

Sewer Treatment System Analysis

Overview

We have conducted an analysis of the existing sewer treatment system for the area's sewer main. In accordance with NZS 4404, the average dry weather flow (ADWF) is considered to be 220 litres per person per day (L/person/day). The dilution/infiltration factor for wet weather has been assumed to be 2, and the dry weather diurnal peak factor is taken as 2.5, both as per NZS 4404.

Based on the WSP report, the number of occupants per dwelling is adopted as 2.3 persons per lot. Consequently, the average sewage flow per lot is calculated as follows:

- **Average sewage flow per lot:** $220\text{L/person/day} \times 2.3 \text{ persons/Lot} = 506 \text{ L/day}$
- **Maximum flow (MF):** $506 \text{ L/day} \times 2.5 = 1,265 \text{ L/day}$

Therefore, each lot is expected to have an average sewage flow of 506 L/day and a maximum flow of 1,265 L/day.

Limitations of the Analysis

- **Assumption-Based Calculations**

The sewer capacity estimates are based on assumed population densities, flow rates, and pipe gradients. Actual flow conditions may vary due to unexpected changes in land use or infrastructure. The average number of lots per hectare have been taken from taking a typical section in the Gleniti area with 76 houses within a 7.8 hectare lot.





- **Lack of Hydraulic Model Validation**

While the calculations adhere to standard design assumptions, they have not been validated using detailed hydraulic modelling, which could provide a more accurate representation of localized constraints and backwater effects.

- **Simplified Gradient Considerations**

The analysis assumes uniform pipe gradients of 1% and 0.5%, whereas real-world conditions may include variations due to topography and construction tolerances.

- **Operational and Maintenance Factors**

The calculations assume optimal operating conditions; however, real-world performance may be affected by blockages, sedimentation, or pipe deterioration over time.

- **Wet weather peak flow factor**

The analysis uses a wet weather peak flow assumption, but in reality, not all users discharge wastewater at maximum levels during wet weather conditions. This means that actual peak flows may be lower than the modelled values, which could impact capacity estimations.

Limitations Based on the WSP Report

- The WSP model calibration was conducted using a short-term flow survey between April and September 2020, meaning predictions may be less accurate in unmonitored areas.
- Confidence in flow predictions is highest at flow monitoring locations and decreases upstream. Consequently, the accuracy of flow predictions diminishes in smaller catchments and local reticulations.
- The impact of climate change on rainfall intensity has been assessed using the 2008 Ministry for the Environment guidance. However, updated 2018 guidance may indicate higher rainfall intensity, which could affect future sewer capacity calculations.
- The model does not account for potential changes in inflow and infiltration (I&I) reduction strategies, meaning actual future sewer performance may differ if mitigation measures are implemented.
- Upsizing recommendations are based solely on pipe capacity assessments and do not consider potential surcharging or backwater effects in constrained areas.

These limitations should be considered when assessing the long-term capacity of the existing sewer network and planning for future development.



Milward Finlay Lobb has concerns that the calibration results may be highly influenced by the time they were taken. The period was during and just after the Covid 19 lockdowns. There was a higher than normal level of residents at home all day and this would result in higher concentrations of waste water flow in the residential areas. When in reality most people spend 8 hours a day in the commercial and industrial areas, closer to the larger pipes with less capacity issues.

Service Capacity Analysis

Pages Road Timaru

DN150 Sewer Pipe: Corner of Pages Road to Highfield Golf Course

- Currently serves **375 lots**
- At a **1% gradient**, it can accommodate an additional **236 lots**, totalling **611 lots**
- At a **0.5% gradient**, it can accommodate an additional **55 lots**, totalling **430 lots**

DN300 Sewer Pipe: Through Highfield Golf Course to Douglas Street

- Currently serves **3150 lots**
- At a **1% gradient**, it can accommodate an additional **668 lots**, totalling **3,818 lots**
- At a **0.5% gradient**, it is currently **undersized by 459 lots**. We believe this is currently part of TDC's upgrade plans.

DN375 Sewer Pipe: Douglas Street to Douglas Street-Selwyn Street Intersection

- Currently serves **4,500 lots**
- At a **1% gradient**, it can accommodate an additional **2,375 lots**, totalling **3,818 lots**
- At a **0.5% gradient**, it can accommodate an additional **348 lots**, totalling **2,691 lots**

DN600 Sewer Pipe: Grasmere Street to Train Tracks Through Ashbury Park

- Currently serves **15,800 lots**
- At a **1% gradient**, it can accommodate an additional **7,857 lots**, totalling **3,818 lots**
- At a **0.5% gradient**, it can accommodate an additional **892 lots**, totalling **2,691 lots**

DN1200 Sewer Pipe: Ashbury Park to Waste Water Treatment Plant

- Currently serves **22,400 lots**



- At a **1% gradient**, it can accommodate an additional **122,982 lots**, totalling **145,382 lots**
- At a **0.5% gradient**, it can accommodate an additional **80,255 lots**, totalling **102,655 lots**

These calculations assume that all pipes are laid at the specified gradients.





Conclusion

The analysis provides an estimate of the existing sewer network's capacity and the potential for additional connections based on assumed pipe gradients. However, given the identified limitations, further validation through hydraulic modelling and real-world monitoring is recommended for more accurate planning and infrastructure development. Our general analysis says there should be capacity for at least 57 extra lots, based on a conservative 0.5% gradient, at 1% we would expect current capacity for 236 more lots currently in the Pages Road area, with a choke point being within the Highfield Golf Course, which we believe has been identified as part of TDC's network upgrade as this is currently undersized for the current capacity.

Upgrading of that Council infrastructure within the Highfield Golf Course to a 375mm will easily accommodate an additional 500 lots.

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