Report

20 February 2026

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From	Claire Murray	**Project No.**	12684942
Project Name	Manuka Street Private Plan Change - Wastewater Review		
Subject	21A Manuka Street Wastewater Review and Modelling Assessment		

1. Introduction

We understand that a private developer has proposed to redevelop the current Castlecliff Bowling Club at 21A Manuka Street into a residential subdivision. This will require a Private Plan Change (PPC) to rezone the land from Open Space to General Residential. As part of the plan change process, the developer will need to assess the impact of the development on the council's wastewater infrastructure to help inform whether or not the plan change should be accepted and/or what controls may need to be in place to enable development.

GHD has previously built and calibrated a wastewater hydraulic model for Whanganui District Council's (WDC) Wastewater Master Plan, which has subsequently been used to assess the impact of growth on the existing network and upgrades required to service that growth. WDC have requested that GHD carry out a review of the developer's wastewater servicing assessment, and carry out our own wastewater assessment using the latest available InfoWorks model to check if there is sufficient capacity in the network to accommodate the proposed development.

The location of the development is shown with the existing wastewater network in Figure 1.

Figure 1 *Location of the proposed development and existing wastewater network*

1.1 Purpose of this report

The purpose of this report is to document the results of the wastewater review and assessment for the proposed development and to evaluate the impact of the development on the existing wastewater network using the latest InfoWorks ICM wastewater model.

1.2 Scope of work

The scope of work for this assessment includes:

– Review of the Orogen wastewater servicing assessment for 21A Manuka Street.
– Incorporate the proposed development into the existing wastewater model to assess the impact of the development on the network performance.
– Evaluate the capacity within the existing network (including growth, no network upgrades) with the additional demand from the development.
– Prepare a brief technical report summarising the findings of the modelling assessment.

1.3 Limitations

This report: has been prepared by GHD for Whanganui District Council and may only be used and relied on by Whanganui District Council for the purpose agreed between GHD and Whanganui District Council as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Whanganui District Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.4 of this report and the assumptions listed throughout this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this memorandum on the basis of information provided by the Client, The Property Group, Orogen and others who provided information to GHD (which may also include Government authorities), which GHD has not independently verified or checked for the purpose of this memorandum. GHD does not accept liability in connection with such unverified information, including errors and omissions in the memorandum which were caused by errors or omissions in that information.

GHD has carried out this assessment using the existing Infoworks ICM model ("Model"), updated as documented in this report. This assessment is therefore subject to the assumptions stated within the relevant Model Build reports. The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Models are from publicly available sources or provided by or on behalf of Whanganui District Council, including possibly through stakeholder engagements. GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs become available.

The Models are limited by the mathematical rules and assumptions that are set out in the previous reports or included in the Models and by the software environment in which the Models were developed.

1.4 Assumptions

There are a range of assumptions made in building and calibrating a hydraulic model, which are outlined in their respective model build reports. GHD has assumed that the latest status-quo models are correct and current. No additional updates to the model have been made except for the updates outlined in section 3.1.

For this assessment, the following assumptions were made:

- A population of 2.7 persons per lot for the development, which is representative of the upper end of density in local areas.
- Wastewater loading from the development is based on the following, as per guidance in NZS4404 and WDC's Engineering Standards:
  - A typical daily flow allowance of 250 litres per day
  - A dry weather diurnal peaking factor of 2.5
  - A wet weather peaking factor of 5
- A residential wastewater loading profile from the previous growth assessments for WDC has been utilised for the development. This represents a typical residential diurnal pattern representative of the area.
- The InfoWorks ICM model used for the wastewater modelling check is the "WanganuiWW.icmm" model in ICM v2024.5, network name: "1in1Y-Growth w/o SI_20/01/2026", version 53.
- No network updates have been made to the models other than those specifically noted. It is assumed that the latest model includes recent network improvements.

Additional assumptions are noted throughout this report.

2. Wastewater servicing review

A wastewater feasibility calculation has been prepared by the developer's engineer (Orogen) to assess the feasibility of connecting the development to the existing 225 mm diameter wastewater main in Manuka Street (Pipe ID: WWP01116, between WWM00201 and WWM00152). The assessment compared the wastewater demand in the catchment upstream of the Manuka Street development to the theoretical pipe capacity at the proposed connection point. Their assessment is based on the following input parameters:

– Number of people per dwelling: 3.5
– Population in catchment upstream of Manuka Street development: 280 (80 dwellings). It is not clear whether this includes population from the proposed development.
– Average dry weather flows of 250 L/person/day
– Dry weather diurnal peaking factor of 2.5 and wet weather infiltration factor of 2

Where applicable, these parameters are consistent with NZS 4404 and WDC's design standards. Both the number of people per dwelling and average dry weather flows are at the upper end of the design parameters in NZS4044.

The landuse upstream of the development is residential and there are no known commercial or industrial inflows. The existing 2026 population upstream of manhole WWM00152 to the east is estimated to be 166 (190 with permitted infill growth) in the latest version of the Infoworks ICM model (refer to catchment in Figure 2). This corresponds to a density of about 2.7 people/dwelling.

