

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO: SEW-03-20-06/ 211115181977

DATE: 15 November 2021

MEMO TO: Kalley Simpson, 3 Waters Manager

FROM: Alex Meredith

SUBJECT: Mandeville Wastewater Modelling – Proposed District Plan Update

1. Summary and Recommendations

This study updated the Mandeville area wastewater model to account for future growth under the proposed district plan with the purpose of carrying out a system performance analysis. Results show that:

- The new district plan creates the possibility of an additional 133 lots in Mandeville, Swannanoa and Ohoka
- Tanks do not overflow in a 1 in 5 year critical rainfall event
- Bradleys Rd pumps switch on but further surcharging is minor in a 1 in 5 year critical event
- There is likely to be some capacity for further growth in Mandeville Area wastewater scheme

It is recommended that:

- The 3 Waters Manager receives this report
- The future development model is updated with the proposed District Plan zoning and kept as an asset for strategic planning
- The future development model is used for analysing the impact of any proposed development outside of the current scheme boundary

2. Background

The Mandeville Area Wastewater Scheme is primarily a Septic Tank Effluent Pumping (STEP) system which mostly services Large Lot Residential and Settlement Zones in Mandeville, Swannanoa and Ohoka. A model of the current state of this scheme was completed in August 2021 (TRIM 210813133061) and this was updated to take into account growth under the District Plan (TRIM 210908143533). This model shows that the scheme currently meets at least a 1 in 5 year level of service with full development without any tanks overflowing and that the critical event has a 48 hour duration.

A new proposed district plan has recently been released wherein the minimum lot size in some large lot residential areas has been reduced. In order to understand the impact of the new subdivision rules on the Mandeville Wastewater network the model is updated assuming all areas currently connected to the Mandeville wastewater network are fully developed under the new district plan. The scope of this work is to update the model to account for this planned growth and undertake a system performance analysis on the updated model.

3. Model Update

3.1. Additional Lots

Additional lots were added to the future development model based on maximum lot yield under the proposed district plan zoning rules and including areas allowed for in the original design calculations for the Bradleys Road pumpstation. Minimum and Average property sizes relevant to this study under the new district plan are shown in Table 1.

Table 1: Minimum and Average Allotment Sizes under Proposed District Plan

Zone	Minimum Allotment Size (m²)	Minimum Average Allotment Size within Subdivision (m³)
Large Lot Residential	2,500	5,000
Settlement	600	600
General Rural	20,000	20,000
Rural Lifestyle	4,000	4,000

3.1.1. Mandeville and Swannanoa Additional Lots

The Mandeville and Swannanoa scheme areas consisted predominantly of RES4A or RES4B with some rural zones under the previous district plan. These have been replaced with large lot residential zoning with the rural land all being rural lifestyle zones under the new district plan. Zones under the previous and proposed district plans are shown in Figures 1 and 2.

RES4A land has the same rules as large lot residential and rural lifestyle zones have the same rules as previous rural zones. Therefore the number of lots don't change significantly in these areas. However, minimum lot sizes can be halved in previous RES4B areas.

