break-out session looking at gaps and issues.

Dougall (HBRC Groundwater Scientist) presented some background on the location, composition and use of the Heretaunga aquifer to give context to the monitoring data. The plains is a depression area that has been filled in by sediments (mainly gravels and silt) coming down from the upper catchments over the last 250,000 years. The depth of the unconsolidated sediments is about 300-900m surrounded by the harder rock sediments on the edge of the basin (i.e. limestone, sandstone in the hill country). Most use is in the unconsolidated gravels (alluvial sediments) but some use in limestone areas.

There are 5174 bores in the aquifer plains system with an average bore depth of 32 metres. Most wells are between 25-50m which is quite shallow compared to the depth of the basin. This reflects drilling and pumping costs and the better natural water quality at shallow depth in terms of iron and manganese.

Dougall explained how the aquifer works using both a birds eye (or plan) view as well as a conceptual two-dimensional model. The conceptual model shows a cut away from Maraekakaho to the coast. The model is useful in showing the unconfined, semiconfined and confined nature of the aquifer. The confined aquifer has a layer of clay/silt that overlays the gravels. In the confined aquifer the water level will rise under pressure head when you drill through the confining silt layer. The confining layer was deposited from the last marine transgression at the end of the last ice age.

Input to the system is from rainfall and river recharge. 70-80% of recharge is from the Ngaruroro River, most of which is lost between Maraekakaho and Fernhill. This has an influence on groundwater quality. But reasonably well buffered from effects from land use in terms of recharge.

Travel time can range from days, months to years depending on where you are in the system. The main productive part of the aquifer (50m or less), is an average of 36 years old based on isotope analysis. The deeper groundwater is very old and slow moving so high levels of iron and manganese from natural mineral dissolution at depth.

The other dynamic shown in the conceptual model is spring flows at the intersection of the un/confined aquifers. This is important when thinking about attributes for the Karamu. There are major contributions of groundwater to the Karamu system on the plains at Irongate, Raupare Tutaekuri/Waimate streams as well as offshore discharge to the ocean.

Matters raised by the TANK Group:

- What is the impact of volcanism and ash etc.? Is it significant for groundwater?
  There have been frequent eruptions from Taupo volcanic zone so there are layers of ash and pumice within the sediment and a lot of reworking of the sediments by river processes on the plains. For example, around Bridge Pa there are large areas of pumice sand from flood deposits reworked from Ngaruroro river. But it is not significantly material for groundwater quality.
- Are you going to cover capacity at any stage? *No just covering quality today.*
- Our experience as irrigators, at the 30m area, is a lot of iron and manganese. Is this relatively young water and not much compared to deeper water? *Correct.*
- Around the periphery, is the limestone input very extensive? Or only in a couple of areas? *Water is in some places of the limestone but this water difficult to use as it relies on fracture flow through rock. Low producing compared to water flowing through the gravels.*
- Around Bridge Pa, Patatahi could problems with the wells be related to limestone "caking up" the system, which would remain a problem even if we dig the well deeper? *Agreed to discuss this specific question offline.*

Monitoring network

23 of the 51 monitoring sites within HBRC's network are within the Heretaunga system. A range of parameters (water chemistry and microbiology) are monitored. State is reported every five years in SOE reporting. At least 10 years is required to report on trends. The most recent reporting for state relates to 2009-2014 and the 13-year period from 1999 to 2014 for trends.

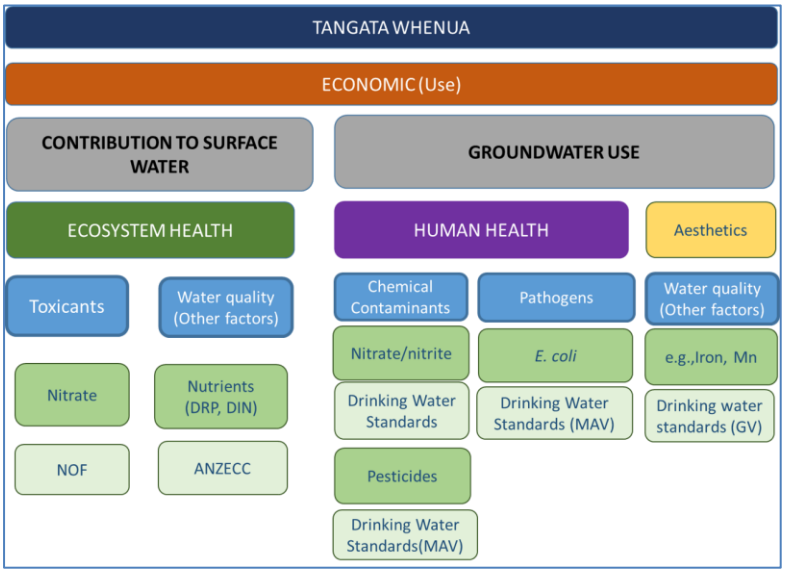
The results are compared with NZ Drinking Water Standard (stringent) and the ANZECC Irrigation Guidelines (less stringent). Both are referred to in the Regional Resource Management Plan. The NZDWS apply to groundwater bores greater than 10m deep proven to be "secure". Criteria for secure include water that is over one-year-old, a secure bore head, with no evidence of contamination.

Matters raised by the TANK Group:

- What data to we have prior to 1999? *There was some data done synoptically (spot samples) in 1997 and 1998 but none prior related to quality. The focus then was as on quantity.*

Values and Attributes

Mary-Anne spoke to a slide summarising the values discussion to-date on values. These include overarching tangata values and economic (use) values as well as contribution to surface water and use. Human health is a key value related to groundwater use. Taste and smell of water are important for use but not directly related to human health so included as separate "Aesthetics" value.



