

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:

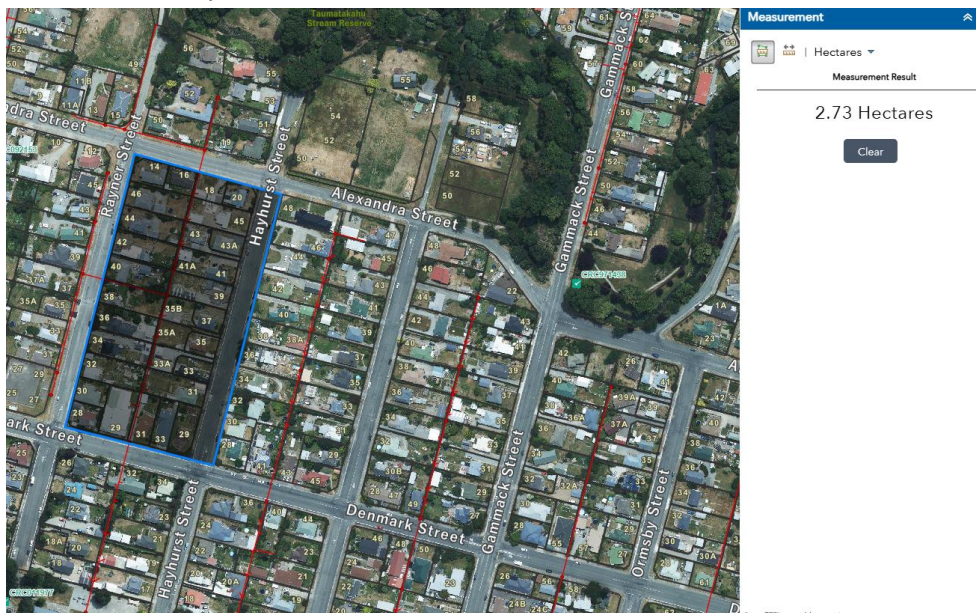
- **Average sewage flow per lot:** $220\text{L/person/day} \times 2.3 \text{ persons/Lot} = 506 \text{ L/day}$
- **Maximum flow (MF):** $506 \text{ L/day} \times 2.5 = 1,265 \text{ L/day}$

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 Hayhurst area which had 32 houses within a 2.7 hectare area.



- **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

Area A - Temuka

Milward Finlay Lobb has estimated the current service capacities of the sewer system as follows:

DN150 Sewer Pipe: Grant Street down to Ewen Road

- 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**

DN225 Sewer Pipe: Ewen Road to Domain Avenue

- Currently serves **665 lots**
- At a **1% gradient**, it can accommodate an additional **1,121 lots**, totalling **1,786 lots**
- At a **0.5% gradient**, it can accommodate an additional **593 lots**, totalling **1,258 lots**

DN315 Sewer Pipe: Down Domain Avenue

- Currently serves **1,576 lots**
- At a **1% gradient**, it can accommodate an additional **2,242 lots**, totalling **3,818 lots**
- At a **0.5% gradient**, it can accommodate an additional **1,115 lots**, totalling **2,691 lots**

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

Area B - Temuka

Milward Finlay Lobb has estimated the current service capacities of the sewer system as follows:

DN150 Sewer Pipe: Richard Pearce Drive to the pump station on Princes Street

- 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**

DN200 Sewer Pipe: Princes Street to part way down Shaw Street

- Currently serves **812 lots**
- At a **1% gradient**, it can accommodate an additional **496 lots**, totalling **1,308 lots**
- At a **0.5% gradient**, it can accommodate an additional **109 lots**, totalling **921 lots**

