REPORT on QUESTIONS ARISING FROM MEETING 23

	QUESTION	RESPONSE	FURTHER ACTION	ACTION BY
1	Costs/benefits mitigation measures to farmers for different land uses especially higher/steep sloped areas with low production and economic value	More detail about erosion types, locations and mitigation measures still needed	Part of further modelling Outputs will inform economic analysis	
2	Impacts of erosion on the coast	This 2016 report provides details about the coastal marine area Hawke's Bay Marine Information: Review and Research Strategy There is also an MPI report that can be referenced/further reading ' Land-based impacts on coastal ecosystems' web link: http://www.fish.govt.nz/NR/rdonlyres/C6F056C5-6863-4F71-A8D7-2D891D75DFC2/0/MorrisonAEBR37_FINALLR.pdf There is also a MAF report about anthropogenic threats to Marine Habitats – which has a large amount of info about sediments – http://fs.fish.govt.nz/Doc/22981/AEBR_93.pdf.ashx	None required	
3	How is the suitability of soils for different land uses assessed	S-map and Land Use Capability in part provides this information. LUC provides information about geology, soil type, slope, risk of erosion and long term capability to sustain productive uses. S-map provides detailed soil chemical and physical characteristics and is currently being rolled out across the region – TANK has just been completed.	None required	

4	Use of LUC in making: * Land use decisions * Policy options	Has previously been used to assign nutrient load allowances (PC6) Could be used to guide policy responses/priority Could be used in modelling scenarios	Recommendations for use of LUC where it might become appropriate	Science/policy team
5	Effect on the environment from erosion and sediment	See answer to Q2 Also refer back to Meeting 22 reporting on clarity, turbidity and suspended sediment and Meeting 23 reporting on Waitangi Estuary. Should be noted that erosion does not just affect water quality but also terrestrial ecology and other terrestrial ecosystem services.	None required	
6	Economic cost of erosion and sediment to land practices for farmers	No reports provided on effects of sediment loss and erosion on farm production - it will vary according to farm type and severity. H/e see for some information; http://www.hbrc.govt.nz/assets/Document-Library/Fact-Sheets/McIvorIan-storm-costs.pdfOther technical documents also available if required.	Reduction in costs to production as a result of erosion mitigation part of economic analysis –	Part of economic analysis
7	Opportunities for improving biodiversity through mitigation measures and specifically using native plant species like manuka that can also provide economic benefits from conversion	Already part of biodiversity strategy– there are opportunities for aligning messages	Awareness and consistency between programmes/strategies	
8	Effectiveness of sediment ponds with recreational	Some effectiveness assessments of different mitigation work already carried out.	Consider possible effectiveness of farm	Brendan/Colin

	benefits/wetlands (farm ponds) as a viable mitigation tool	Sediment pond effectiveness data for urban development and road construction projects – not for farm ponds.	dams in trapping sediment.	
9	Trend information – potential differences in erosion over time with different land uses over time	SedNet can simulate erosion potential under different land covers but not predict trends	Provide comparisons for different land cover regimes	Barry L
10	Historical data on sediment load to calibrate model it to land use	See above – SedNet can predict sediment loss from different land cover scenarios e.g. totally forested versus current land cover.	See above	
11	Modelling of mitigation for surficial and land slide erosion types	SedNet can model this through changing land cover type.	Report on mitigation measures and their effectiveness	Land Science /land managers
12	Role of subsidies	Part of management response options analysis	Still to come	Project team
13	Risks with respect to geology/sediment type and soil loss, nutrient status/contaminants risk and soil loss, and relationship to the LUC	Sednet can help with predictions but can't prioritise importance of these parameters. LUC also predicts erosion risk – but does not provide information about actual erosion	Mitigation options to be developed for further discussion	Project team
14	Soil loss impacts on ecology	See question 5		
15	Impacts of sediment loading on disruption to hydrology of streams and springs (in plains rivers)	Any information from river and drainage management team? Mary-Anne to follow up with river managers	tbc	Mary-Anne River managers
16	Peer review TAG input	SedNet will be peer reviewed internally by LCR. Still refining the model for TANK.		Barry if necessary

17	Provide for intertidal habitats to "creep" inland a result of effects of climate change and sea level rise	This may be a problem best addressed by land use control and climate change adaptation measures as well as ensuring river engineering and asset management plans allow sufficient space. It may be as simple as providing sufficient reserve areas etc, but need to avoid 'hard' edging (e.g. stop banks, roads, concrete armouring) that will prevent 'creep'. The channelized, active erosion of the Ngarururo and Tutaekuri arms of the Waitangi is particularly problematic for this. There currently is no habitat to creep. Sea level rise is only likely to lead to more erosion. Estuaries and coastal wetland areas can serve as a form of protection from sea level rise and storm surges.	Will report back options for plan changes or other methods where possible	Gary C
18	What level of sediment input to the estuary would be acceptable?	Work in progress – sediment plates recently installed. Possible core sampling to help understand historic and current rates. Caution needed in determining pre-European levels of sediment deposition by core because our estuaries have changed SIGNIFICANTLY. Project team are going to run SedNet using forested catchment and see what the % difference between current and forested is and then use this to 'guess' what may have been the pre-European rates of sediment deposition and assess against current. Draft ANZECC guidelines for sediment deposition in estuaries is the Natural Sedimentation Rate (NSR – pre-European) + 2mm per year. In speaking to the author last week, he said that when NSR can't be calculated you should use the default of 0, which means we should be aiming for an annual sediment deposition rate of 2mm per year. 2mm a year is a good target, although a more realistic goal may have to be set with expert help. The biggest problem for the	Report on feasibility/costs of core sampling.	Oli/Anna

