

Memo

To:	Ara Poutama Aotearoa	Job No:	1003449.2000
From:	Simon Aiken	Date:	6 th July 2020
Subject:	Water quality and treatment assessment- SWMH1 and SWMH2a		

An assessment of the water quality and the effectiveness of treatment options for SWMH1 and SWMH2a is provided in the attached spreadsheet. SWMH1 and SWMH2a are the terminal manholes before the downstream discharge point and have been sampled due to the outfalls being partially or fully submerged during storm events (Figure 1).



Figure 1: Photo showing partially submerged outfall and proximity of discharge pipes.

Although the chambers are linked by a small overflow pipe that flows during higher magnitude events the manholes were sampled individually as they effectively represent different branches of the stormwater network (Figure 2). Given the proximity of the outlets we have also presented results averaged across the two manholes to represent, what is in effect, a single point source discharge (Figure 1).



Figure 2: Sampled stormwater manhole locations and names.

Samples of stormwater were taken from SWMH1 and SWMH2a at regular set intervals during a rainfall event on 24 May 2020¹ to understand changes in the composition of stormwater quality over the duration of the event². Samples were analysed for total suspended solids, total nitrogen and phosphorus, ammonia, dissolved copper, and dissolved zinc, as shown in the **Results** tab³. These results were analysed to assess levels of contamination and the effect of treatment and dilution. The process to assess stormwater quality as per the provided spreadsheet was as follows;

- **Mean Concentrations:** Event mean concentrations (average concentration of contaminants across the storm event) of the contaminants were calculated for each manhole separately and as an average of both manholes combined (see tab “Treatment and Dilution Analysis” tables 1 and 3 in accompany spreadsheet).
- **Weighted Concentrations:** In addition to averaging the concentrations of contaminants across a discharge event results were weighted to take account of relative stormwater volume that each sample represents, or storm duration to provide volume proportional results, and time, proportional weighted concentrations⁴ (see tab “Treatment and Dilution Analysis” tables 2 and 4 in accompany spreadsheet).

¹ Rainfall depths are taken from the Spriggens Park EWS. The total rainfall depth recorded was 5.5mm over 4 hours and is considered a ‘low normal’ rainfall event. The antecedent dry period was >5 days.

² Due to the nature of the stormwater network, flow monitoring and flow proportional sampling was not practical. Instead the samples were collected at regular intervals and the analytical results for each contaminant were weighted by both volume (based on the proportion of total rainfall the sample represented) and time (based on the proportion of the rainfall event that sample represented).

³ No e.coli data was collected due to a miscommunication with field staff.

⁴ See Auckland Regional Council Technical Publication 10 (TP10)

- **Treatment and Dilution Analysis:** Concentrations from mean and volume weighted analyses had factors applied to account for dilution (in the receiving environment) and treatment using a proprietary treatment device.

Based on a review of constructed and operational stormwater proprietary treatment (i.e. real-world stormwater influent data) of the sort proposed in the AEE, a conservative treatment efficiency of 40% reduction in metal concentrations and a 30% reduction in nutrients has been applied. Better treatment efficiencies may be able to be targeted to some contaminants, through the use of specific media filters. The results only represent a single rainfall event, and further sampling is programmed to get a more representative sample set.

A dilution factor of five has been applied to the results to simulate reasonable mixing. This factor was agreed in correspondence with Horizons Regional Council in October 2014. This approach assumed dilution followed stormwater treatment. The results are presented in the attached spreadsheet under the Treatment and Dilution Analysis tab.

6-Jul-20

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