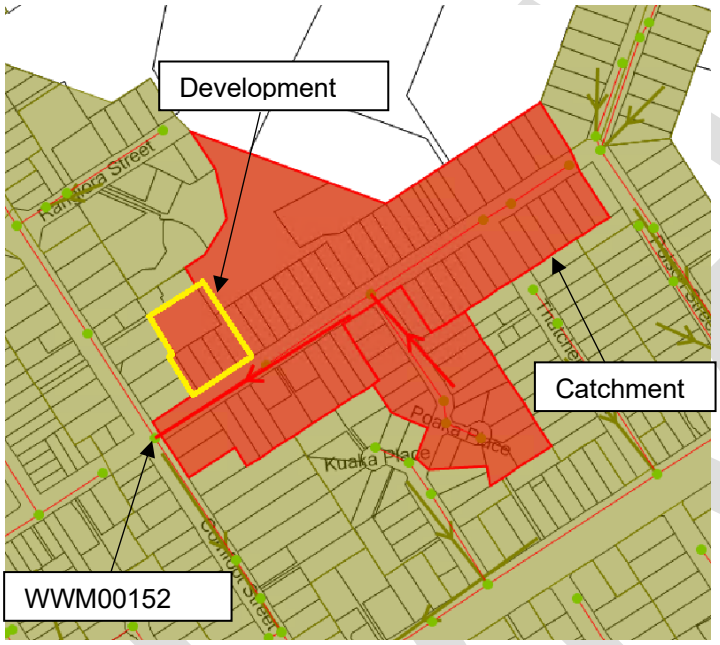


Figure 2 Catchment (shown in red) draining into manhole WWM00152 via pipe WWP01116

The delineated catchments are consistent between GHD's and Orogen's assessment; the difference in population can be explained by a higher population density and a higher number of dwellings in Orogen's assessment, suggesting that the Orogen population of 280 includes the Manuka Street development. The higher number of dwellings assumed by Orogen may also be attributed to the fact that there are multiple land parcels against a single title in several instances.

Orogen's calculations estimate the capacity of pipe WWP01116 to be approximately 41 L/s and the peak wet weather flows from the catchment upstream to be 4 L/s, suggesting capacity in the pipeline. The isolated peak wastewater flow generated from the development is not explicitly stated in the assessment. Although their calculations are in line with NZS4404, observed flows in the catchment show a much higher wet weather response. For comparison, the calibrated InfoWorks ICM model estimates a peak 1 in 1 year wet weather flow of 10.3 L/s from the catchment in Figure 2 (including infill growth and the development).

Orogen surveyed the inverts of pipe WWP01116 and thus their estimated pipe capacity differs from the pipe full capacity in the ICM model, however the pipe full capacity from the model is still higher than the estimated flows above. Downstream of the development, the network drains into the existing 300 mm diameter main on Cornfoot Street. There are no obvious constraints on the immediate downstream network that would affect the theoretical capacity of the wastewater network. However, the actual downstream network system performance needs to be assessed using the Infoworks ICM model (refer to section 3).

3. Wastewater modelling check

The impact of the development on Whanganui's wastewater network was analysed using the calibrated InfoWorks ICM wastewater model. The following two scenarios have been run for the modelling check, as agreed with WDC:

– Base Scenario: committed growth, no upgrades (i.e. existing network)

– Developed Scenario: committed growth, no upgrades (i.e. existing network), plus Manuka Street development

3.1 Wastewater modelling updates

Prior to the modelling assessment, the following updates were made in the model:

– The existing populations have been updated using the most recent Land Information New Zealand (LINZ) 2023 address points and recent development data received from WDC. The 2026 total population estimate of 44,405 for the Whanganui urban area has been agreed with WDC as a suitable estimate.
– The growth model includes committed residential growth which includes WDC greenfield growth in Springvale and Otamatea and the fully developed Mill Road industrial area.
– The growth model also includes the infill population growth enabled by the operative District Plan. This was incorporated by adding Potential Housing Units (PHU) as identified in the GIS file of 'Developable Lots for Land Parcels in the General Residential Zone (GRZ)' provided by WDC on 10 December 2025.
– Wastewater network updates were reviewed downstream of the Manuka Street development. The only update in this part of the catchment is the recent relining of the Cornfoot Street main. The pipe roughness for this pipe was reviewed in the model but considered appropriate and left as-is.

3.2 Wastewater design flows

Similar to previous modelling by GHD for WDC, a synthetic dry weather diurnal pattern was applied with an average dry weather flow (ADWF) of 250 L/person/day for the proposed development. This is at the upper range of the guideline ADWF values provided in NZS 4404 and consistent with the Orogen assessment. Peaking factors were applied for dry weather and wet weather flow, in accordance with the peaking factors recommended in NZS 4404, being 2.5 times ADWF for peak dry weather and 2 times PDWF for wet weather.

