17 February 2026

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Project Name	RDC 3 Waters Growth Strategy		
Subject	Marton, Bulls and Taihape WWTP Assessment		

1. Introduction

Rangitīkei District Council (RDC) has commissioned GHD Limited (GHD) to undertake a Three Waters infrastructure assessment to consider the implications of planned growth areas on existing infrastructure. The purpose of the assessment is to identify potential infrastructure upgrades required to accommodate future growth.

As part of this work, GHD has been requested to review and interpret previously completed assessments by others for the Marton, Bulls, and Taihape wastewater treatment plants (WWTPs) in the context of the proposed growth strategy.

1.1 Purpose of this Memorandum

The purpose of this report is to:

– Provide a high-level summary of the work done to date (by others)
– Assess the implications of the Three Waters Growth Strategy on those findings for the Marton, Bulls, and Taihape WWTPs.

This is not an independent review of the WWTP capacity, and is only meant to identify the impact of the proposed growth strategy on the recent work carried out at the WWTPs by others.

1.2 Scope and limitations

This memorandum: has been prepared by GHD for Rangitikei District Council and may only be used and relied on by Rangitikei District Council for the purpose agreed between GHD and Rangitikei District Council as set out in section 1.1 of this report.

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

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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. GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

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1.3 Documents received

The following documents have been received in relation to this assessment:

– *Marton Bulls WWTP Optioneering – Shortlist* (draft) v0.1, Tonkin and Taylor, July 2025
– *Taihape WWTP - Desktop Capacity Review and Sampling Plan*, GHD, August 2025
– *Marton to Bulls Wastewater Centralisation – Growth Assumptions*, Good Earth Matters, April 2024

It is noted that there is a more recent version of the Tonkin and Taylor (T&T) options report, however, only snips of the growth assumptions and flows were provided to GHD upon request. Therefore, the option descriptions for Marton and Bulls rely on information from the version 1 report dated July 2025.

2. Marton and Bulls WWTPs

Both Marton and Bulls WWTPs are lagoon-based systems that discharge into the Rangitikei River and the Tutanenui Stream respectively. Both existing Wastewater Treatment Plants (WWTPs) are currently operating under expired resource consents. Key issues with the plants are with performance limitations, particularly for nitrogen removal and seasonal variability, sludge accumulation, ageing infrastructure, and tightening discharge requirements mean upgrades or replacement are required.

Tonkin and Taylor (T&T) carried out an evaluation of possible solutions to meet the 2055 treatment and discharge requirements for the Bulls and Marton communities. All of the options include a centralised WWTP that services both Marton and Bulls schemes while retaining the existing pond-based systems to act as a buffer and partial treatment of waste.

This centralised WWTP is made possible by an existing 12.5 km pipeline between Marton and Bulls which has been partially constructed, enabling centralisation but requiring pumping and additional infrastructure to complete the connection. This pipeline can be seen in Figure 1 below.

