

Memorandum

To: Wolfgang Kanz, Gisborne District Council **Date:** 29 January 2021
From: Gareth Hall **Our Ref:** 3256820-425394796-49
Copy:
Subject: Gisborne District Council Wastewater Overflow Consent Section 92 Responses

Gisborne District Council has received a request for further information in respect of its application for a resource consent for wastewater overflows. We have been asked to respond to the following questions.

Wastewater Network Model Updates and Upgrades Report

Please clarify what the initial model conditions were (time of day, time of year, etc)? Assuming dry initial conditions may mean that system performance (i.e. wet weather spill frequency and volume) is predicted to be better than it actually is.

No specific consideration was given to how dry or wet the catchment was in generating this information. As the model was calibrated to the flow survey, the hydrologic conditions (in terms of how dry and wet the catchment was) would therefore be similar to those experienced at the time of the flow gauging.

The flow survey was undertaken from 5 April to 9 July 2014. There were numerous rainfall events during that period so dry initial conditions would not have been present. Refer to the attached AWT Flow monitoring report which includes plots of the rainfall events as well as wastewater depth and velocity, which typically show a background base flow. The model was therefore calibrated under both dry and wet conditions to represent real life rainfall events.

In the modelling of specific overflow events, a saturated catchment was assumed. Hence we consider that the predicted overflow volumes are representative of what occurs in the specified events.

Please clarify how the wastewater hydraulic model was calibrated and the suitability of that calibration for undertaking overflow frequency assessments.

The model has undergone numerous calibrations over the years. The latest calibration was based on the 2014 flow gauging referred to above. The flow gauges were mainly located in the vicinity of the sluice valve overflow locations. The purpose of these locations was to provide as accurate estimate of flows as possible at the discharge points. So the modelled overflow volumes should be accurately represented in the model.

The Wastewater Network Model Updates and Upgrades report shows the impact of reduced direct stormwater inflows (65%, 75%, 85% reduction) for the specific rainfall events. For the 2 year ARI event, upgrades to the wastewater network are then added to the model, that combined with the % reductions in direct stormwater inflows results in zero overflows for the 2 year ARI.

We consider the model provides a representative estimate of the overflow rates and volumes for the storms and scenarios that were modelled.

Please discuss the application of the TP108 storm profile, in particular the applicability to the Gisborne region and why alternative approaches (e.g. a long term simulations) were not adopted?

The TP108 storm profile is simply a nested design storm (an approach which is widely applied across the world) that has been locally adapted to reflect Auckland relative rainfall depths at different durations. Strictly speaking, the model does not use the TP108 pattern, but rather uses an equivalent approach but applied to reflect Gisborne rainfall depths at different durations based on HIRDS data for Gisborne.

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A long term simulation was not considered necessary to provide overflow performance during the specified events. It is considered that the model as run provides a suitable estimate of discharge volumes under the modelled rain events.

The wastewater hydraulic modelling utilized the now superseded HIRDS (v3) rainfall dataset. Please provide sufficient evidence that the difference between HIRDS (v3) and HIRDS (v4) does not result in significant changes to the modelled performance of the wastewater network.

While the HIRDSv4 RCP 6.0 to 2050 rainfall is very similar (0% to 3% difference) to the modelled rainfall for the 2-12 hour range, the HIRDSv4 rainfall is lower than that modelled for the durations of less than 2 hours and for the 24 hour total. The 10-minute HIRDSv4 rainfall is 11% less than modelled, while the 24-hour rainfall is 6% less. So the existing model outputs using HIRDSv3 should not be under predicting the performance of the wastewater network.

Please advise if the applicant's previous networking monitoring followed the guidance and methodology outlined in the Water NZ Infiltration and Inflow Control Manual Volume 1, 2nd edition, March 2015 to quantify:

The flow monitoring undertaken for model calibration provided flow/time graphs which show that the network is dealing with significant direct inflow (fast response), then rain derived infiltration followed by groundwater infiltration - which are consistent with the Water NZ manual.

Gisborne Wastewater Discharges to Rivers (Memo)

(ix)(c) Please provide more detail on how the modelling of the overflow discharges was undertaken, including the rain events used and how the durations were determined.

The rainfall events used were the 2 ARI event (being the GDC Drainwise Programme target containment standard) and the 10 ARI event to test compliance with the Building Code. The rainfall events were developed using rainfall depths at different durations based on HIRDS data for Gisborne as described above.

The network upgrades referred to are those from the Beca report 'Gisborne Wastewater Network Model Updates and Upgrades', to meet the 2 year ARI containment standard assuming 85% of the direct stormwater inflows have been removed by the Drainwise Programme.

The same rainfall events were used in the work which was reported in the Beca letter dated 12 December 2018. The 48 hour duration was provided by GDC. It is the longest duration that an overflow has been open in the past five years. Within this duration, a 24 rainfall duration and a 24 hour drawdown or system emptying period after the end of the rainfall were modelled.

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