A value of 2.7 people / dwelling has been used to determine the Manuka Street development population. This figure is in line with previous modelling assessments and coincides with the national average and upper end of the densities for local areas. This equates to a population increase of 30 people for the proposed 11 lots. The development was represented in the model by adding a new subcatchment with the above parameters draining to manhole WWM00152.

3.3 Dry weather system performance

Dry weather flows from the development are shown in Figure 3.

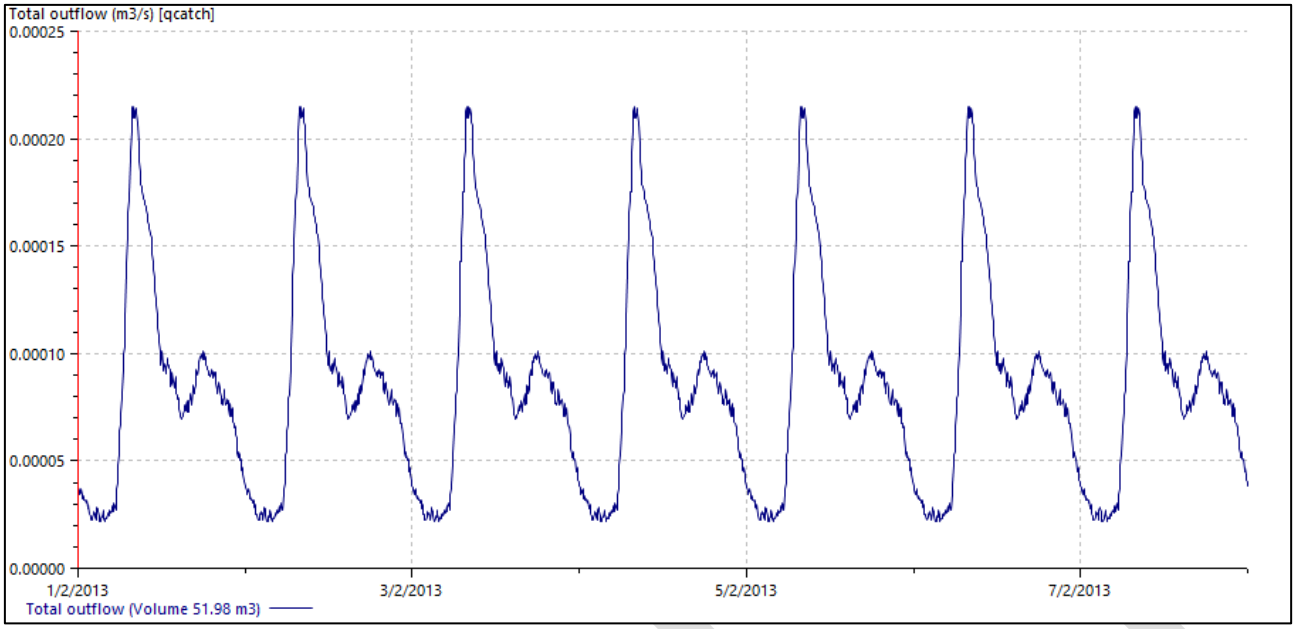
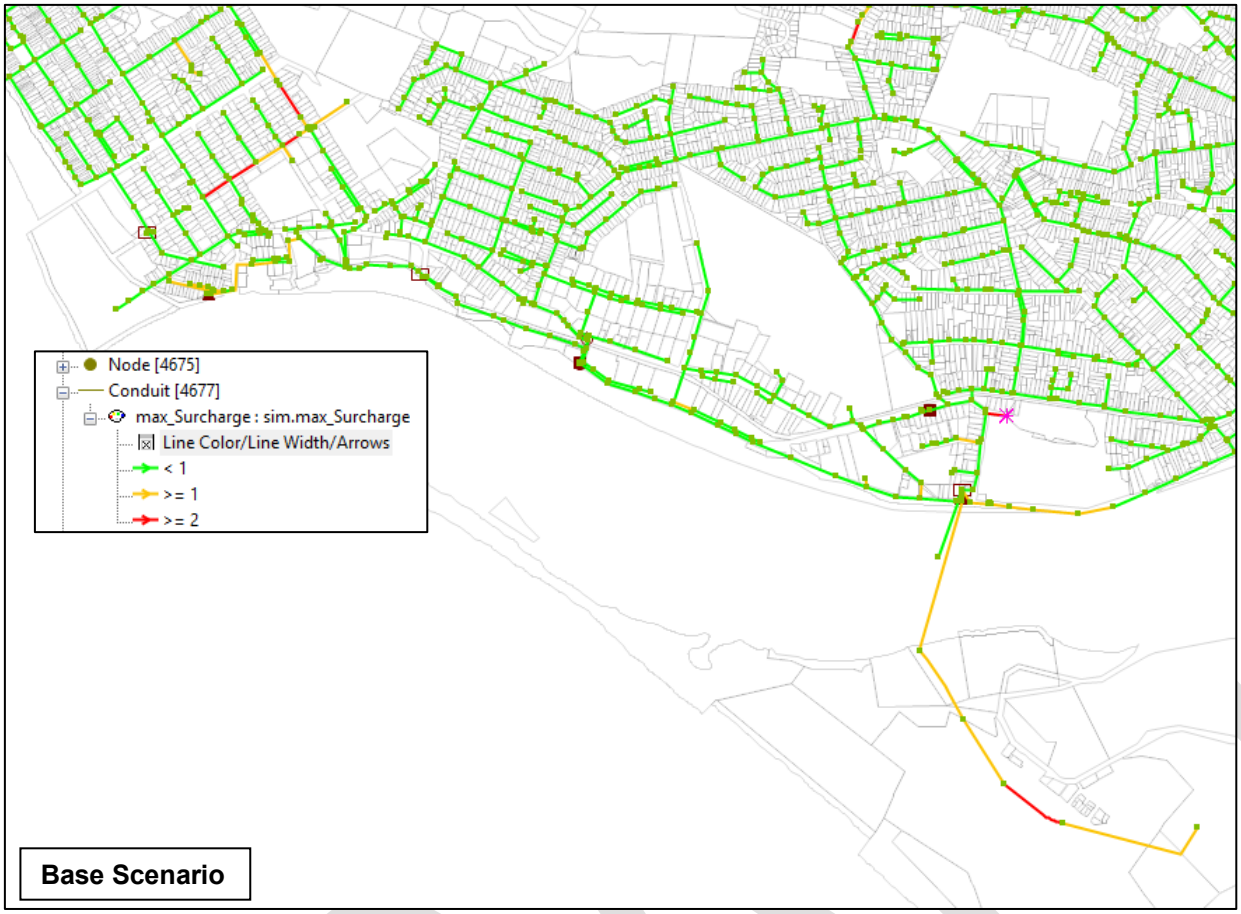