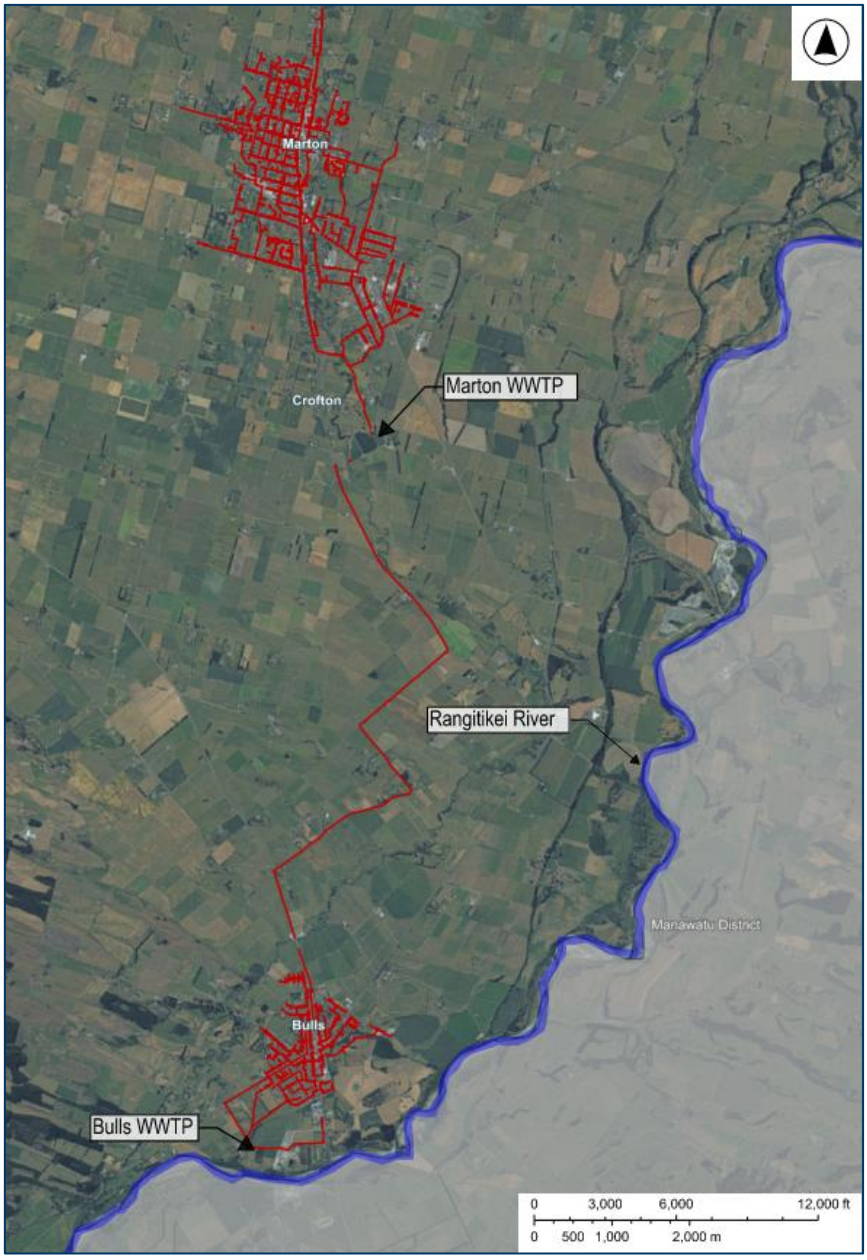

Figure 1 Marton and Bulls wastewater network aerial view (RDC GIS Map Viewer)

2.1 Proposed options

T&T were engaged by RDC to carry out an optioneering assessment to treat the centralised scheme. The shortlisted options involve upgrading the existing oxidation ponds with additional treatment units either at the Bulls site or at the new land disposal site. These options were preferred in the previous Lutra process assessment completed in July 2025. These were selected based on cost, footprint and if the process was widely used. The following treatment steps were selected:

- Moving Bed Biofilm Reactor (MBBR) for nitrogen removal.
- Chemical Phosphorus Removal (CPR), which involves dosing coagulants like aluminium sulphate or ferric chloride.
- DAF treatment for solids removal.
- Option 5 includes a membrane filtration (MF) unit for additional solids removal due to the low dilution in the river.
- Options 1-4, and 6 include a UV system for disinfection. This was determined to be unnecessary for option 5 due to the use of membrane filtration.

Table 1 displays the six shortlisted proposed solutions. The options fall into the following key discharge categories.

– 100% discharge to land with storage
– Combined discharge to land and river
– 100% discharge to Rangitīkei River

Table 1 Options assessment (Marton Bulls WWTP Optioneering, T&T, 2025)

Option	Treatment Strategy	Discharge Strategy	Centralised Treatment Location	I&I Reduction Assumed	Key Features
1	MBBR + CPR+ DAF + UV	100% Land	New plant at land disposal site	No	Largest land and storage requirement;
2	MBBR + CPR+ DAF + UV	100% Land	New plant at land disposal site	Yes	Reduced flows and land area via I&I reduction; still land-constrained
3	MBBR + CPR+ DAF + UV	Land + River (Hybrid)	New plant at Bulls WWTP	No	Flexible operation; land when possible, river when constrained
4	MBBR + CPR+ DAF + UV	100% River (Moderate dilution)	New plant at Bulls WWTP	No	Moderate treatment standards; continuous river discharge
5	MBBR + CPR+ DAF + MF	100% River (One plan standards)	New plant at Bulls WWTP	No	Most stringent treatment; membrane filtration;
6	MBBR + CPR+ DAF + UV	100% River (High dilution)	New plant at Bulls WWTP	Yes	Relies on successful I&I reduction

The process flow diagrams for these options are displayed below in Figure 2.2 and Figure 2.3 .

It is understood that T&T have further advanced the optioneering assessment, especially as it relates to the recently released Wastewater Environmental Performance Standard. Only snips of the growth assumptions and flows were provided to GHD from the latest T&T report for this study. As such, the options for the future treatment scheme may have changed from those presented above.