Dougall discussed the attributes related to each value. Key points included that nitrate to protect human health is much less stringent than nitrate for ecosystem health, 11.3mg/L compared with 2-3mg/L (for toxicity) respectively.

At the moment we can't compare what's in groundwater directly with the surface water. The GW/SW will help us to show this link.

E-Coli is important for drinking water and is a very stringent standard, less than 1 coliform unit (same as the detection limit).

Aesthetics are the natural geological inputs that we can't influences such as iron and manganese so aren't contaminants as such.

State and Trend Results

Dougall then presented the state and trend results from SOE monitoring for the two key attributes - Nitrate- Nitrogen and E-Coli compared to NZDWS. He also presented results for phosphorous and pesticides, including a map showing pesticide monitoring sites over-laid with landuse. Key points included:

- Nitrates: hot spots (in particular two bores with increasing trend one from high base) were in the un-confined aquifer. Dougall can provide actual monitoring results for each monitoring site. It was noted that once nitrates hit the halfway mark it triggers regular monitoring by drinking water supplier.
- Denitrification. The nitrate is consumed by bacteria which happens in the deep unconfined aquifer as well as in the stream environment.
- E-Coli: Research shows there is naturalised E-Coli in groundwater so detection may not signal a problem, particularly as monitoring wells not drinking wells. Non-compliance with DWSS only takes detection 1 in 18 samples. The most striking results are a monitor bore in Poraiti and well 10496 (in Brookvale area) which is a very shallow well in unconfined aquifer. Gaps and issues with monitoring network were discussed, particularly limitations of inherited shallow wells that pick up landuse so aren't useful in understanding groundwater condition. The intention is to review, adapt, expand data collection and monitoring network through increased funding in the next Long Term Plan. Improvements to the network will be covered in the Monitoring Plan required as part of the TANK plan change. Preference is now to drill wells at 20-30m (vs 8m) on public land for consistency of time series (rather than collecting data from private bores).
- Phosphorous: whilst not important parameter for the drinking water standard it has a consequential effect on ecosystem health where groundwater contributes to the Karamu system on the Plains. The key point to note was the higher values are in the confined aquifer which is most likely to be related to the long contact time in the aquifer but not critical as unlikely to be contributing to the Karamu system. Would be concerned if big contribution at high concentrations. The model will help us with pathways but not concentrations of Phosphorous. Traditional thinking is phosphorous sticks to soils but nationally there is thinking around whether there is a finite capacity for the absorption of phosphorous to soil. Overall no trend but the results show some interesting increases in the deeper confined aquifer but not sure what is causing it.
- Pesticides: no detection which is good news story. The programme is a national programme undertaken by ESR, testing by Agrisure Quality. Nelson as had some very small levels detected. Underpinning the programme is continuous monitoring to ensure phased-out pesticides that persist for a long term will be detected if the leach out. Dougall can give TANK Group members the full list if interested.

Matters raised by the TANK Group:

- Will we start seeing the increasing trend in Nitrate-Nitrogen flowing from the un-confined into confined aquifer? *Very hard to make the conclusion at this stage. It may well be a localised landuse effect rather than a broader issue. Need to determine the significance of the monitoring results.*
- Any clues why historically high Nitrate levels in Ngatarawha?
- Have you done well testing to see what's causing the outliers? Is there are plan to monitor/investigate the cause? *We are doing some shallow well monitoring at the moment.*

- Does the long-term regular testing around Roy Hills closed landfill inform knowledge on the state and trends of groundwater? Does HBRC get this data? *Difficult to draw conclusions from monitoring set up for a point source (old dump site) but it can enrich the data set. Yes, it comes through our compliance monitoring network.*
- Do we have wells that go deep enough to show the denitrification? *Yes, we have 100-150m monitoring wells.*
- Is this what you'd expect to see, higher nitrates in upper reaches of aquifer and dissipates through denitrification to the coast or something anomalous here? *Bit of both. But likely to be seeing localised landuse effects. The focus needs to be on areas most susceptible to contamination (unconfined aquifer) where rainfall recharge is pushing down. The GW/SW model will be help to determine if important.*
- Who are the public and private well drillers in HB? *There are currently two drilling companies working with our region – Bayliss Brothers and Honour Drilling. There are also other companies that have drilled the over 5000 wells in our region.*
- Bore 1191 shows a trend of increasing phosphorous, and was also high in Nitrate, which you put down to a localised issue, is it likely to be the same for phosphorous? *We don't know for sure but could be as in unconfined aquifer.*
- Could the unexplained increases in the trend in phosphorous be related to septic tank effluent? *In unconfined aquifer yes.*

6. Item # 4 – Planning framework for groundwater (slides 28-33)

Mary-Anne presented slides recapping the planning hierarchy (national, regional, consents) and showing the current provisions in the Regional Policy Statement (RPS) and Regional Resource Management Plan (RRMP) to reinforce we're not starting from scratch. The issues are reasonably well described in the current RPS and RRMP. However, the objectives in the RPS and RRMP are slightly inconsistent with each other and may be something we need to revisit through the TANK plan change, particularly in relation to whether we manage groundwater quality in the aquifer generally or in specific areas. Both plans have a range of policies and "toolbox" methods both regulatory and non-regulatory and specific management of activities particularly discharges in the Heretaunga Plains and rules related to those activities. Risky activities in relation to managing GW quality are mentioned in the objectives and policies with associated rules such as feedlots, application of contaminants, animal effluent, transfer stations, septic tanks, stormwater. Consents are required for many of these in the unconfined aquifer.