Figure 3 Dry weather flows from the development

Pipe surcharge maps for the base scenario and developed scenario are shown in Figure 4 for the vicinity of the development, and in Figure 5 for the wider network downstream to the wastewater treatment plant. A surcharge state of <1 (green) indicates that the pipe is not surcharged; a surcharge state of 1 (orange) indicates that the water level at the upstream and/or downstream end of the pipe is above the soffit level but the flow is less than or equal to the pipe's full capacity; and a surcharge state of 2 (red) indicates surcharge due to insufficient pipe capacity.

The model does not predict any change in pipe surcharge state with the addition of the development.

Figure 4 *Peak dry weather system performance maps showing pipe surcharge results – vicinity of development*



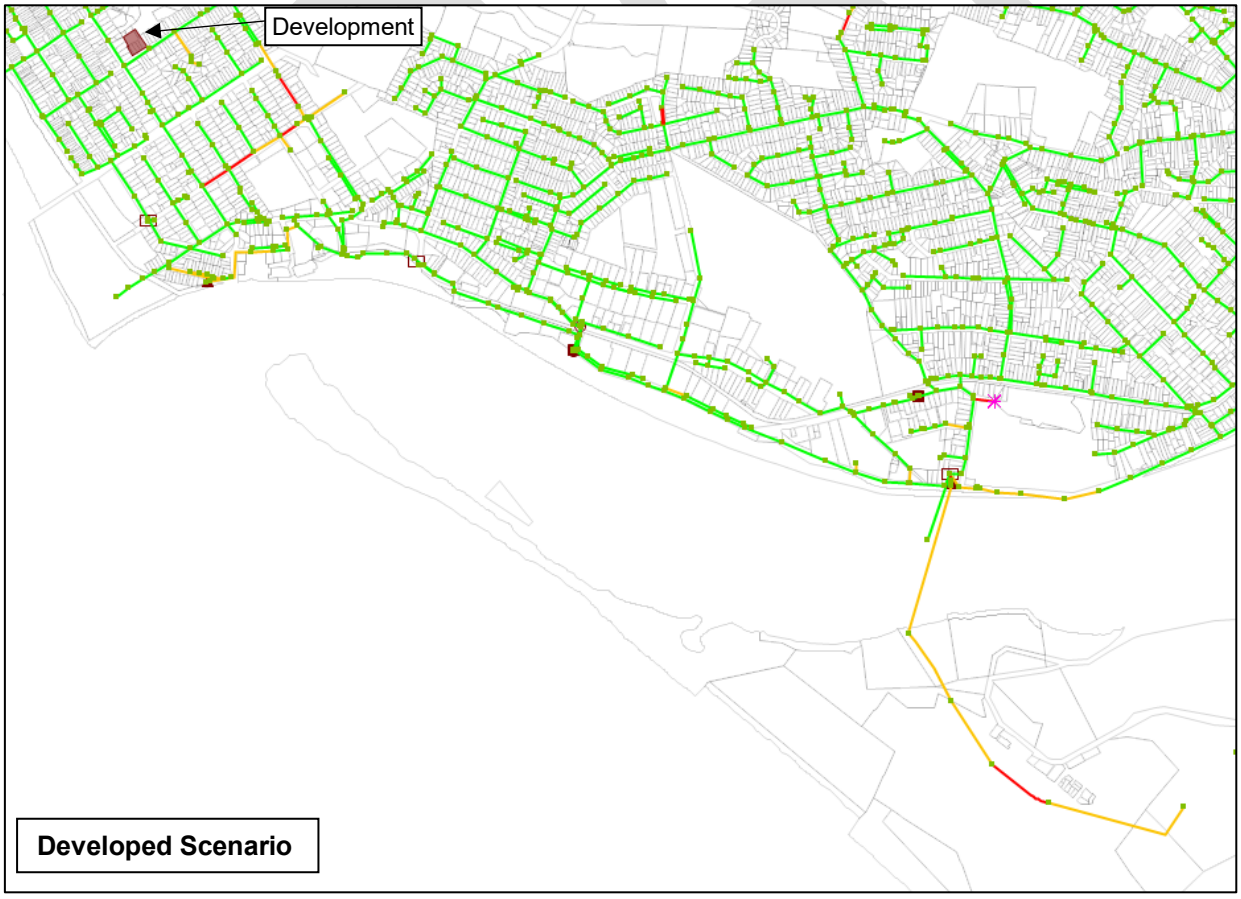


Figure 5 *Peak dry weather system performance maps showing pipe surcharge results – wider network*

3.4 Wet Weather System Performance

WDC has adopted a 1 in 1 year Level of Service (LoS) for the Whanganui urban wastewater network. The adopted 1 in 1 year flow event was used to assess the wet weather network capacity. Figure 6 shows the discharge from the development which peaks at 0.44 L/s, two times the peak dry weather flow of 0.22 L/s. Figure 7 shows the flow in existing conduit WWM00152.1, located immediately downstream of the connection manhole WWM00152 on Cornfoot Street. The hydrograph shows a higher response to the rainfall event from the existing catchment upstream. It is important to note that the peak of the rain event occurs during the night, and therefore the wet weather peaking factor is applied to the lower night-time flows. However actual flow data used for calibration also indicate a much higher wet weather peaking factor in this catchment.