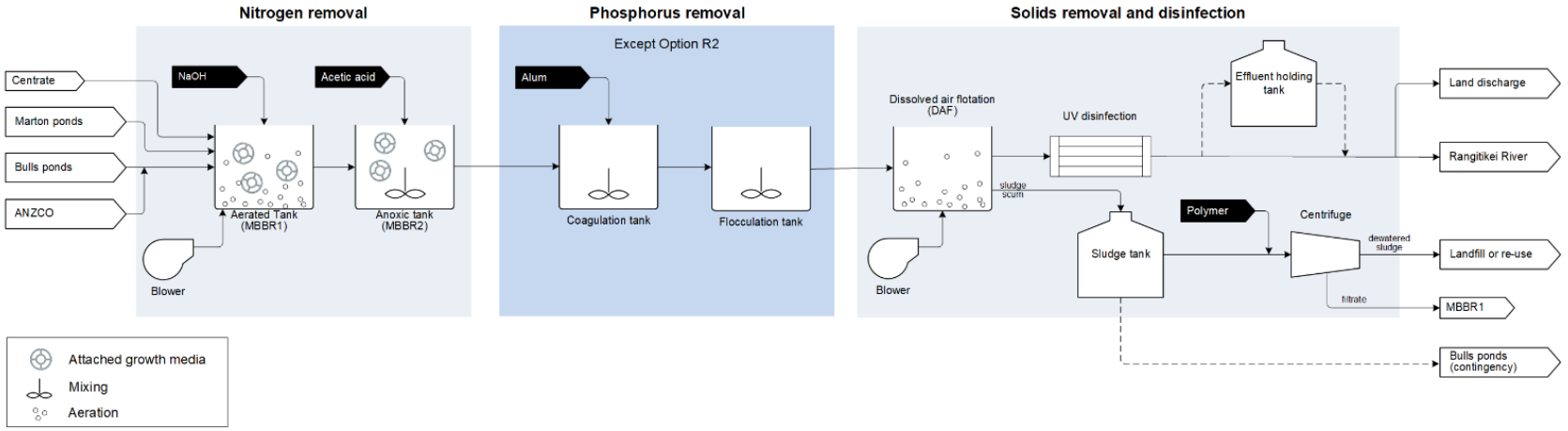

Figure 2.2: Process for all options (except Option 5) (Marton Bulls WWTP Optioneering, T&T, 2025)

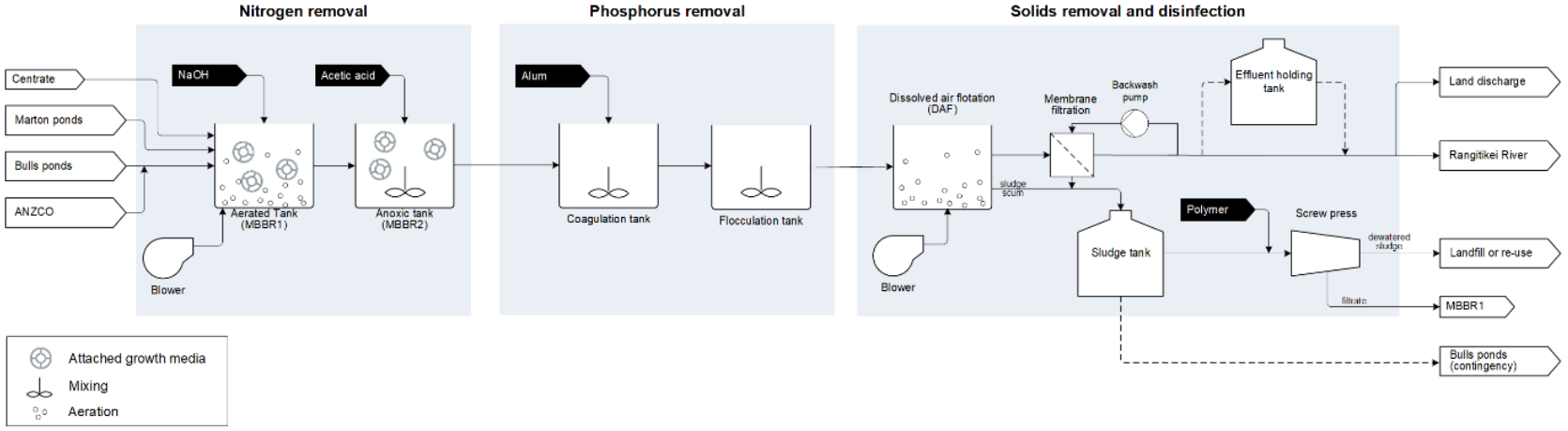

Figure 2.3: Process Option 5 (Marton Bulls WWTP Optioneering, T&T, 2025)

2.2 Growth Assumptions

The flows used for the T&T options assessment were projected to a 2055 horizon. This has been compared to the growth assumptions used in the Three Waters Growth Strategy prepared by GHD (February 2026). The strategy evaluated the impact of flow rates in the wastewater network under various growth scenarios. Multiple scenarios for both Bulls and Marton were modelled using Integrated Catchment Modelling (ICM), which consisted of different proposed greenfield growth areas and infill. Figure 4 and Figure 5 display the areas assessed for Marton and Bulls.

Bulls

1. BUL01
2. BUL02
3. BUL03

Marton

4. MAR01
5. MAR02
6. MAR07
7. MAR01, MAR02, MAR03 (partial), MAR04 (partial), MAR07

Figure 4 Bulls and Marton greenfield growth areas assessed (RDC 3 Waters Growth Strategy, GHD, 2026)