Breakout session

Mary-Anne and Robyn clarified the instructions for a breakout session to discuss the following questions:

1. Are the proposed attributes the right ones to focus on to manage GW values?
    a. Human health – Nitrate/nitrite, E.Coli, Pesticides
    b. Ecosystem health – Nutrients-Nitrogen
2. Is the current state acceptable? (As presented by Dougall earlier)
3. What are the gaps and issues with the way we currently manage for contaminants (current RRMP provisions, noting these are not always regulatory but may include things like investigations and monitoring)?

A member of each group reported back on the following butcher paper notes:

Question	Group	Findings	*HBRC proposed actions*

Question 1 : Attributes	Vaughan's Group	Discussion on pesticides/herbicides Is there enough regulation? NZ level regulations/audits of spray diary	*Provide information about of existing regulation with commentary*
	Hugh's Group	Current list is ok What about the other contaminants? Copper, Arsenic, other P2 determinants Though no evidence of these in Heretaunga	*Consider other contaminants e.g., Copper, Arsenic, and P2 determinants in the drinking water standard in monitoring plan.*
	Mike's Group	Phosphate No3/No2 E.coli Pesticides Surface water N	*To be considered in monitoring strategy.*
Question 2: Current state acceptability	Vaughan's Group	Current state – acceptable Natural occurring phenomenon Inputs to Aquifers – more monitoring – not enough known to increase regulations	*To be considered in monitoring strategy.*
	Hugh's Group	**Acceptability of current state and trend** Need to know why P is ↑ in confined aquifer Need to protect groundwater ecosystem to purify water Is 'confined aquifer' fully secure? Is there some influence from surface? Is age of water in monitoring wells – avg or % young water? Are there spring fed streams affected by P? Overall current state ok but some trends of concern	*Increasing trends in phosphorus to be explored by science team.* *Groundwater ecosystems is and emerging science in the research space. HBRC are advocating*
	Mike's Group	Only isolated areas of concern Possibly needing further research	
Question 3: Gaps and issues with current management of contamination	Vaughan's Group	More monitoring in the unconfined aquifer (particularly nitrogen) Do we need more controls "Land Use" at this stage?	
	Hugh's Group	Do we have enough monitoring sites in unconfined? (3 sites show a problem but unclear whether localised affect) Link better quality and quantity. Does risk go up with more abstraction? Pumping pulling more water from unconfined aquifer? P – why on up trend – DG to explore further and report back	
	Mike's Group	**Missing gaps** Point sources Feedlot management	

Matters raised by the TANK Group:

- How is the age of the water measured in the SOE wells? Averages or proportion? *The results from GNS drinking water assessment is a mean average age of 30 something and 90 years greater than 50m. If you have an old average age unlikely to have a young fraction.*
- What is causing the increasing phosphorous trend in the confined aquifer? Could it be weathering of high P retention soils. *Don't have an answer for the trend right now. But the high P state is naturally occurring from a geological source. Will explore further with GW colleagues and come back to the TANK Group.*

Where to from here

Mary-Anne thanked the Group for useful feedback on objectives for the state of groundwater quality, which will inform the next stage of plan drafting. She noted the current plan provisions already cover many of the issues raised today so likely to be tweaks rather than fundamental changes. The main outcome from today is a need to focus on investigations and monitoring going forward.

Action items

24.4 HBRC Groundwater Scientist to come back to the TANK Group with more information on the cause of increasing Phosphorous trend in the confined aquifer.

7. Item # 5 – Sediment

Unlike groundwater quality, sediment is something that is likely to result in reasonably fundamental changes to the plan. Mary-Anne described the session as taking the data and work that Barry has produced using SedNet and interpreting it.

It covered:

- A review of **why managing sediment is important**, which was previously covered in TANK meeting #23. These are negative effects on water quality values (ecosystem health, social/cultural, Uu, Mauri, Wairua, flood control) and attributes (clarity/turbidity, deposited sediment, MCI, mud in estuary as well as sediment pathways link to Phosphorous and E.coli).
- **How we reduce sediment loss**, which is well-known from many decades of management history in the HB region under the Soil Conservation and Rivers Control Act enacted in the 1940s. For example, more vegetation, less time/area with exposed soil, timing of exposure of bare soil to elements, new techniques such as direct drill seed planting, cultivation according to contour, wind breaks, set-backs from rivers/streams/drains and stock exclusion/fencing.
- **How much difference we can make** (with the help of modelling). The key message from the data is that about one third is from natural sources, therefore two-thirds is what we can influence. Managing landslides on pastoral hill country through stabilisation planting would result in 30-35% reduction of total sediment loss. This is based on an area of 113,500ha which within it will contain areas of land that are at risk of erosion i.e. the whole of the 113,500 is not at risk of erosion. *In reality this area would be more in the region of 5,000 ha of land that is directly at risk of erosion and needing remediation.* There is also an estimated 715 km of unexcluded 2nd to 4th order river corridor on farm land that if stock could be excluded could result in a further 5% of total sediment loss. The 715km includes dairy, sheep and beef, short term rotation cropping, orchards and vineyards but excludes forestry, urban areas and rivers in DOC estate. Sandy noted that although a small percentage, 5% is cumulative and would overtime have a significant instream impact. The effect of other measures such as improved land use practices (e.g. cultivation techniques/setbacks) and other soil conservation works (e.g. wetlands, sediment ponds) is uncertain and we can't model it in SedNet. Research is underway in these areas. This is relevant when we talk about regulation and land use controls. Mary-Anne summarised the information presented into an indicative cost and benefit

table. This gives a very broad, catchment-scale understanding of the size of sediment problem and solutions to help determine the management objective we set for sediment loss.

