

Client Ref: RM17.282.1

09 July 2018

Otago Regional Council
Private Bag 1954
DUNEDIN 9054

Attention: **Elyse Neville**
Senior Consents Officer

Dear Elyse

Milton Wastewater Treatment Plant Consent Application - Response to Request for Further Information

Please find enclosed the information requested in your letter of 17 May 2018.

We include some notes below on the spreadsheet of flow data to help with interpretation. We are happy to arrange a discussion between Michael and Isobel Oldfield and/or Sue Bennett of Stantec New Zealand if that would be of assistance:

1. Date – all data has been summarised into a per day format
2. Year – self-explanatory
3. Month – self-explanatory
4. Day – self-explanatory
5. Average Bypass Volume (L/s) – average volume of the discharge over a day, taken from the pivot table
Note: The instantaneous bypass flow has historically been determined by the information system on-site at the WWTP as the difference between the M1 flow rate and the M2 flow rate. The data is recorded in the system at the following intervals, whichever is the smallest:
 - a. Every hour or
 - b. When the flow rate at M1 or M2 changes by more than 7.5L/s from the preceding recording.The result of this is thousands individual data points, which needed to be summarised for the application in order to allow some level of analysis to be done. The daily bypass volume was therefore determined by multiplying the time interval between each recording and the next by the instantaneous flow rate of the initial record. These volumes were then summed for each day to provide an estimate of the daily bypass volume. It should be noted that flow meters M1 and M2 are different, with the M2 flow meter being much older and measuring at a different accuracy to the other meters. This results in differences between the recorded flow rates which are recorded as instantaneous bypasses but which may be artefacts of the measurement system and not real bypasses.
6. Rainfall (mm) – provided by ORC and taken from the Tablehill site
7. Rainfall in 72hrs (mm) – we defined a large rainfall event as more than 5mm over a 72 hour period, this column therefore calculates the rainfall over 72 hours (the day before, the day in question and the day after)

We defined a large rainfall event as greater than 5mm in 72 hours because this is the rate at which it is generally accepted that runoff begins to occur. During these events greater volumes are arriving at the WWTP because the runoff causes infiltration into the system. These events have therefore been classified as 'wet weather' events, i.e. events with sufficient rainfall to affect the volumes arriving at the WWTP, potentially resulting in a bypass

8. Rainfall 72 hours >threshold – this column denotes a 0 to days when rainfall in 72 hours is less than 5mm and a 1 to those days where rainfall in 72 hours is greater than 5mm
9. River flow calculated using ORC equation (m³/s) – river flow in the Tokomairiro River at the discharge point calculated using the west branch flows and an equation provided by ORC.

Note: Section 3.3 of the application discusses the river flows and how the flow at the discharge point was derived in detail.

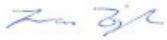
10. Duration (days) – the duration of each discharge event was calculated by subtracting the difference between each time interval that had a discharge occur (in the master spreadsheet) and then summing this if a discharge occurred all day a value of 1.0 would be reported. If there were three discharges each occurring for 20 minutes, these would equate to 60 minutes across the day or 0.04 of a day
11. Duration (days) >1min – it was considered that a discharge of less than a minute was not a real discharge (as discussed in the AEE) this column therefore removes all discharge events of less than 1 min
12. Volume in river (m³) – this column calculates the volume during each discharge for the day by converting the m³/s river flow to a m³/day flow and then multiplying this by the duration of the bypass discharge for that day
13. Bypass volume over 1min duration (m³) – this column reports the volume of only those bypass events that were over a minute in duration
14. Dilution – this column divides the river volume by the bypass volume to give the available dilution at the time of the bypass
15. Meter 4 (M4) daily flow (m³) – this reports the daily volume of the final discharge from the plant to the river, this includes both the treated discharge and the bypass volume, as M4 is located after the two discharges join close to the river bank. To get the volume of treated wastewater discharge only, column R should be subtracted (bypass volumes over 1min in duration) from column T (M4 Daily Flow) – it should be noted however that:
 - Column R is derived based on a series of calculations (subtracting M1 from M2, and then summarising the data into a daily volume) and this means that any errors in the data are compounded, and subtracting the M4 flow to give a treated wastewater discharge volume will cause a further compounding of any potential errors
 - Column R is also based on a number of assumptions, as outlined elsewhere in this explanation, so deriving the overall volume of treated wastewater on any day should be done recognising those assumptions

So, any calculation of the treated wastewater volume for any given event should be treated with care in your analysis. While we have not done the treated wastewater volume calculation in the attached spreadsheet, a comparison of the treated wastewater discharge and the bypass volume discharge for any given bypass event could be done by doing the subtraction we have outlined above to give you the treated wastewater discharge, and then comparing that to column R again.

16. Wet weather bypass volume >1 min – as discussed a wet weather event was considered an event with greater than 5mm in 72 hours, this column therefore reports all bypass volumes which occurred during the days on which there was a wet weather event (all days with a 1 in column L – rainfall 72hrs >threshold), excluding bypass events that were less than a minute long
17. Wet weather dilution >1 min – this column reports the available dilution during the wet weather bypass events as determined in the way discussed above (point 16)
18. Dry weather bypass volume – this volume reports all the bypass events that occurred when rainfall was less than 5mm in a 72 hour period and the bypass duration was greater than a minute
19. Dry weather dilution – this column reports the corresponding dilution for the dry weather events discussed above
20. Dry weather duration – this column provides the duration of each dry weather bypass event, noting that this is the total over the day and therefore may represent more than one event

Please feel free to contact me if you have any questions in relation to the information

Yours sincerely



Frances Lojkin
Principal Planner
Stantec New Zealand

Copy to: Peter Ross, Senior Projects Engineer, Clutha District Council, P O Box 25, Balclutha 9240