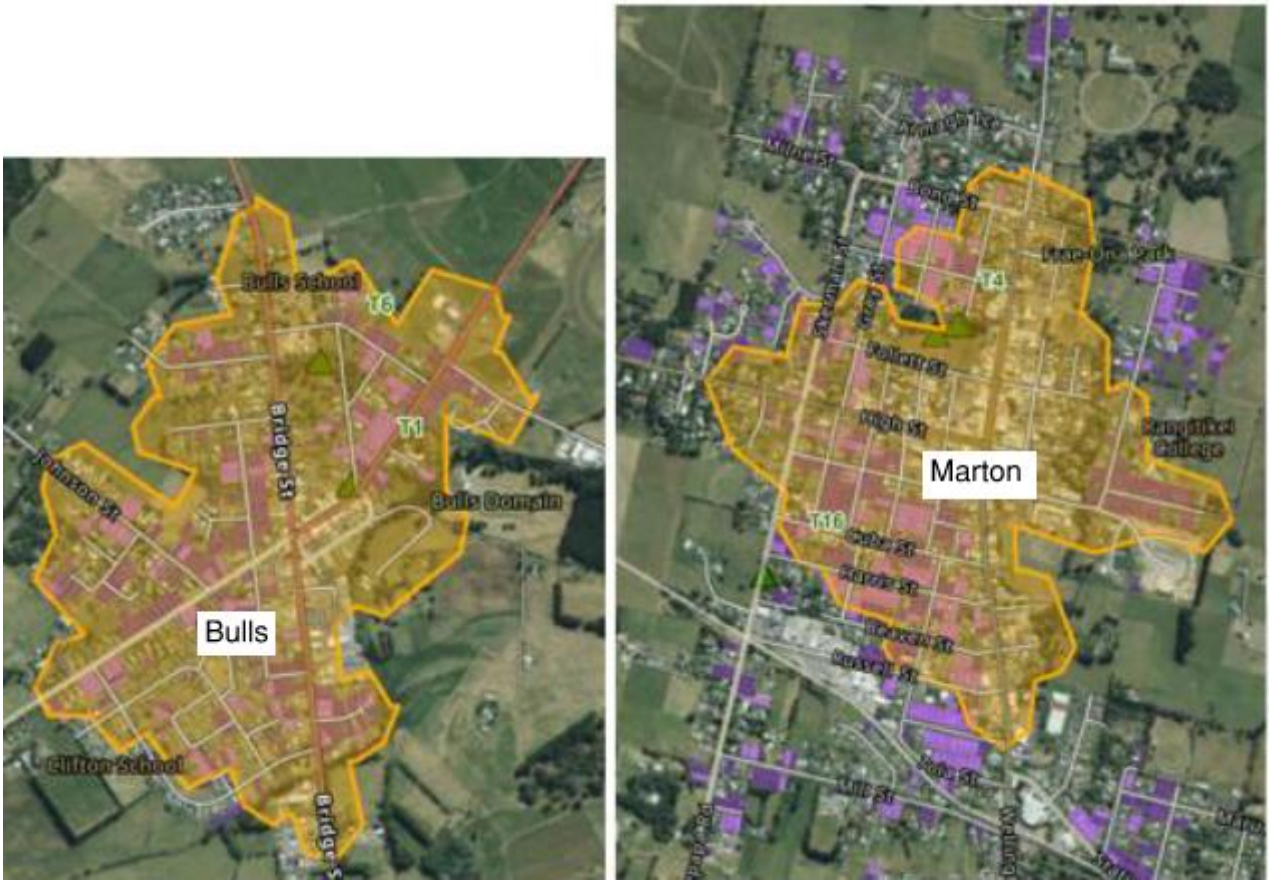

Figure 5 Bulls and Marton Infill area assessed (RDC 3 Waters Growth Strategy, GHD, 2026)

Table 2 displays the growth assumptions used for each assessment.

Table 2 Growth assumption comparison

Growth Consideration	T&T Options	GHD Growth Strategy	Comment
Population Assumptions			
Baseline population prediction	Bulls 2,250 Marton 5,520 **Total 7,770** (Taumata Arowai Register)	Bulls 2,114 Marton 5,538 **Total 7,652** (2018 Census)	Very similar baseline 2025 populations
Population density	No assumption	2.7 ppl per dwelling	
Growth Methodology			
Population growth	Constant 1.5% p.a.	Derived from housing growth areas	Different growth drivers
Additional flow allowance	+250 m³/d in Bulls industrial area	None	T&T includes nominal industrial uplift only in Bulls.
Growth allocation	Residential + industrial	Residential only	Key structural difference
Base flow assumptions			
Flow data basis	3-month period August to September 2024.	3-day period instantaneous flow data	Both flow data
Residential	250 L/person/day	250 L/person/day	Same residential flow basis
Non-residential allowances			
Commercial		0.4 L/s/ha	

Industrial medium	No specific non-residential growth criteria stated	0.7 L/s/ha	
Industrial heavy		1.3 L/s/ha	
Treatment of non-residential demand	Included implicitly in monitored flows + nominal allowances	Explicit land-use based allowances	Different modelling philosophy
Peaking factors and I&I assumptions			
Dry weather peaking factor	Not applied	2.5	
Wet weather peaking factor	2.7	5	GHD assumes significantly higher wet weather response
Inflow and Infiltration (I&I) reduction	Future flows are equal to present day flow with an additional 500 m³/day allowance for ANZCO	No assumption	

Both studies employed two distinct methodologies to evaluate growth in Marton and Bulls: one based on total lots per area and the other based on a constant percentage increase. GHD's assessment utilised growth projections provided by RDC, which are not linked to specific dates but instead offer an ultimate scenario based on developable area. While both assessments utilise comparable baseline populations and residential flow rates, the GHD approach incorporates substantially higher wet weather peaking factors, but only residential allowances for future growth.

The 1.5% population growth rate in the options assessment is one of three scenarios outlined in Good Earth Matters' 2024 growth memo. This growth rate is reported as aspirational in the memo as it is above other technical projected data. The industrial allowances reported in the growth memo of 175 m³/d and 570 m³/d in Bulls and Marton respectively were not followed in the T&T options assessment.