Costs and effectiveness of mitigation – indicative only

Erosion Mitigation Measure	Cost	Effectiveness	Contribution to total sediment load	Estimated Cost
Pole planting for slip control	Space planted poles at 30-50 trees/ha $800/hectare	Effectiveness 70-80% reduction in slips compared with pasture	~30-35%	56500 - 113000ha $45.2m - $90m
Fencing for stock exclusion	Fencing costs vary; $3/m - temporary $18-20/m – post and wire $36/m - deer	Up to 80%	~5%	$2.1m -$12.8m ($3 -$18/m)
Other measures	Variable	Variable	Unknown	

In summary, the table is showing that about one third (35-40%) of total sediment loss (or 50% of anthropogenic impacts) would be mitigated by stabilisation planting of erodible land and fencing of riverbanks at a cost of between roughly $50-100 million over 10 years. *It should be noted that as mentioned in the text the actual amount of hill country land that would benefit from remediation is actually closer to 5,000 ha than the 113,000 ha mentioned in the table above. This in turn would dramatically reduce pole planting costs to around the $4,000,000 mark.*

- **What the management objective should be.** The TANK Group members were asked to vote on their preferred management objective for sediment loss over the next 10 years or beyond by a show of hands. The starting point for consideration was 20% reduction over 10 years. No decision was made with the Group split between 10-30% and a desire to have both short and longer-term goals. One Group member did not vote citing the need for more information.

<u>Matters raised by TANK Group members:</u>

- When you say DOC Estate do you mean you've taken out Kaweka Park etc not the smaller reserves? The DOC estate was calculated using the GIS layer provided by DOC I believe this layer includes all DoC owned or managed land.
- When you exclude DOC land do you exclude marginal strips as well? These strips could be significant in terms of riverbank that could have stock excluded so may be worth revisiting. *Yes, the model uses the GIS layer we got from DOC which is all DOC land. All the data is reviewed as the model develops and new data becomes available.*
- Does the overestimation in area (the 113,000 ha) mean the estimate of sediment tonnage is similarly over-estimated? *No, the 113,000 ha is the total area covered by the individual watersheds (polygons) that contain within them some land at risk of erosion. Each watershed has been converted to what is called an 'erosion terrain' which is made up of a combination of topography, rock type, rainfall and associated erosion processes and rates. From that combination it can be predicted how much sediment would be produced under those conditions and by what process within that watershed. The resolution of the model does not go below the watershed so an exact location of each erosion type within the watershed cannot be shown for each erosion process. As with all models there will be a margin of error around the tonnage estimate, but we can be confident that the stated "52% (noting this figure is likely to change as the modelling is refined, the latest figure being 50%) of total sediment loss within TANK is from landslides" relative to other sources is accurate. Tonnage is also partially calibrated with in-stream impacts and rolled back up the hill. The overestimate of area affected by*

landslides is an issue because it affects the total cost of treatment. That is, a smaller area will actually mean it costs less to treat the same amount of sediment tonnage. By looking at an associated model (the Highly Erodible Land model) we can predict that approximately only 5,000 ha of land would require remediation. Further work will be done to refine the area estimate. It is also proposed that a sub-group be tasked with addressing the limitations of the model.

- In terms of riverbanks is this only about stock exclusion, or does it also account for other sediment processes, for example forestry planted right up to river? *To estimate the riverbank lengths, we looked at second to fourth order rivers and the current land use/cover. If the land is in forestry it is assumed stock is excluded. SedNet is a snap shot in time so if the land use changes as shown in new imagery the model would need to recalculate the sediment loss.*
- Given significant causes of sediment is 70% chronic events from major climate/storm events and 30% from diffuse loss should we focus or management/policy approaches on the 30% that we can influence? *SedNet is a long term model so it averages out large scale events. How you manage land will effect both landslide and riverbanks sediment loss. For example, during Cyclone Bola, soil retention was much better in planted areas. What SedNet is good at is showing the relative risk between areas. The big events will affect the high risk areas so they should be the areas for greatest management focus for fencing, planting etc.*
- Is there a threshold where the amount of sediment becomes harder to flush? *Definitely, but depends on characteristics of stream, for example velocity.*
- Is the contribution relative or equal between the hill country and the flats? It would be easier to fence off the flats but would that result in the same reduction relative to fencing the hill country? *Hard to generalise as it would depend on stream morphology (how incised banks are), stocking rates etc.*
- Are our channelized streams (and its impact on sediment loss) factored into SedNet? *No SedNet does not include any man-made earthworks or channelization. SedNet assumes if you fence, there will be regrowth resulting in stronger riverbanks. A sub-model in SedNet assumes 80% reduction in erosion. Therefore, there will still be 20% erosion still occurring even with stock exclusion. Stock exclusion is estimated to have a 5% reduction in sediment loss (as well as co-benefits related to nutrients) but demonstrated we cannot fix the sediment problem from fencing stock.*
- Do you think the sediment loss into the Hawke Bay is having an impact on the sea floor and habitat for marine species? *This was covered by Oli in the previous TANK meeting. We don't have a big coastal monitoring programme so there isn't enough science to definitively connect costs and benefits or how much we need to reduce the sediment to have an impact on the attributes we are measuring. We just know that reducing sediment will have an impact but we don't know by how much. It is likely that sediment in the coastal area is increasingly becoming a problem and is an area that HBRC are investing a lot more in. Any In-stream benefits from this process will accrue to the coastal environment.*
- Are we doing any work to investigate the value of making these improvements? My understanding is that HBRC did some small scale projects resulting from the 2011 event to value keeping the soil on the land. Without this, a spend number is a spend number, what is the return on investment we are after? *After last's TANK Group meeting, Mary-Anne sent some links to studies that looked at the costs and benefits at the farm scale. (see* http://www.hbrc.govt.nz/assets/Document-Library/Fact-Sheets/McIvorIan-storm-costs.pdf). *Another report of interest is Estelle Dominaties report which quantifies the ecosystem service value from soil conservation, now on the portal or available on request. But what we don't know, is how to assess the benefits to the attributes that we're setting our objectives around. Budget was approved this morning to undertake a literature review around the impacts of sediment on ecological function in the coastal environment which we will bring back to TANK table. However, the key point is we haven't done enough monitoring traditionally to confidently quantify the direct ecological benefits from any particular number and will require an ongoing monitoring. Therefore, we are suggesting we set a target, monitor over time the benefits from the interventions and when it comes time to review the plan we can do more or less. This also needs to be packaged up with on-farm productivity costs and other costs and benefits.*