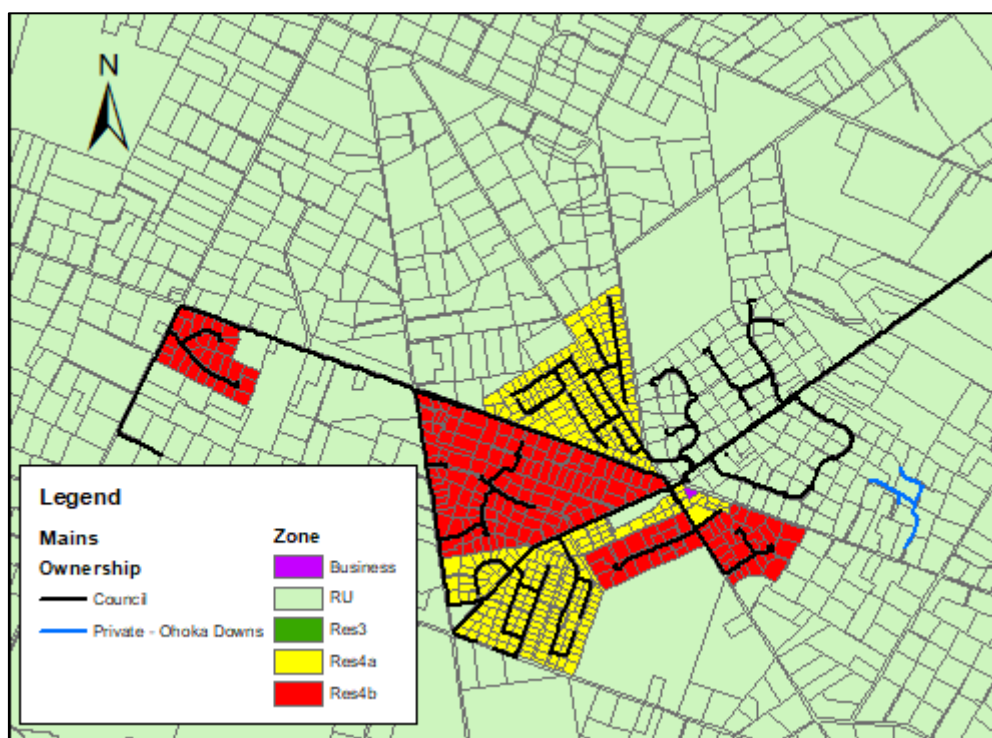


Figure 1: Swannanoa and Mandeville Land Zones under Previous Plan

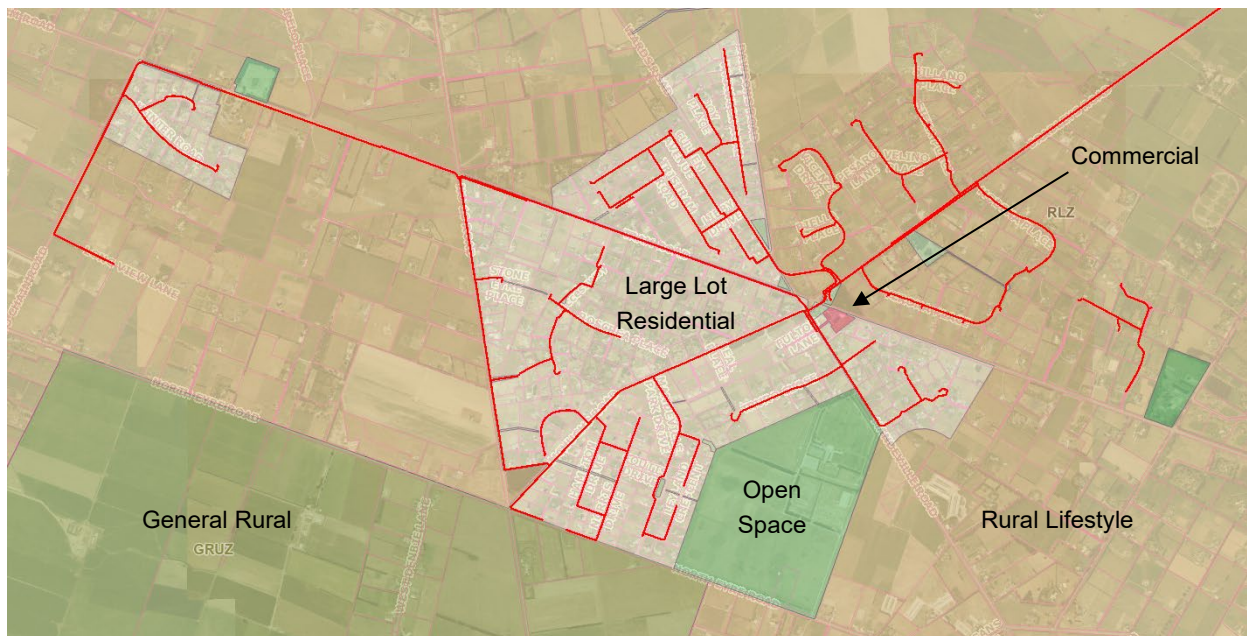


Figure 2: Swannanoa and Mandeville Land Zones under Proposed District Plan

3.1.2. Ohoka Additional Lots

Ohoka contained a mix of RES4A, RES4B and RES3 land under the previous district plan as outlined in Figure 3. Similar to Mandeville the RES4A and RES4B zones are reclassified as Large Lot Residential. This means, previous RES4A land rules are largely unchanged, whereas previous RES4B areas can now be subdivided down to half the size of the previous rules. Additionally, most RES4A areas are covered by the Bradleys and Mill Rd ODAs. The RES3 areas are reclassified as Settlement Zones and are unchanged from the previous District Plan. The new zoning can be seen in Figure 4. ODP plans for Mill Rd and Bradleys Rd can be seen in Appendix A.