2.2.1 Future Flows

Table 3 displays the flows estimated in the GHD growth strategy assessment to the flows estimated in the T&T options assessment. The GHD growth strategy analyses the wastewater flows over a three-day period in July 2020 to represent the existing population; however, it should be noted that such a limited timeframe may not accurately represent typical influent flow conditions arriving at the plant, as flow assessments are generally conducted over a few years to capture seasonal and climatic variability. Additionally, the strategy is based on flows modelled within the reticulation network, which may differ from those observed at the wastewater treatment plant (WWTP).

Table 3 Growth scenario flow comparison

Location	GHD Growth Strategy				T&T Options Assessment 2055 Future Flows				
	Growth Scenario	ADWF m³/day	PWWF m³/day	Population	ADWF m³/day	PWWF m³/day	ADWF with I&I m³/day	PWWF with I&I m³/day	Population
Bulls	BUL01	730	1150	3039	1,541	3,120	603	1,779	3,200
	BUL02	519	937	3271					
	BUL03	515	932	2172					
	Bulls Infill	710	1130	2983					
Marton	MAR-01	3172	9776	7134	3,943	14,134	3,473	12,865	7,400
	MAR-02	3019	9696	6515					
	Combined (01,02,part 03, part 04,07)	3652	10,227	9059					

	MAR-07	2971	9654	6324					
	Marton Infill	2988	9671	6513					

The specific growth scenarios that will ultimately be realised for Marton and Bulls are uncertain. However, the flows adopted in the T&T options assessment are generally higher than those predicted by the GHD growth strategy, indicating that the shortlisted options are unlikely to be constrained by the growth scenarios assessed. However, the combined Marton scenario predicts a population increase of more than what the T&T upgrade allows. Under this scenario the WWTP may not be infrastructure ready if the combined scenario is realised before the T&T 2055 design horizon. It is recommended that RDC understand the likelihood of the combined Marton scenario as it may affect the required capacity and design for the WWTP options currently being carried out.

Discharge to water dilution ratios may vary depending on the growth scenario adopted. However, based on the Growth Strategy projections (excluding the combined Marton scenario), dilution ratios are expected to increase. As a result, more stringent discharge concentration limits are not anticipated to be required.

When considering the various options being considered for Marton and Bulls, options 2 and 6, which rely on inflow and infiltration (I&I) reduction, allows for flows in excess of those predicted by the GHD Growth Strategy and will only be adversely impacted under the Marton combined scenario.

In general, the T&T options assessment adopts a conservative population and flow basis when compared with the identified growth areas. The staging of growth and the timing of WWTP upgrades remain uncertain and will require further consideration to ensure that upgrades are implemented ahead of growth as it occurs.

2.2.2 Future loads

Because the GHD growth strategy looked at the impact of growth on the piped infrastructure, it did not assess the future loads associated with the wastewater that is relevant when considering impacts on WWTPs. Table 4 displays the influent design loads used in the T&T options assessment. The following assumptions were made to calculate the future loads:

– The baseline nutrient loads were recorded between December 2023 and March 2024
– The Marton nutrient load did not increase in the future scenario as the Marton WWTP includes a significant trade waste component
– The Bulls loads were increased to reflect with the population growth (1.5% annual increase) with an assumed industrial flow of 200 m³/day

Table 4 Options Report Influent Design Loads (T&T 2025)

	Marton		Bulls	
Influent Design Loads (kg/day)	**Baseline 2025**	**Baseline 2055**	**Baseline 2025**	**Baseline 2055**
Population	5,520	7,400	2,250	3,200
5-day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	1,700	1,700	153	296
Total suspended solids (TSS)	2,743	2,743	217	413
Total Kjeldahl Nitrogen (TKN)	158	158	37	84
Ammoniacal Nitrogen (NH_4-N)	54	54	28	68
Total Phosphorus (TP)	28	28	5.8	31
Dissolved Reactive Phosphorus (DRP)	13	13	3.3	26

It is difficult to conclude whether the predicted loads remain reasonable under the growth strategy as the T&T report does not state the assumed residential and industrial criteria used for the 2055 scenario. It is understood that T&T are also reassessing the BOD_5 into the existing WWTP, which may further impact the design capacity.

2.3 Regulatory context

The Taumata Arowai wastewater environmental performance standards (WEPS) for wastewater discharges were finalised and came into force on 19 December 2025, after the T&T draft options report. GHD has been made aware that the impact of the WEPS are being assessed by T&T[1]. The following sections highlight the potential implications of the finalised standards on the assessed options, rather than providing a detailed comparison of proposed versus finalised requirements.

2.3.1 Discharge to water

The WEPS discharge to river standards are materially consistent with the draft standards that informed the T&T options assessment. However, the final WEPS contain a periphyton risk assessment that GHD understands T&T is undertaking. Depending on the findings, the discharge limits may be more stringent in terms of nitrogen and phosphorus limits, resulting in preference of a more “mechanical” treatment plant over the pond-based system.

2.3.2 Discharge to land

The WEPS discharge to land standards retain the overall framework set out in the proposed standards; however, changes were made to land assessment category definitions and associated performance limits.

Under the T&T assessment (July 2025), the land disposal area was classified as Category 4, with the potential for Category 5 depending on site performance. According to the WEPS and the accompanying guidance documents, options relying on land disposal may require reassessment to confirm category applicability under the updated framework.