- A recommendation was made in regard to using Whaingaroa Harbour in the Waikato as an example of good practise. They have a track record of stock exclusion, planting and retiring and the effect it had on sediment build-up in the harbour.
- In relation to timeframe, 10 years seems quite short in relation to planting erodible land, would 20 years be a better timeframe? *10 years is the life of the plan at which we would check effectiveness rather than the target achievement date. We can't be certain in what we can achieve in 10 years so suggesting an adaptive approach.*
- There is also the area of cultivation (as well as planting and stock exclusion) to consider to reduce sediment loss. *The impact of this is uncertain but there is research underway. Cultivation rate by slope and setbacks could be looked at as possible rules. Ways we might achieve the target will be discussed after lunch.*

Action items

24.5 HBRC to come back with more information on the costs and benefits of sediment reduction, including quantified effects on the coastal environment, instream attributes, biodiversity benefits, sediment removal for flood conveyance and on-farm productivity.

24.6 A sub-group is tasked with ironing out some of the flaws with the SedNet model, particularly the overestimation of erodable area by erosion type.

8. Item # 6 – Existing provisions and toolbox for managing sediment

Mary-Anne presented a slide on the toolbox of instrument we have to achieve the management objective, including regulation (national and local rules), incentives (subsidies, grants, industry/landowner commitment), education/advocacy (industry focussed Farm Plans) and works and services (Council advice and support).

She then presented a summary of the existing provisions in the RRMP related to sediment. She noted that issues are reasonably well described, there is a comprehensive set of objectives but the policies are a bit light (including some new ones related to TukiTuki) suggesting a need for more targeted policies to manage sediment specific to the TANK catchment. There is also a rule in relation to land disturbance and vegetation that could use a bit of work.

Mary-Anne then presented a toolbox of possible management packages. These can either work together or separately.

Possible Management Response Package

New targeted policy for TANK

Regulation options	Incentives / subsidies (industry commitment)	Advocacy/ Education (Farm Plans/GAP)
National rules Plantation forestry NES Stock Exclusion *details still tbc*	Subsidy for targeted soil and erosion control works programme Specified programme of work Industry and landowner commitment to outcomes Monitored and reported on	Options include; (i) regulation for all farms, (ii) targeted farm plan regulations – required in specified areas (iii) industry commitment and support - targeted to key areas. Farm Plans developed and advocated for as farm management tool.
More stringent local forestry/stock exclusion rules? Other targeted local rules setbacks cultivation winter grazing etc		

Regulation options within the toolbox include national and regional/local rules. National rules are coming for managing environmental impacts from plantation forestry (early 2017) and stock exclusion (mid 2017). We will need to consider whether the national standards are tough enough to achieve TANK objectives or whether we require higher levels of performance. We will refine our thinking as more information comes out about the national regulations. Other ideas for rules to consider include land disturbance rules around cultivation setbacks. There are already best practice requirements for setbacks of at least 3m from waterways in the RRM but there is an opportunity to require others to do it. There is work currently underway about the impact of feedlots based on implementation of the current rules and how they could be managed better, due in December. This could lead-on to changes to the current policy if that's what's needed. Bearing in mind that regional consistency needs to be considered.

The second column proposes a different approach for sediment management linking subsides/grants to specific and measurable soil conservation works and outcomes alongside an industry commitment to get the work done within a timeframe. It is unclear what this would involve but an opportunity for industry to work out a way to demonstrate to the group and the community that it is committed to changing the way it manages sediment.

The third column is about the role of Farm Plans, and gives three possible options for how they could be applied. Options include regulate all (option 1), or targeted regulation for example by worst erodible areas or by sub-catchment (option two) or as a non-regulatory tool which would focus on the output of the Farm Plan not the Farm Plan as the output (option three). The benefits and costs were presented for each option. It was noted that it will be hard to specify upfront exactly what each farm needs to do to achieve the management objective (e.g. 20% sediment reduction) as each farm is so different. This is particularly relevant to the regulatory option.

Matters raised by TANK Group members:

- If the requirements are demanded by customers, e.g. Fonterra and effluent management, industry sanctions will be more effective to elicit change than regional council enforcement.
- There are some good examples of auditing of farm plans and showing change e.g. the irrigation schemes in the South Island self-manage with farm plans at the heart of their social licence to operate. Farm plans need to be output focussed so what you do is actually making a difference. If you understand your resources and what needs to change, farm plans are really good tool.