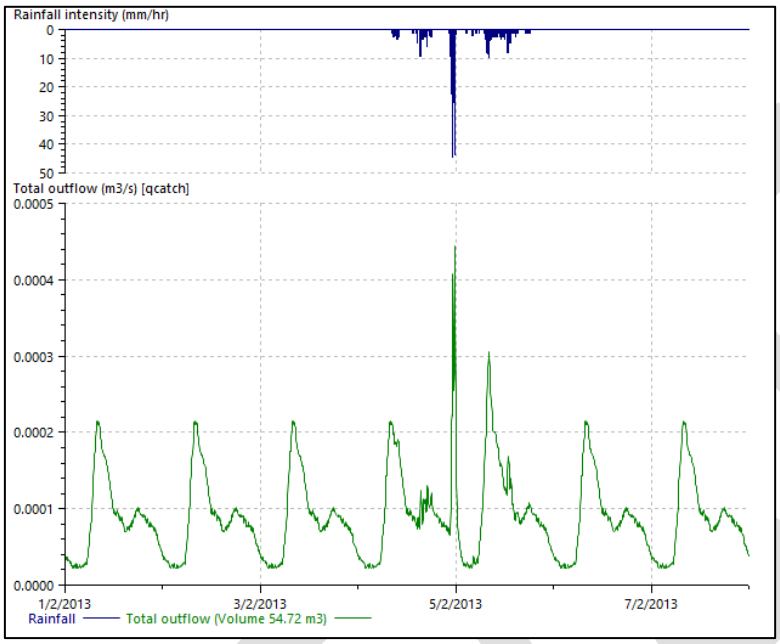


Figure 6 *Total discharge from the development – 1 in 1 year LoS event*

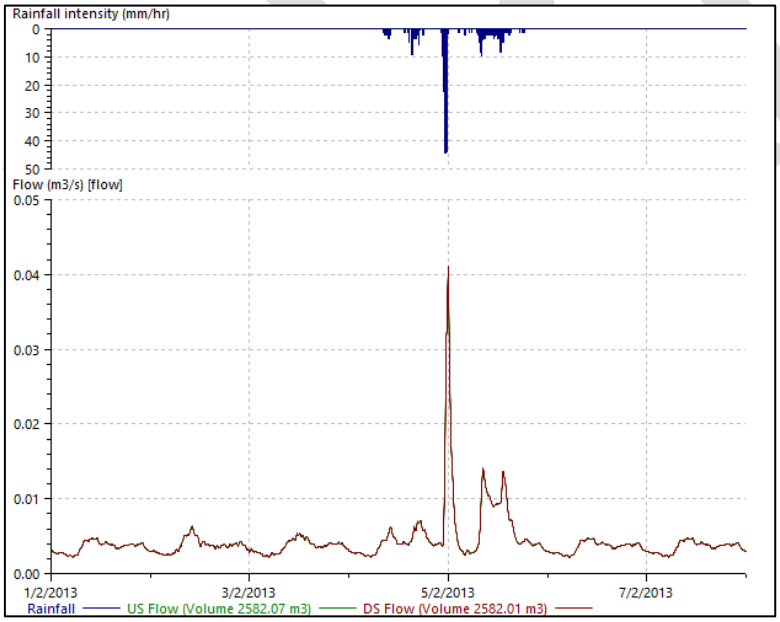
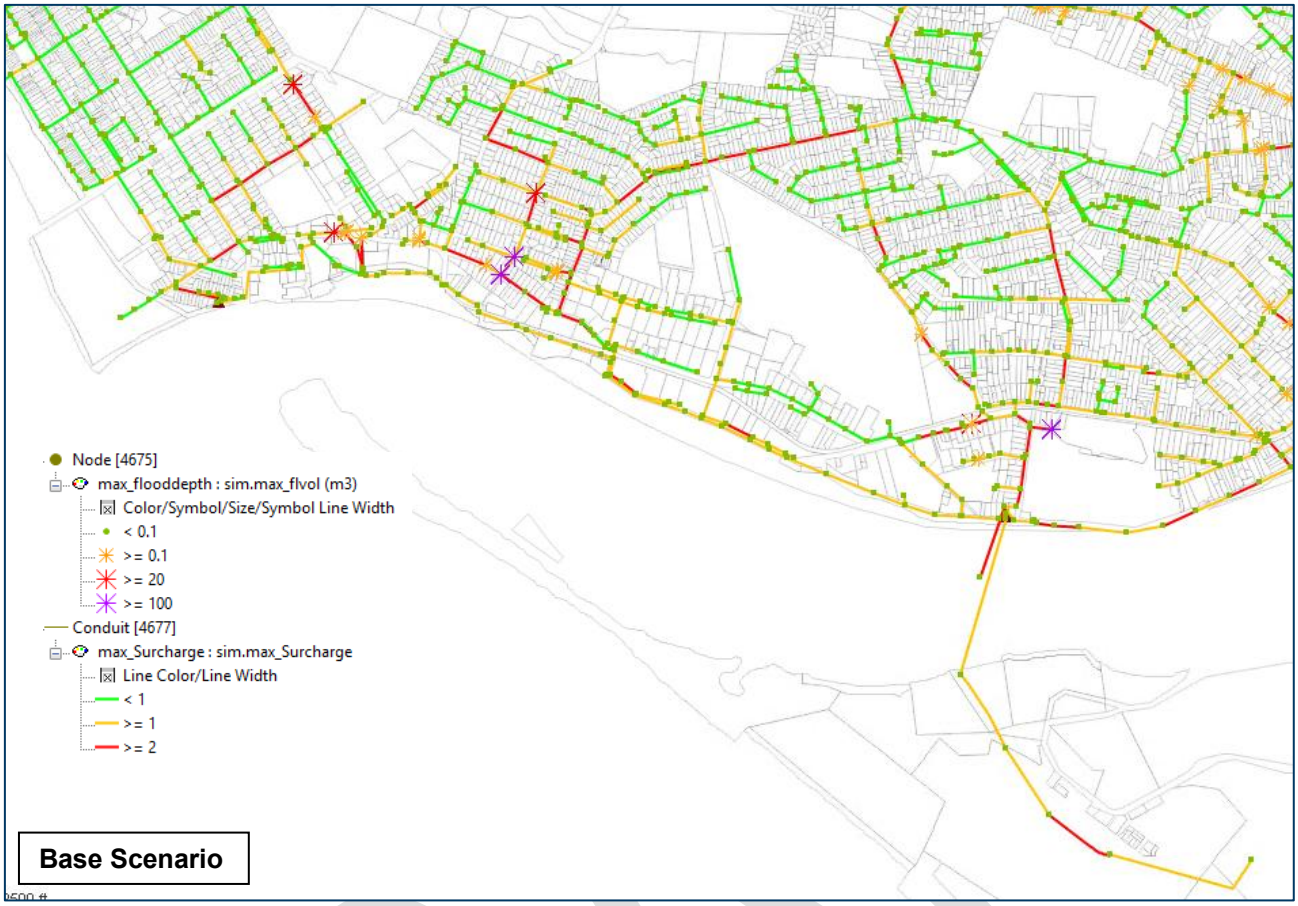


Figure 7 *Flow in pipe WWM00152.1 (base scenario, wet weather), immediately downstream of connection manhole for the new development on Cornfoot Street*

3.4.1 Manhole Spills

Manhole spilling for the base scenario and developed scenario are shown in Figure 8 for the 1 in 1 year LoS event. The model does not predict any additional manhole spills in the developed scenario when compared with the base scenario. There are some differences in the manhole spill volumes between the two scenarios, however when considering the change in volumes at each manhole, these are considered to be within the numerical accuracy of the model. That is, increases in spill volume at each manhole was less than 5 m^3.