Key changes introduced in the finalised standards include:

– Revised Total Nitrogen and Total Phosphorus limits
– Introduction of separate public access and no public access E. coli limits
– Clarification of discharge limits for slow and rapid infiltration systems.

It is also noted that the discharge to land options (Options 1 to 3) would incur significantly higher CAPEX, and this could be an important decision factor for the final evaluation of the preferred options.

2.4 Recommendations

Based on the T&T report, most of the options shortlisted for the Marton and Bulls WWTPs allow for more capacity than the GHD growth assessment scenarios. Therefore, it is reasonable to assume that the capacity of the proposed WWTP upgrades will not be affected by most of the growth scenarios. However, if the Marton combined scenario is realised, the WWTP upgrades will not have enough capacity to cater for the population if it occurs before 2055. It is recommended that RDC check the likelihood of each growth scenario before commencing the upgrades.

GHD understands that further works are being undertaken by T&T to update the July 2025 report to align with the discharge limits set out in WEPS, which came into effect in December 2025. As part of the update, it is recommended that RDC confirm the growth strategy and future population to be adopted for the WWTP upgrade.

[1] Phone call with Steve Carne (Feb 2026)

3. Taihape WWTP

The Taihape WWTP is situated on Papakai Road in Taihape, to the east of the Hautapu River. Figure 6 displays an aerial view of the Taihape wastewater network.

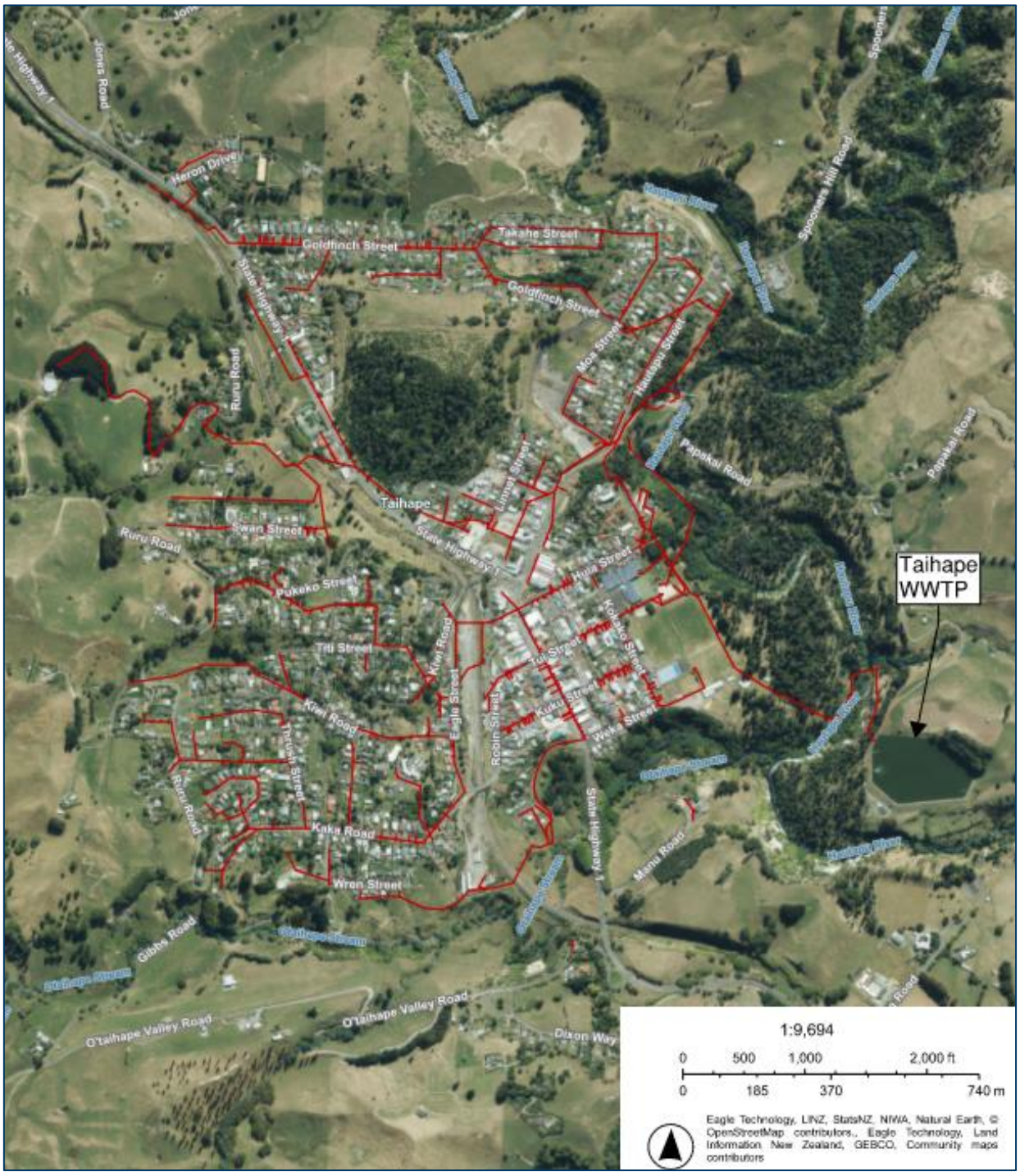

Figure 6 Taihape wastewater network aerial view (RDC GIS Map Viewer)

The WWTP consists of an oxidation pond, followed by fine screening, membrane filtration, alum dosing, and a lamella clarifier, before discharge to the Hautapu River. Figure 7 provides a process block flow diagram.