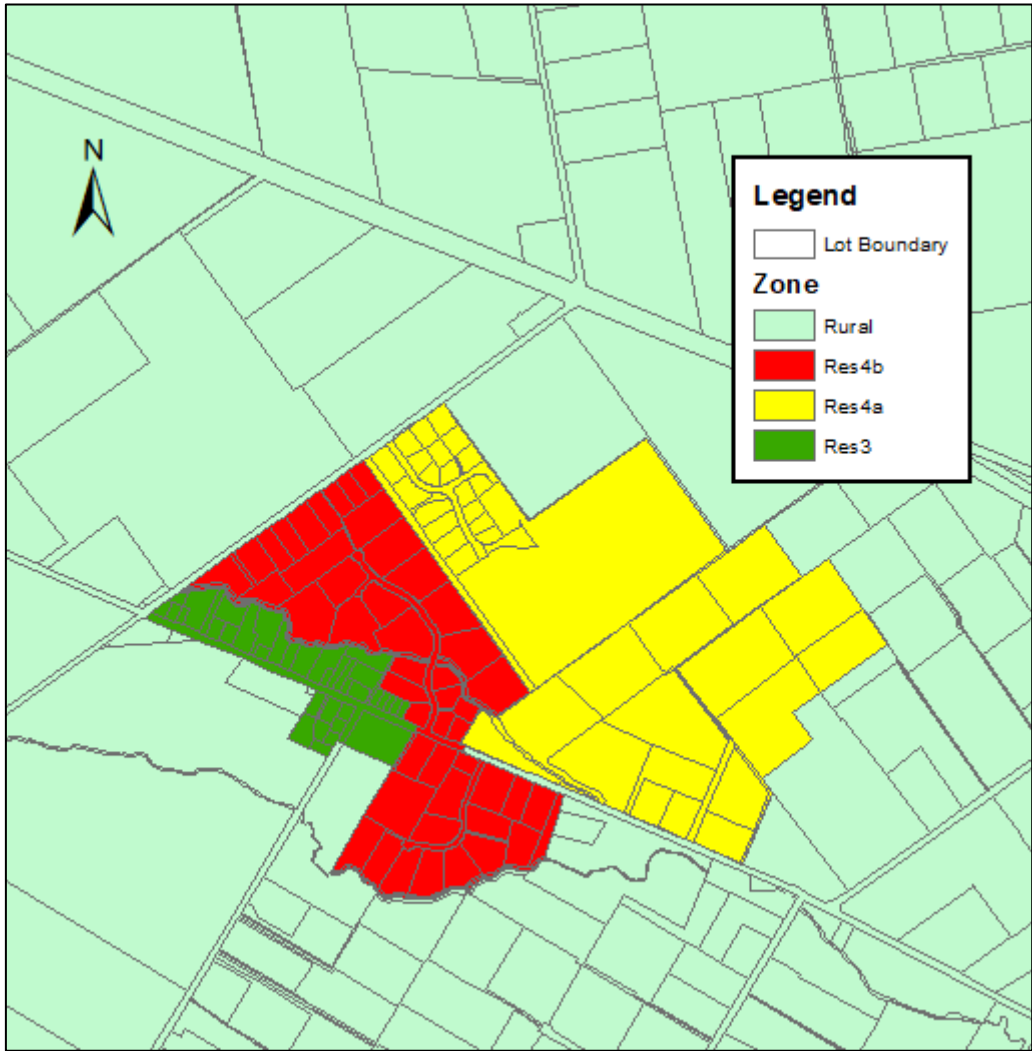


Figure 3: Ohoka Land Zones under Previous District Plan

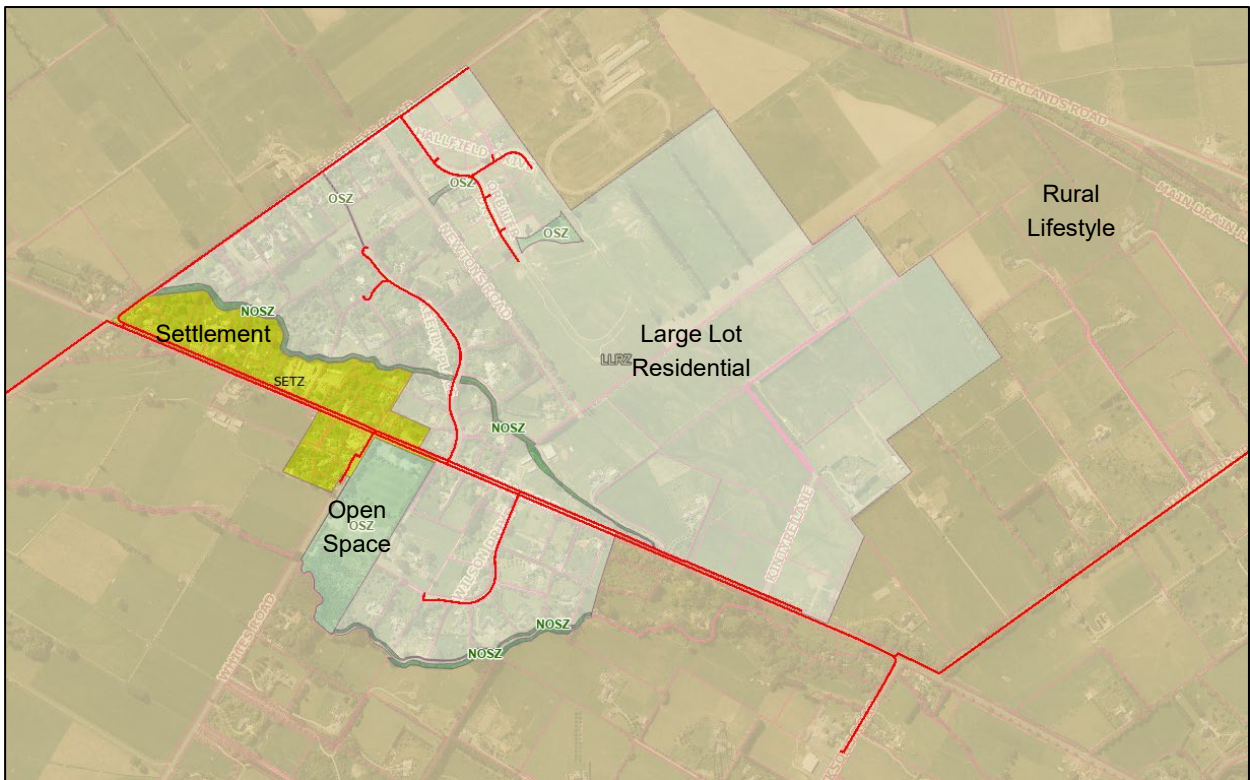


Figure 4: Ohoka Land Zones under Proposed District Plan

3.1.3. Additional Lots Summary

Table 2 summarises the additional lots added to produce the new development model. Wet weather flow loads for the additional lots were added to match those present in the eastern catchments in the Rangiora future model as outlined in the previous future Mandeville model build report.