Behaviour Change

Jim Sinner presented on recent research on what motivates behaviour change. The research distils the necessary conditions for behaviour change into three elements:

- *Understanding* the problem and the reasons for a change
- Having *ability* to change behaviour, including having the knowledge, resources and physical ability to change
- An *imperative*/ strong reason to make change – this could include a desire for the outcome being sought or a regulatory requirement.

When thinking about options for management packages, the Group need to think about what combination of approaches best covers all three elements.

Breakout session and report back

Small groups considered and reported back on the three broad approaches to sediment management (Regulation; Incentives; Advocacy/Education) to inform more detailed consideration by a working group. The breakout groups were also asked to consider what form that working group should take. The two options proposed were the Economics Assessment Working Group or a new group, for example a collective of primary sector/farming reps.

At the conclusion of the report back, it was agreed that the question of who and how the detailed analysis of sediment management packages is done, be referred to the Economic Assessment Working Group for them to consider and report back to the TANK Group. The work would need to be completed by March 2017. It was noted that the Economics Assessment Working Group (EAWG) has a mix of

farming and non-farming representatives and the cost benefit analysis of management packages fits well with the EAWG purpose as well as dovetailing nicely into the socio-economics work that it is commissioning.

It was noted, that the Tangata Whenua group were asked for advice on which experts to bring to the table, such as biological farmers (now called regenerative agriculturists), marine ecologists and an ecological economist. Cannot recall any presentation to TANK from these experts. It was suggested that Economic Assessments Group is a good place to insert them.

James responded that inserting a biological farmer advisor into EAWG around sediment management seemed appropriate and HBRC would investigate an ecological economist. HBRC are in the process of commissioning a desktop review of marine science related to the impact of sediment as there is very little primary research to draw on but we have two coastal/marine experts who are advising TANK, so satisfied that those issue will be covered to the extent we can.

Action items

24.7 HBRC to provide a link to Plan Change 6 sediment provisions, noting the TukiTuki catchment has different issues so this should be for interest rather than a model.

24.8 Economics Assessment Group to consider who and how the detailed analysis of sediment management packages should be done (due March 2017) and report back to the TANK Group.

24.9 HBRC to investigate inserting biological farming and ecological economics expertise into the Economics Assessment Working Group.

Suggestions included referring to Roger Grace's work (marine), Marjan van den Belt now at VUW (ecological economist), Phyllis Tichimin, Nicole Masters (Association Biological Farmers).

The written notes *(with additions from report back)* from of each group was:

	REGULATION OPTIONS	INCENTIVES / SUBSIDIES (INDUSTRY COMMITMENT)	ADVOCACY/ EDUCATION (FARM PLANS/GAP)
Vaughan's Group	Retirement of land (associated with subsidies)	Subsidies for retired land Options/alternatives/incentives for new/different land uses HBRC need more emphasis on advising re. land use options for optimising land use/what' appropriate. Issue: balancing public vs private benefit.	Customised plans for every farm (but also the urban will have a plan) - By sub catchment - By risk - By sector
	Preferred option- Require tailored "management plans" applicable over time for all business (urban as well as farms) **Target -** The breakout groups was split on the target. Some thought start at 30% and be persuaded down and one in the group though needed more information on impact to justify a target any greater than 10%. **Working group membership** – don't support the farmer only grouping. Need engagement of hill country people.		
Mike's Group	National rules are happening as a minimum base, then targeted to priority areas. Keep it simple. Do the basics first. Fix obvious problems: - cattle from streams - Feedlot run off into streams (except for stream clearing) - Risk assessment for cultivating hill country Keep it simple Do the basic obvious things first 80/20 rule e.g. - Cattle from permanent waterways (except for stream clearing) - Run off from feedlots controlled - Risk assessment plan & mitigation when cultivating hillsides, harvesting forests	Stock exclusion unintended consequences: - choking waterways Metres from waterway, should depend on water flow direction Target % of compliance with national regulation, national rules, industry rules, e.g. Dairy NZ "Good management practices"	- Don't believe every farm should be required to have a plan, massive undertaking, little proven benefit Benefits of best practice e.g. - preventing pugging - pole planting - further example under plan change 6. Loss of 30% of flat land farm Bio-diversity Pole plantings Pugging Subsidised help

	If you don't keep it simple, there will be: - Many unintended consequences - Poor buy in Can target compliance with base line as performance indicator		
	Preferred approach: Council role to say what needs to be achieved but industry to self-regulate, recognising some groups (red meat sector) are perhaps under-regulated compared with other sectors. Advocacy and education around best land use/practice. **Target**: whatever target is set needs to be supported by value proposition **Working group membership**: Hill country farmers, Beef+Lamb, and meat processing companies to be involved (as have leverage)		
Jim's Group	Retirement Market pull is very important - May want local setback rules for stock exclusion – need to quantify sediment benefit vs. cost - Targeted rules for stock exclusion on steep country where upgraded for erosion control. - May need rules for cultivation on land >X degrees' slope	- Provide education about costs of sediment loss which is already a subsidy to land user. - Subsidies lead to behaviour for the wrong reason - Potential benefit from branding for good environmental practice - Want better info on economic benefits & costs of erosion control (pg24 in slides) Costs of not managing sediment.	- Land users are difficult audience to reach very hands-on 'kinetic' people - Sectors need to lead from the front & practice what they preach - Urban sector could better understand farming sector - Making farm practices more 'visible' will lead to change (social/peer pressure) - A small % of people can lead to change.
	Gaps: More information on economics and costs for sediment control. **Preferred approach**: national regulations plus local rules (see first column). Not keen on subsidies. **Other**: Have asked for speakers (e.g. biological farmers) who could have given us some more evidence of land management options and the effects of sediment. **Target**: desire for ambitious improvement but reluctance to put a figure on it without more information. Some support for aspirational target. **Working group membership**: not discussed		