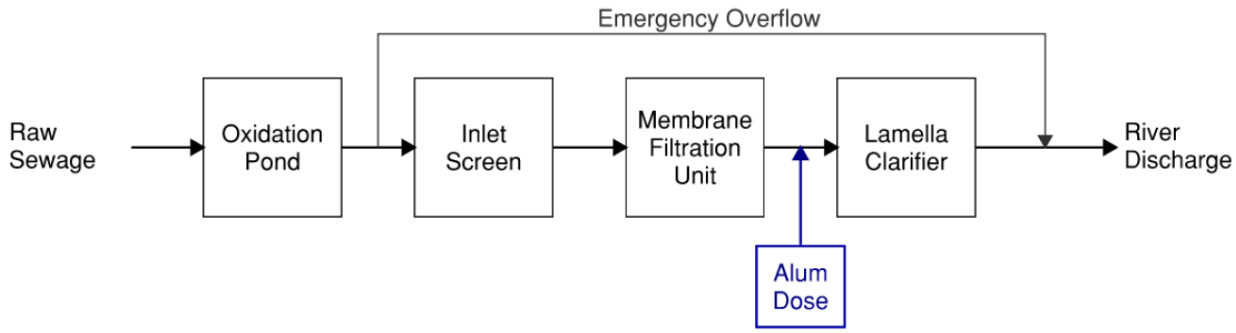

Figure 7 Taihape WWTP process block flow diagram (Desktop Assessment, GHD, 2025)

The Taihape WWTP discharge consent is set to expire in July 2027. GHD completed a desktop capacity review and sampling plan in August 2025. The purpose of the assessment was to provide RDC with an appreciation of the Taihape WWTP plant issues and short-term capacity shortfall. The capacity review was based on a future population in the year of 2034; this date was selected to reflect the current consent lapse date.

3.1 Proposed upgrades

The desktop assessment found the following issues with the plant based on issues raised at the site visit and upon review of the received data.

– Concentrations above consent limits of TSS, Al (total aluminium), BOD_5 and PO4-P (dissolved reactive phosphorus) have exceedances above the consent limits.
– The pond sludge volume was 42% at the time of the 2023 survey, and this would considerably reduce the hydraulic retention time. The level of sludge accumulation is considered excessive.
– The plant lacks automation and control of the membrane filtration process.

The desktop assessment suggested the following upgrades to the Taihape WWTP.

Table 5 Proposed upgrades (GHD Desktop Assessment, 2025)

Process Area	Suggested Improvements	Reasons / Justifications
Plant Inlet	Install an inlet screen	Remove large solids from discharging into the pond
	Undertake composite influent samples	More accurate characterisation of incoming loads
Oxidation Pond	Reduce sludge level (currently ~42%)	Improve organic treatment and reduce risk of high solids going into the membrane plant
	Baffle curtains	Create a semi-settling zone upstream of membrane filtration to reduce solids load
Membrane Filtration	Operation optimisation	Improve reliability and performance of membrane system
	Additional process instruments	Better monitoring and control of membrane operation
Lamella Clarifier	Reconfigure pipework to put this unit upstream of the membrane filtration	Better confidence about the quality of the plant discharge
	Optimise alum dosing	Reduce PO_4-P spikes in downstream samples

Following completion of the assessment, GHD understands that there is a screen installed in the terminal pump station based on an email received by Steve Carne from one of RDC's contractor. No details of the mechanical screen were provided, hence GHD recommends a further review to determine if the inlet screen is still needed.

3.2 Growth assumptions

The flows used for the GHD desktop assessment were projected to a 2034 horizon. The GHD growth strategy evaluated the impact of flow rates in the wastewater network under an infill scenario for Taihape. Figure 8 displays the infill area assessed for Taihape.

Figure 8 Taihape infill area assess (3 Waters Growth Strategy, GHD, 2026)

Table 9 compares the growth assumptions used for each assessment.

Table 6 Growth assumption comparison

Growth Consideration	GHD Desktop Assessment	GHD Growth Strategy	Comment
Population Assumptions			
Baseline population prediction	1,668 (2023 Census)	1,928 (Based on 2018 Census)	Different baseline populations.
Population density	No assumption	2.7 ppl per dwelling	
Growth Methodology			
Population growth	Rangitikei District Council Infrastructure Strategy 2024 assumes an ~5% annual population increase	All growth is residential and based on growth areas capacity for housing.	Different growth drivers
Additional flow allowance	None	None	
Growth allocation	Residential	Residential	

Two different methods were used to assess growth in Taihape. The growth strategy assumes an ultimate infill housing scenario based on current lot density in central Taihape with no specific future date. The

desktop assessment uses the RDC Infrastructure Strategy 2024 growth data but does not adopt the 2024 baseline population of 1,809 from the strategy reports.