Table 2: Additional lots added for future development model

Area (Previous zoning)		Existing Lots	Existing Lots in Future Model	Additional Lots	Total Future Development Lots
Mandeville Area	Swannanoa RES4B	29	30	14	44
	Mandeville RES4A	253	302	0	302
	Mandeville RES4B	153	200	95	295
	Rural – Ohoka Utilities & Ohoka Downs	113	136	0	136
	Rural - Other	0	0	0	0
Total Mandeville STEP Sewer		548	668	109	778
Ohoka Area	Ohoka RES3	8	94	0	94
	Ohoka RES4A	4	116	0	116
	Ohoka RES4B	6	46	24	70
	Rural	3	3	0	3
Total Ohoka LPS Sewer		21	259	24	283
Total Mandeville-Ohoka Scheme		569	927	133	1061

4. System Performance Analysis

4.1. System Performance during Critical 1 in 5 Year Event

Figure 5 shows the minimum available freeboard in each tank in a 1 in 5 year, 48 hour rainfall event (where freeboard < 0 shows overflowing tanks). It can be seen that the system is operating as expected with no tanks overflowing or badly surcharging in Ohoka, Swannanoa or Mandeville.

The Bradleys Rd headworks site runs mostly on gravity. However, during high flow events the pumps will switch on if the tanks reach 60% full, corresponding to a depth of approximately 1.6 m. They will then overflow if they reach a depth of approximately 2.6 m.

Figure 6 shows the tank depth with time during the 1 in 5 year, 48 hour rainfall event where the rainfall event is run 4 times as described above. It can be seen that the tanks only get high enough to trigger a pump run during the peak of the rainfall events and that the pump is effective in quickly bringing the tank levels down when this happens, though it does surcharge briefly before this happens reaching a maximum depth of approximately 1.85m.