9. Item # 7 – Future consideration for water quality and water quantity

This agenda item was as a brainstorming exercise to identify the risks associated with potential changes in the future that could impact on the state and trends of water quality/quantity attributes. Size and scale are important here as it needs to be a large enough change for the effect to show in monitoring and/or modelling. Possible examples include climate change and dairying conversions. However, the group generally agreed that dairy isn't a significant risk in the Heretaunga plains as all suitable land was converted in the last round of high prices. The potential changes identified as high risk will be the focus of future work, including modelling and policy options.

Please note the table below includes what was discussed with some additional refinements added since the meeting. This is work-in-progress and will be circulated for TANK Group member input.

Potential change		Effect	Possible management responses	Planning horizon	Likelihood & consequence	RISK***
Climate change		More frequent and extreme weather – drier droughts and rain bombs	• Allocate less water • Water augmentation • More storage	Long term	Likely Minor*	Low
Intensification of existing land uses (with more inputs i.e. water, nutrients and food)**	Arable	Increased demand for (light) irrigation Increased sediment entering water		Short term		
	Horticulture		•	Short term		
	Viticulture					
	Pastoral farming	Increased demand for irrigation Uncertain sediment impacts (may be benefits with increased pasture cover)				
	Dairy (feedlots)					
Land use changes (driven by market forces)	Dairy conversions from pastoral	Increased nutrients and sediment entering waterways			Low	
	Pipfruit conversions	Increased demand for irrigation			High Medium	
	Arable conversions					
	Native bush clearance to farming					
	Native bush clearance to forestry					
Land use change (driven by other factors)	Clearance of exotics on DOC land (not replanted)	Increased sediment entering water				
Attitudes and awareness/ behaviour change					High Low	

Urban growth	Increased stormwater discharges	• HPUDs (but not always followed) • Land use rules in Regional Plan	Short term		
Tourism		•			
Water bottling	Increased demand for water	• Hierarchy of water use			

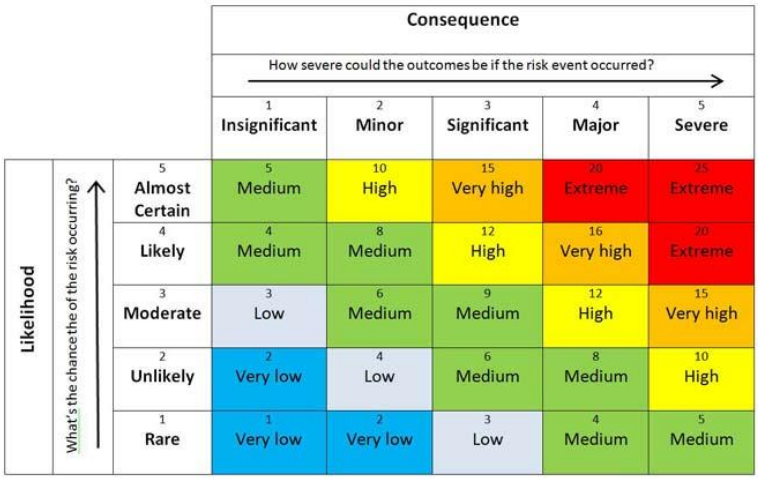
Notes:

* Climate change models show range of outcomes, are generally base on a 100-year outlook and exhibit high levels of uncertainty.

** Intensification of existing land use resulting in increased production with the same or less inputs (achieved through technology for example) is not included in the table as this is not something we need to manage for.

*** Risk is a combination of likelihood, consequence and in this case the planning horizon.

KEY	
Long term	50-100 years
Medium term	10-30 years
Short tem	1-10 years



Matters raised by TANK Group members included (not covered in the table above):

- Even with a dryer climate there will be intensification of horticulture to meet demand but this is likely to reduce the environmental footprint. But must intensify with the community's support.
- Land use rules for activities on land above the unconfined aquifer have recently been removed from the Hastings District Plan. *We will come back with some advice on this as unaware of their removal and had intended to mirror these in the TANK plan change.*
- Behaviour change is driven by consumer markets. Primary production is not a static thing it is constantly improving its environmental footprint (e.g. more efficient with water, less chemical use).
- Increasing community awareness and demand for environmental management.
- Branding and regional pride. *These are things that can be picked up in the non-regulatory parts of the plan.*
- Increasing tourism numbers is a risk and an opportunity.
- DOC recently received hundreds of thousands of dollars to remove wilding pines up around the Comet Ranges (the top range of Ngaruroro and Tutaekuri). The project involves around 17,000ha, 7,000 of which is densely planted. Timeframe is for next four years. *DOC and HBRC to take offline, quantify impacts and bring back to the TANK Group.*

- Is there are perceived possibility or probability of increased irrigation demand over the next 10 years of any significance within the TANK catchments? Next TANK meeting will look at scenario options to model so any information on this will be helpful. Informal study on Ngaruroro, possibly 1600 hectares over the next 20 years. HBRC pre-feasibility study was 6,000 ha. Likelihood that some vines could come out and be replaced by trees, there is quite a lot of land in light soils around Bridge Pa for example that based on current economics would convert from vines to apple trees if there was the water. Water is the only thing holding it back.
- Arable sector is seeing increased demand for our products and see Ruataniwha as an opportunity at some stage in the future. Research is going into light irrigation (as opposed to heavy).