DN225 Sewer Pipe: Shaw Street to Domain Ave

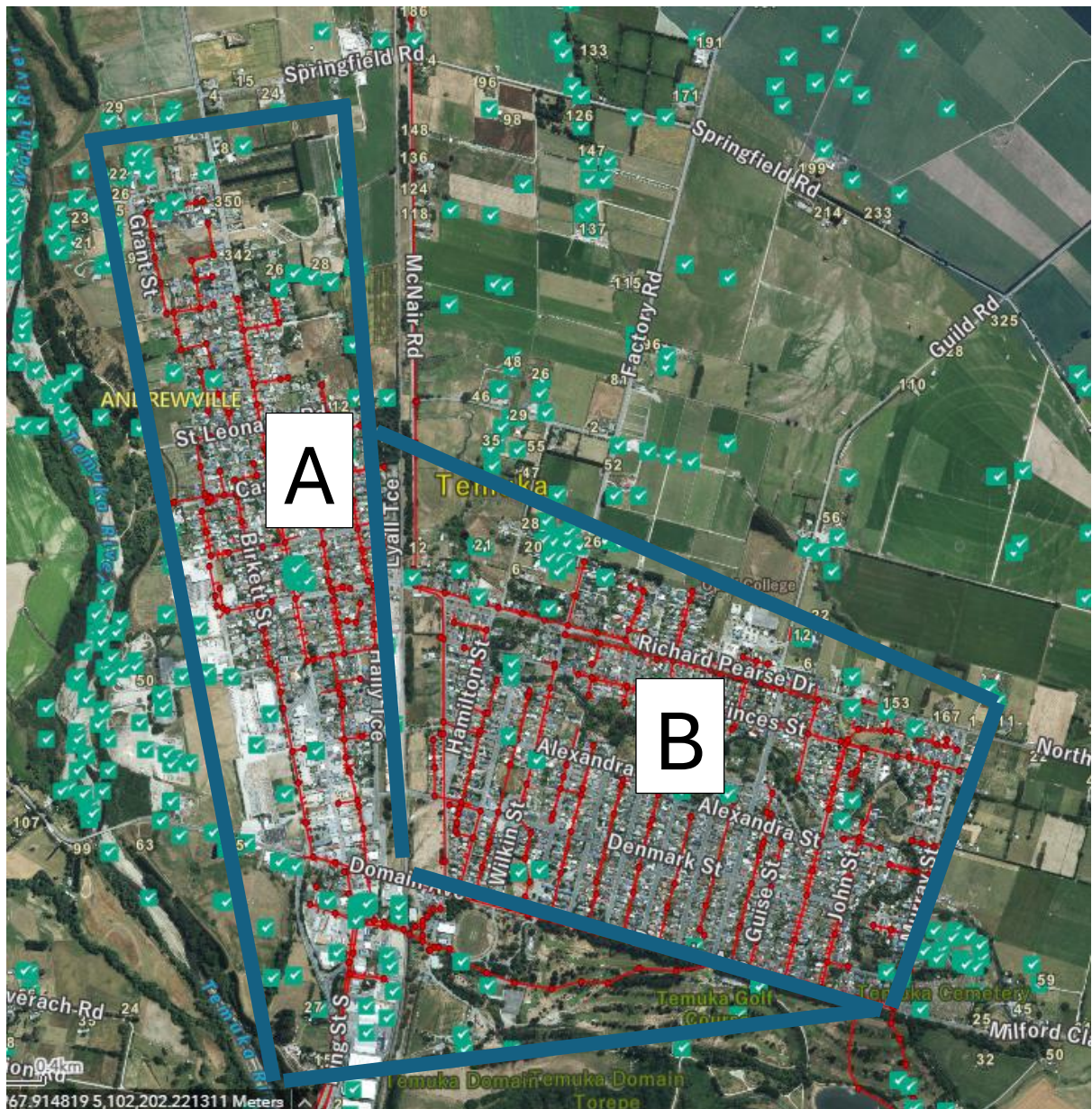


- Currently serves **812 lots**
- At a **1% gradient**, it can accommodate an additional **974 lots**, totalling **1,786 lots**
- At a **0.5% gradient**, it can accommodate an additional **446 lots**, totalling **1,258 lots**

DN375 Sewer Pipe: Domain Ave to Waste water treatment ponds

- Currently serves **2,228 lots**
- At a **1% gradient**, it can accommodate an additional **4,647 lots**, totalling **6,875 lots**
- At a **0.5% gradient**, it can accommodate an additional **2,620 lots**, totalling **4,848 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 55 extra lots in both the area servicing area A south and west of State Highway 1. FDA 7 lies within servicing area B with existing capacity for an additional 110 lots.

Reviewed by:

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