		Waitangi are episodic events when centimetres of sediment are temporarily deposited in the estuary. A check with the engineers confirms we don't have any data about the difference that the stop banks etc make on the amount of sediment now washing through the system instead of settling on flood plains.		
19	What is an acceptable level of nutrients in the estuary?	Reporting on nutrient loads still to come. Our science experts would say "*the current loads (particularly within the Ahuriri) are too high. We need to reduce these as a matter of priority*". (in order to protect ecosystem values) The Waitangi is displaying symptoms of elevated nutrient concentrations – phytoplankton blooms and macroalgal mats.	Nutrient budgeting reports still to come	Oli/Anna
20	Change in species presence in the estuary as a result of factors like avoidance behaviours? What historical data is available? The information held by hapū may be able to be correlated with data?	There is enough literature out there that would indicate that in the Upper Ahuriri, probably the Taipo, the streams coming into the Ahuriri and possibly the Clive reach dissolved oxygen levels that do not support healthy functioning ecosystems and are likely to generate fish avoidance at least for part of the day. The species present in both estuaries has changed greatly. Species will avoid areas for a whole variety of reasons; lack of habitat, food, DO concs, nutrient tox etc. It is likely that this is occurring in the Waitangi but to what extent, or what species, we cannot say. I am discussing with the Kohupatiki crew about developing a map of historical distributions of species, mahinga kai etc. For the Waitangi this is probably the best info we have on what used to be there		
21	What is the likely scenario for species if there is no change in management practices?	The likely scenario for the Ahuriri is that the system will degrade from the top down, we will see more areas of anoxic sediment, cyanobacterial mats, expansion of invasive and very little life in		

		the sediment. If there is nothing in the sediment to eat, fish and birds will get no nutrition from the area. For the Waitangi, it is a better flushed system, but may experience increased macroalgal blooms leading to small areas of sediment anoxia and reductions of DO, re-release of DRP etc. For the Waitangi the likely scenario is continued species loss. The specifics of this are not clear whether it be bird, plant or fish species		
22	Is there a discrepancy between nutrient levels and sediment loads, i.e. high nutrients, low sediment load in the Clive River versus the high sediments, low nutrients in the Ngaruroro/Tutaekuri Rivers?	*Overview why the Karamu/Clive catchment is so different from the Tutaekuri and Ngaruroro catchments in terms of nutrients and sediment.* <u>Nutrient concentrations:</u> Apart from natural differences in geology and other factors (like climate, morphology, flow characteristcs etc) that may also be contributing factors to differences between the Tutaekuri, Ngaruroro and Karamu/Clive catchments, the following are main reasons why nutrient concentrations and sediment loads differ between the catchments. <u>Tutaekuri/Ngaruroro catchments:</u> The upper catchments of the Tutaekuri and Ngaruroro are in native forest/ shrub cover and some forestry. Water generated from this area is very low in nutrients. Nutrients are generally high in the tributaries, but dilution occurs when entering the main stems of the Tutaekuri and Ngaruroro with water from the upper catchment. Main stem nutrient concentrations moderately increase from upstream to downstream due to the input from the tributaries, and the increase is higher in the Tutaekuri (smaller area of upper catchment in native vegetation and less water) than in the Ngaruroro (larger area in native vegetation). Karamu catchment:	None required	

		The entire Karamu catchment is in pastoral farming, cropping, orchards, vinyards etc, therefore land use influences water quality over the full catchment area. In the Karamu catchment there is a higher proportion of intensive land use (cropping) than in the Tutaekuri and Ngaruroro. The nutrient yield will be modelled and we expect that this will help us understand potential differences in nutrient yields between the catchments. Nutrient concentrations are significantly higher in the Karamu catchment than in the Tutaekuri and Ngaruroro catchments. <u>Sediment load:</u> Clarity (turbidity) is similar in lower Tutaekuri and Ngaruroro and in the Karamu catchments, but the load from the Ngaruroro catchment to the estuary is highest because it is the largest catchment of the three. The Karamu catchment is a lowland catchment (flatter land), which means that sediment entering the streams gets deposited and accumulates more than in the Ngaruroro and Tutaekuri catchments.		