While the contributing flow from the development is considered small in comparison to the wider network flows, the model indicates that the network is near capacity in the LoS event. Wider surcharging in the network indicates the system is sensitive to the cumulative effects of development.



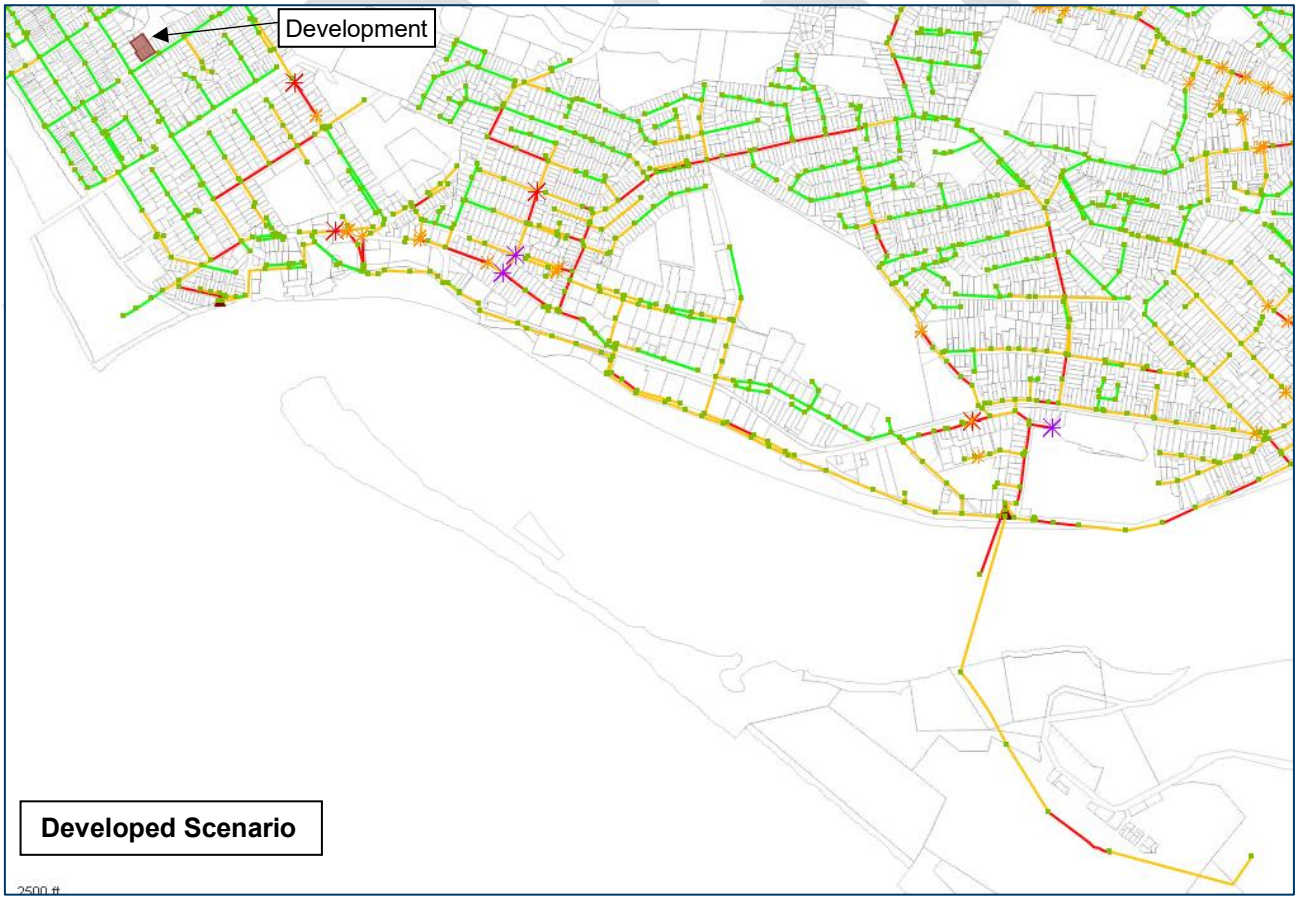


Figure 8 *Network results showing manhole spilling for 1 in 1 year LoS event*

3.4.2 Constructed Overflows

WDC's wastewater network includes several constructed overflow points. The overflow points downstream of the development that operate during the 1 in 1 year LoS event are identified in Figure 9. The model predicted overflow volumes from these overflow points are summarised in Table 1.