Grass	1.4	
Arable	1.15	(vege crops)
Pipfruit	0.8	
Viticulture	0.6	

- Water bottling. The intention for the TANK Group to consider hierarchy of water needs was noted and the desirability to commission desktop research into demand and growth potential of this sector, size of the industry and how fast is it growing nationally and internationally. It was noted that there is a lot of community interest in the issue and it is perceived to be out of control (rightly or wrongly) but that council has no tools to address it. Agreed to commission research.

Action items

24.10	HBRC to come back to the TANK Group with some advice on the purported changes to the Hastings District Council regarding Land use rules for activities on land above the unconfined aquifer
24.11	DOC and HBRC to discuss the recent funding for wildling pines offline, quantify impacts and bring advice to the TANK group.
24.12	HBRC to commission desktop research into the potential growth and demand for water bottling in the region.
24.13	Desiree to summarise the list of issues and call for any additional issues to be added, particularly as many people had left the meeting by this stage.

10. Item # 8 – Next meeting agenda

Mary-Anne presented a slide on next steps in the process. The next TANK meeting will include draft solutions for the Karamu and the Heretaunga GW/SW model and scenarios. Unlikely to have time to address Waitangi Estuary state/trends and may have to start early to get though all the work.

11. Item # 9 – Verbal Updates from Working Groups (slide 9)

Engagement Working Group

Drew encouraged everyone to grab a new information booklet to distribute to networks. It is dated November 2016 with an expectation that it will need updating around March 2017.

At a recent working group meeting there was general consensus that current communications are working well with no push to communicate more widely before the end of the year, particularly in light of pending WCO. Think Tank and media releases will continue with a review planned in the new year to step up communications with wider community, particularly in relation to options and costs. Happy to take any suggestions on what we might do. Will look into video opportunities, particularly related the tangata whenua values and attributes, for example visual projects like the dredging project at Kohupatiki Marae.

The group was cautious about making the big sell of TANK if it was going to be overtaken by the WCO before we got out message out. The minister hasn't yet established the tribunal. Last week, we meet with the consultants working for the applicants and they are presently trying to pull together a meeting between applicants and HBRC to discuss process. Close enough to Christmas now that is unlikely to be publically notified this year.

Economic Assessments

Mary-Anne gave a brief verbal update in relation to the RFP for socio-economic work. Four proposal were received, currently shortlisting against agreed criteria and will then hold interviews.

Stormwater

In the absence of Rina, Mary-Anne gave an update of the most recent meeting of the working group, which looked at the overlap between TA and regional council controls. The group intend to go to Auckland to observe best practice in terms of both receiving environmental and instream values. Also discussed the need to amend the RPS to enable TAs to manage land use in relation to risks around stormwater management, legacy and new discharges. The intention is to embed the stormwater plan in the TANK Plan Change for Napier, Hastings and Havelock North (rather than a discrete stormwater plan) as this would go against the principle of integrated management. This needs to be agreed by the Regional Planning Committee. It was noted that the TAs have been proactively addressing high risk businesses. Advocating every business has an environmental plan (not just farmers). Improvements come at a cost but many in train already.

Wetlands

Nothing to report. Group has not yet convened. Gavin is in the middle of Environment court negotiations regarding what is a wetland. It was noted that Lake Runanga needs a lot of work.

Mana whenua

The Mana whenua group has completed is values to attributes report and it is currently being reviewed by HBRC. The Group, including the treaty settlement groups, plan to meet before 14 December to look at the TOR and representation on working groups as well as finalising the engagement plan. Joella and Joyce-Anne to coordinate.

Action items

24.14 HBRC to report back to TANK Group on when the Wetlands and Lakes Working Group is likely to be convened.

11. Karakia and close.

The Group said a karakia together and the meeting ended at 4pm.

Summary of Action Points

ID	Action item
24.1	TANK Group members to RSVP to Desiree for the jet boat trip and the social function afterwards.
24.2	TANK Group members to send Desiree ideas for where to stop on the jet boat trip.
24.3	TANK Group members to let Desiree know if they can't access email on Sunday morning and want to be contacted by phone.
24.4	HBRC Groundwater Scientist to come back to the TANK Group with more information on the cause of increasing Phosphorous trend in the confined aquifer.
24.5	HBRC to come back with more information on the costs and benefits of sediment reduction, including quantified effects on the coastal environment, instream attributes, biodiversity benefits, sediment removal for flood conveyance and on-farm productivity.
24.6	A sub-group is tasked with ironing out some of the flaws with the SedNet model, particularly the overestimation of erodable area by erosion type.
24.7	HBRC to provide a link to Plan Change 6 sediment provisions, noting the TukiTuki catchment has different issues so this should be for interest rather than a model.
24.8	Economics Assessment Group to consider who and how the detailed analysis of sediment management packages should be done (due March 2017) and report back to the TANK Group.
24.9	HBRC to investigate inserting biological farming and ecological economics expertise into the Economics Assessment Working Group.
24.10	HBRC to come back to the TANK Group with some advice on the purported changes to the Hastings District Council regarding Land use rules for activities on land above the unconfined aquifer
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24.13	Desiree to summarise the list of issues and call for any additional issues to be added, particularly as many people had left the meeting by this stage.
24.14	HBRC to report back to TANK Group on when the Wetlands and Lakes Working Group is likely to be convened.