3.2.1 Future Flows

The future flows predicted by the Growth Strategy were compared with the assumptions used in the desktop assessment to better understand the potentialcapacity implications. Table 7 displays a comparison of the future flows and loads from the two studies.

Table 7 Future flows and population

Location	GHD Growth Strategy				GHD desktop assessment		
	Growth Scenario	ADWF m³/day	PWWF m³/day	Population	ADWF m³/day	PWWF m³/day	Population
Taihape	Infill	652	1926	2,290	Not assessed	Not assessed	1,872*

* *The Rangitīkei District Council Infrastructure Strategy (2024) reports a 2034 population of 1,872, which differs slightly from the 1,865 value used in the desktop assessment. This has been updated for consistency.*

Future flows were not assessed as part of the Taihape WWTP desktop assessment. However, the 2034 population adopted is lower than the population projected under the GHD Growth Strategy infill scenario. The RDC Infrastructure Strategy population projections are displayed below in Table 8.

Table 8 Projected population (Infrastructure Strategy 2024)

Area	%	2024	2034	2044	2054
Taihape	5%	1,809	1,872	1,950	2,039

The growth strategy infill scenario assumes a higher long-term population than the RDC 2054 projection.

3.2.1.1 Implications for treatment capacity

The desktop assessment considered the capacity of the membrane filtration system as one of the key process bottlenecks. Due to high inflow and infiltration in the wastewater network, the design membrane throughput of 1,200 m³/d could be exceeded at times, resulting in flow bypass when the pond storage volume is used up. The capacity of this may need to be increased in the future if I&I is not resolved.

The existing oxidation pond and the lamella clarifier have been assessed with sufficient process capacity to handle the current and future flows, based on typical loading rates.

3.2.2 Future Loads

To understand the implications of the growth strategy on organic loading, future BOD_5 loads were estimated using the same methodology adopted in the desktop assessment. The assessment was based on the following criteria:

– Pond surface area of 3.23 ha
– Typical domestic wastewater per capita BOD_5 loading of 60 g/day

The above per capita BOD_5 loading rate approach was adopted due to the fact that some of the recent influent results reported unusually low influent BOD_5 concentrations. An intensive sampling campaign has been recommended to better characterise the influent data, which may impact the results.

Table 9 Projected BOD_5 loading

Parameter	Current Population	Future Population (2034)	Growth Strategy Population
Population (EP)	1,668	1,865	2,290
BOD_5 loading (kg/d)	100	111.9	137.4
BOD_5 Aerial loading (kg/ha·d)	31	35	43

It is expected that the future loads to the plant will increase based on the growth strategy population projections. However, the estimated aerial BOD_5 loadings are well below the typical loading limit for lagoon-based treatment of 80 kg/ha.d.

3.3 Regulatory context

The desktop assessment was completed in August 2025 before the Taumata Arowai WEPS limits came into effect in December 2025.

With the current consent expiring in July 2027, this falls under the transition period where the consent expiry date is extended to 27th August 2028, and the consent holder (Rangitikei District Council) will have up to 5 years following the consent renewal to implement the upgrade. Assuming the treated effluent will continue to discharge to water, subject to a future Best Practicable Option (BPO) assessment, it is likely that the Taihape WWTP will undergo a considerable upgrade including addressing ammoniacal and total nitrogen removal requirements under WEPS.

Moreover, the GHD desktop assessment discussed the implications that Taihape WWTP could fall under the small plant category which will have different treatment requirements than the discharge to water standard requirements. The criterion for a small plant is defined in section 58 as:

1. *The plant takes in a daily average load of $cBOD_5$ of less than 85 kilograms; or*
2. *The consent authority believes that—*
    a. *the plant services wastewater from no more than 1,000 people; and*
    b. *the plant does not service a significant volume of industrial and trade waste.*

The small plant category will apply if the intensive sampling results (yet to be commenced) comes back with an estimated influent BOD_5 loading rate of less than 85 kg/day. Under this category, the discharge concentration limits for total nitrogen and total phosphorus do not apply; and the other discharge concentrations are relaxed from 90 percentile limits to 75 percentile limits. This may affect the proposed treatment plant improvements.

On the other hand, in the scenario that the Taihape WWTP does not meet the small plant category (e.g. incoming BOD_5 load > 85kg/day) and is required to incorporate nutrient removals to align with the WEPS limits, the existing oxidation pond could be augmented in a similar manner (e.g. MBBR for nitrogen removal and alum dosing for phosphorus removal), or replaced by a new activated sludge based treatment process and retaining the pond as wet weather flow storage.

3.4 Recommendations

As discussed above, the GHD desktop assessment (August 2025) focused on the current and short-term performance issues of the Taihape WWTP. Pond desludging, installation of baffle curtains and optimisation of membrane filtration would improve the operability of the existing plant in the interim. The I&I reduction programme also plays a part in addressing the current performance issues.

In parallel, a Best Practicable Options (BPO) assessment for the long-term planning is needed to plan for the future upgrade works, particularly to meet the WEPS limits and future growth forecast. The existing treatment set-up as it stands requires significant upgrades to meet both the WESP limits and the growth forecast.

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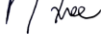
S4	0	E. Hoskin	I. Ho R.Baugham		P. Free		17-2-26
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