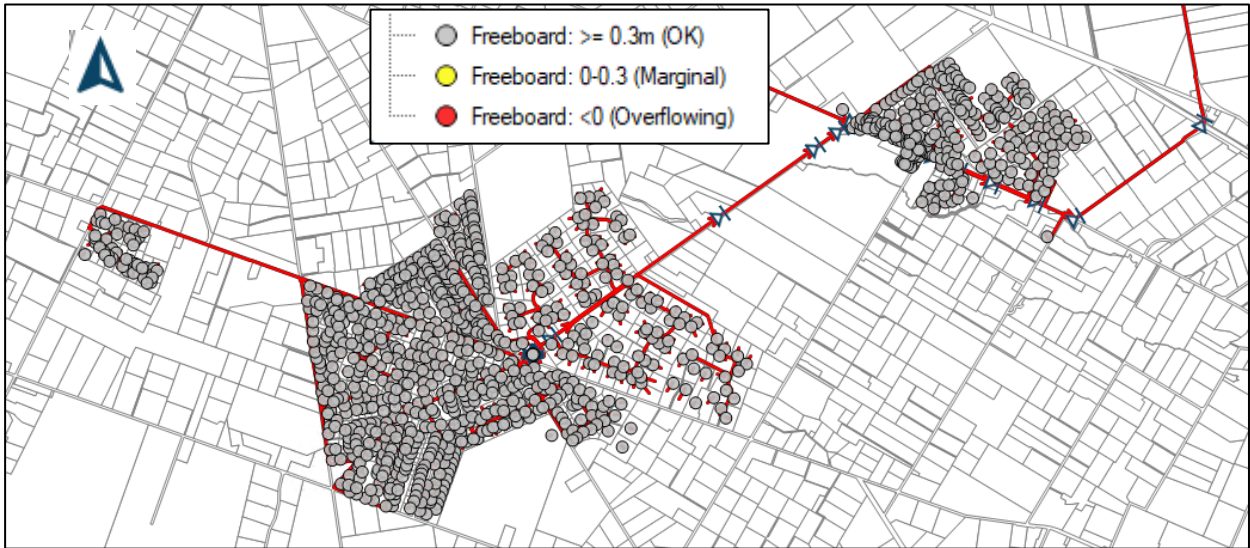


Figure 5: Tank Freeboards in 1 in 5 year, 48 hour rainfall event

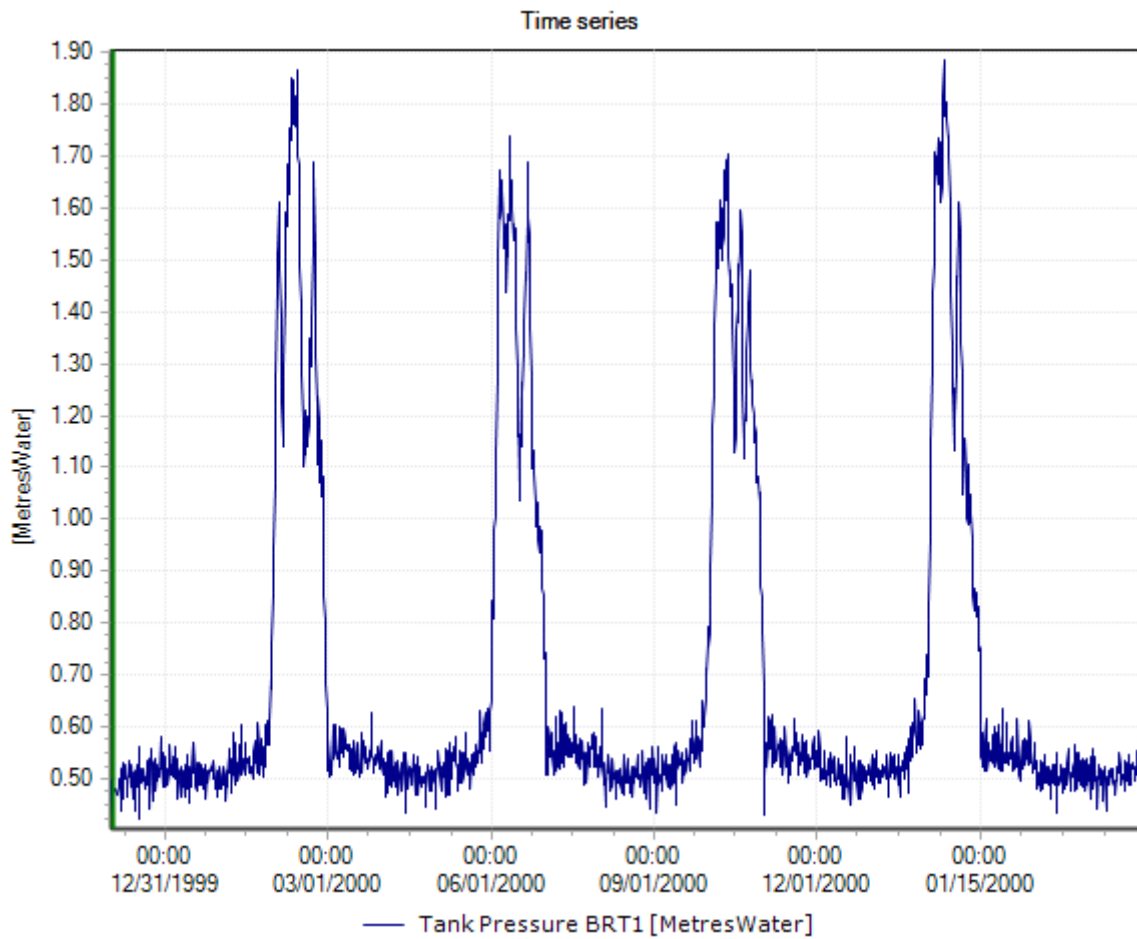


Figure 6: Bradleys Rd tank depth with time during 1 in 5 year, 48 hour rainfall event

5. Conclusions, Recommendations and Future Use

A model for the future state Mandeville Area Wastewater Network taking into account the proposed district plan has been successfully constructed and run. Lots were added based on expected growth outlined in the proposed plan and I&I was set to approximately match code of practice levels. Several conclusions/ recommendations can be made.

- The model shows a 1 in 5 year level of service is currently being achieved.
- There is likely some capacity for further growth in the network
- It is recommended that this future development model is updated with the proposed District Plan zoning and be kept and maintained as an asset for strategic planning
- It is recommended that this future development model be used to analyse the impact of any future development outside of the currently serviced area.

Appendix A: Plans for Bradleys Rd and Mill Rd ODPs

