Key points summary: Peter Cochrane

Introduction

This provides a response to several questions asked by the Commissioners. Where necessary I have sought the comments of Dr Fisher and Mr Hamill to help inform my answers.

Q1: How much monitoring has occurred post network improvements – ie what proportion of the improvements have occurred and what are still proposed and how much more improvement will be realised?

In the December sampling event all of the roof replacement and painting work was completed and approximately 70% of the re-sleeving work was completed.

In the May and July sampling events 95% of the re-sleeving was completed.

There is still a very minor amount of work to be done to complete this work, with a delay in achieving practical completion due to material manufacture and supply delays from overseas.

Q2: What are the sources of nutrients in the stormwater post sleeving?

The sources of nutrients would include small amounts of groundwater seeping into the network (currently none, but small infiltration possible again in the future), from vegetative material in stormwater (lawn clippings, leaf fall, pollen), rainfall (rainfall in coastal areas in particular contains nitrogen), animal (bird) faeces in the catchment, dust and pollen, and from soil and sediment.

Q3: How have you landed at the phosphorus removal percentages for both devices, how certain are you that they will achieve this?

In selecting a level of performance for this treatment device, my advice (and the advice of Dr Fisher) was to choose a level of efficiency of 30% for Total Phosphorus that was conservative and provided a factor of safety to ensure that whatever was installed would be able to meet (or exceed) the treatment performance used in my assessment. A conversative assumption was preferred so the subsequent assessment of effects by myself and Dr Keesing was conservative.

It is likely that a better performance will be achieved and the conditions offered by the Department to undertake an investigation of stormwater quality following commissioning of this device will be able to verify our assessments of discharge water quality.

This monitoring could also inform the quanta of the other measures proposed by Mr Hamill in his evidence and offered by the Applicant in Condition 17B. However, my preference would be to set environmentally conservative levels for both phosphorus treatment and in-lake removal, rather than try and match or balance the two.

Draft consent condition 11 requires the installation of a proprietary treatment device with a specified long-term average treatment efficiency of 75% of suspended solids. This will see the removal of at least 30% of Total Phosphorus.

New draft consent condition E sets out monitoring of stormwater quality following the commissioning of the treatment device. This condition can confirm of verify that the quality of stormwater is the same or better than that used in my calculations.

Q4: Which device (Jellyfish or Up-Flo) do you consider to be more appropriate and why? Should the system be targeted at phosphorus removal?

The purpose of referring to these devices was to demonstrate that there are such systems that are commercially available and in use. These devices and their levels of performance were also referenced to demonstrate that these types of devices can readily deliver the levels of treatment performance that I have used for the basis of my assessment.

There is a lot of design that still needs to be completed before a final treatment device is selected, and it would be premature at this stage to indicate a preference for one device or another. At the detailed design stage we will select the proprietary treatment device based on a wide range of considerations including: physical fit within existing network, space on-site, hydraulics, treatment efficiency for nutrients and metals (to meet resource consents), construction methodology, supply timelines, cost, etc.

The treatment device needs to perform several tasks including the removal of gross pollutants, and reductions in concentrations of suspended sediment, metals and nutrients.

While targeting the treatment of any one of these contaminants is possible, consequential changes to the levels of treatment other contaminants needs to be carefully considered. To that end I would avoid the specific targeting of treatment of phosphorus for this treatment device at levels higher than those used in our assessment (ie 30%).

Q5: Do you need site specific rainfall data here?

Although not necessary, site-specific rainfall data would be useful to have as it would remove a small uncertainty about rainfall depths, the timing of rainfall and overall rainfall patterns between Spriggins Park and the Prison site. This would reduce some minor uncertainty about the calculation of contaminants loads in stormwater.

Based on this I would support a consent condition of the type described below that could be incorporated into the draft condition set.

The Consent Holder shall install and maintain a rain gauge at the site. The rain gauge shall be capable of measuring and recording rainfall at maximum interval of 10-minute.

Q6: Quantification of the improvements in stormwater quality brought about by the measures outlined by Dr Fisher in his evidence

Where possible I have quantified the effects of the measures outlined by Dr Fisher in his summary, these are outlined in the table below. These are shown as annual reductions in contaminant loads. Some of the measures outlined by Dr Fisher are regarded as good practice, and a quantitative contaminant reduction cannot be determined. Where these show a qualitative benefit they are shaded green.

	Sediment	Nitrogen	Phosphorus	Zinc	Comment
	kg/year	kg/year	kg/year	kg/year	
Historic load estimates	8,300	345	30.9	15.7	
Measures					
Work to replace or paint roofs				6.5	Improvement targeted Zn generation from galvanised roof materials
Network cleaned, sediment and other debris removed					Potentially significant removal of sediment from the network. Ongoing through SMP
Signage put in place to catchments were to the stormwater system and into the environment)					Good Practice: Unquantified reduction in risk of non-stormwater contaminant discharges (paint, solvent, food waste) to stormwater and surface water through signage. Ongoing through SMP
Prison staff were also provided with information about the network and how to care for it (e.g. how to dispose of paint, use drains etc.).					Good Practice: Unquantified reduction in risk of non-stormwater contaminant discharges to surface water through education. Ongoing through SMP
Extensive rehabilitation of the stormwater network by re-sleeving pipes and sealing subsoil drains	1,750	50	7.7		Significant reduction in nutrient loads. Sediment load reduction most likely due to cleaning of network, and on-site management.
Rainwater harvesting where feasible					Unquantified but small reduction in contaminant load due to volume reduction (the proportion of reduction will depend on volume of storage put in place and the amount of water re-used
Treatment by a proprietary stormwater device	437	35.5	5.4	3.5	75% TSS removal, 30% treatment for nutrients, 40% removal for zinc

	Sediment	Nitrogen	Phosphorus	Zinc	Comment
In-Lake nutrient removal consistent with achieving One Plan targets for lake		5.9	3.63		This is the difference between the load from treated stormwater (assuming 30% nutrient removal) and the load if stormwater TN and TP concentrations equal the in-lake One Plan targets (see Table 2 of Mr Hamill's EIC).
In-Lake nutrient removal to removal all residual nutrient load		35.5	5.38		This would remove all the residual load of TN and TP from the stormwater after treatment (assuming 30% treatment of nutrients). These residuals will be lower if the treatment is better than the assumed 30% (see Table 2 of Mr Hamill's EIC). TN loads are shown for completeness but we recommend that any conditions are focused on TP for reasons described in paragraph 34 of Mr Hamill's EIC.