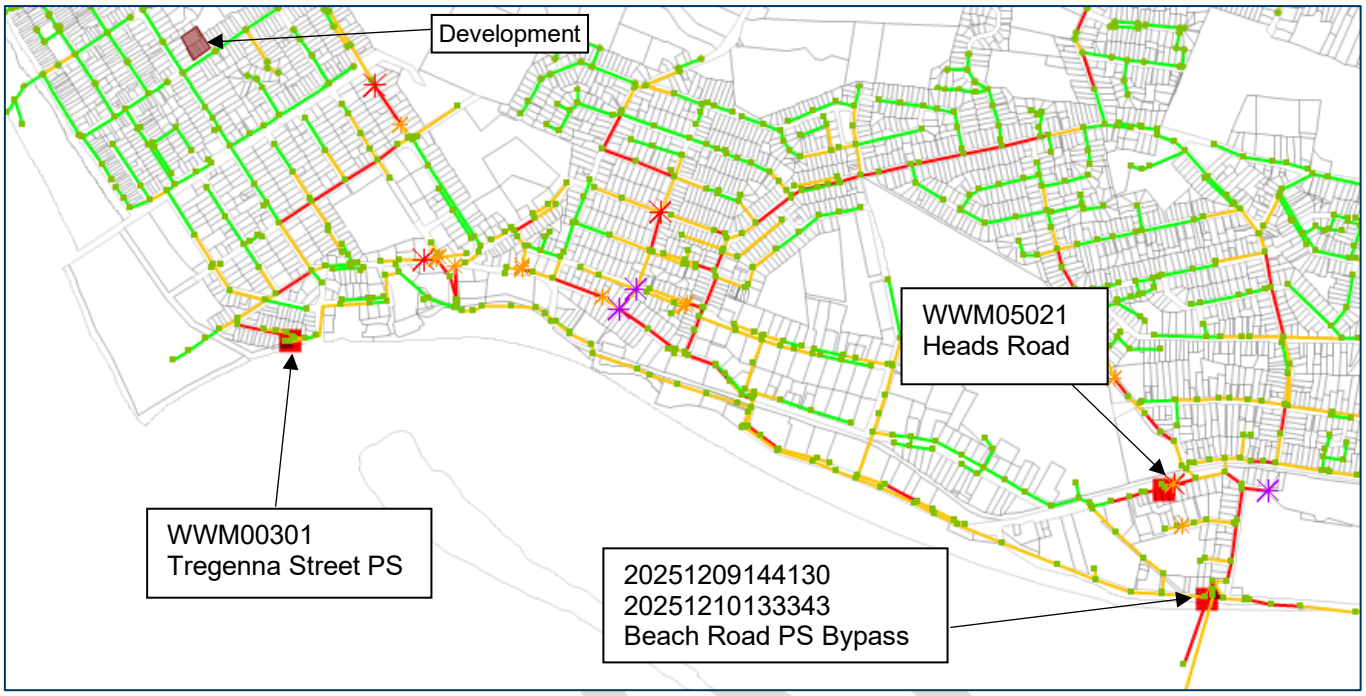


Figure 9 *WDC constructed overflow points downstream of the development (overflows shown by red squares)*

Table 1 *Comparison of constructed overflow volumes in the base and developed scenarios*

Wastewater Manhole / Asset ID	Location	Overflow Volume (m^3)			Percentage Increase due to Development
		Base Scenario	Developed Scenario*	Increase due to Development (approximate)*	
WWM00301	Tregenna Street PS	2351	2363	10	0.5%
20251209144130 20251210133343	Beach Road PS Bypass	58851	58903	50	0.1%
WWM05021	Heads Road	50.4	50.4	No increase	No increase

* The magnitude of the overflow volumes may be affected by the changes to timing of peak flows at the overflow points. This is due to the changes between the timing of pumped flows due to development and timing of peak flows from other parts of the network upstream of the overflow points.

The constructed overflow volumes at the Tregenna Street overflow and the Beach Road bypass are expected to marginally increase due to the development. WDC is aware of the wastewater network limitations and overflows at both the Tregenna overflow and the Beach Road bypass.

It is important to note that the Tregenna Street PS overflow is predicted to activate in dry weather in the base scenario. Although the isolated contribution of the development is relatively minor, the cumulative impact of city-wide growth has an impact on the system performance and increased overflows in the existing network.

4. Summary

This modelling study assessed the impact on Whanganui's wastewater network of adding a new 11-lot residential development at 21A Manuka Street. The development's impact was assessed by adding development flows at WWM00152 into WDC's calibrated Infoworks ICM wastewater model. Both the dry weather and wet weather network performance were assessed. The model did not predict any changes in pipe surcharge for the dry weather system performance and no notable change in manhole spilling was predicted in the wet weather system performance. A slight increase in overflow at the Tregenna Street pumpstation and Beach Road pumpstation was predicted, although this represents only a small percentage increase (<0.5%).

Although the isolated contribution of the development is relatively minor, the cumulative impact of city-wide growth is impacting network performance. This is seen, for example, in the activation of the Tregenna Street pumpstation overflow during dry weather flows in the base scenario which includes infill development. The model also indicates portions of the network downstream of the development that are already surcharging.

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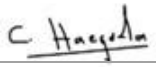
S3	DRAFT	Claire Murray	C Haegoda R Baugham		R Baugham		20/02/26

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