

HORSESHOE BUSH ROAD SUBDIVISION WASTEWATER SERVICING REPORT

**Horseshoe Bush Road
Dairy Flat, Auckland**

TUAKIRI PROPERTY LTD
May 2026 | V2



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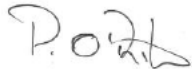
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EXECUTIVE SUMMARY

This Wastewater Servicing Report has been prepared by GWE Consulting Ltd. (GWE) to support the Fast-Track referral application for the proposed Horseshoe Bush Road subdivision and development in Dairy Flat, Auckland. The proposal involves a large-scale greenfield residential development across approximately 77.9 hectares, with an indicative yield of approximately 1,020 dwellings and a small supporting commercial component. The Site is currently rural in character, is not assumed to have immediate access to a public wastewater network, and therefore requires an on-site wastewater servicing solution.

Wastewater generated by the proposed development is expected to be predominantly domestic in nature. Based on Watercare Code of Practice design assumptions of three persons per dwelling and 180 L/person/day, the full development is estimated to generate an average dry weather flow of approximately 681 m³/day, equivalent to 7.8 L/s.

A centralised wastewater servicing approach is proposed. Wastewater from individual lots would be collected using a low-pressure sewer network and conveyed to a centralised wastewater treatment plant. This approach is considered suitable for the Site, reduces infiltration and inflow risks, and allows flexible staged delivery as the subdivision develops.

The preferred treatment approach is a high-performance, modular wastewater treatment plant, with hybrid MABR/MBR technology identified as an appropriate concept-level solution. This technology can produce high-quality treated effluent, including effective removal of suspended solids, nutrients, and pathogens, and can be expanded progressively to match development staging. Indicative treated effluent targets include cBOD₅ of 10 mg/L, TSS of 10 mg/L, total nitrogen of 10 mg/L, total phosphorus of 1 mg/L, and faecal coliforms of less than 10 CFU/100 mL.

Treated wastewater is proposed to be managed through land-based disposal where practicable, using pressure-compensating dripper irrigation within suitable landscaped or dedicated disposal areas. If the Site cannot accommodate full land disposal, partial or supplementary discharge to a stream may be required. Any discharge to surface water would require more stringent treatment standards and further assessment of receiving environment sensitivity, stream flows, water quality, ecological values, dilution, and applicable regulatory limits. Additional polishing or process optimisation may be incorporated if required to meet surface water discharge standards.

Key wastewater-related effects to be addressed through the substantive application include potential impacts on surface water, groundwater, soil saturation, nutrient accumulation, ecological values, odour, amenity, and cultural values. These effects are expected to be manageable through advanced treatment, appropriate disposal area sizing, setbacks from sensitive receptors, operational controls, monitoring, and ongoing maintenance.

This assessment concludes that wastewater from the proposed development can be reticulated to a centralised wastewater treatment plant on-site and treated to a high standard. Subject to further investigations, detailed design, environmental assessment, and resource consent approvals, the proposed servicing strategy provides a feasible pathway for wastewater management that can support the development in a safe, sustainable, and environmentally responsible manner.

1 INTRODUCTION

This technical report has been prepared to support a fast-track referral application for a proposed residential subdivision of properties located between Horseshoe Bush Road and Kahikatea Flat Road in Dairy Flat, Auckland (Site).

2 PURPOSE AND SCOPE

This report has been prepared by GWE to provide a high-level assessment of wastewater servicing for the proposed Horseshoe Bush Road development.

The report addresses:

- Wastewater generation and flow estimation based on proposed development assumptions.
- Identification of key design drivers, constraints, and opportunities.
- High-level wastewater servicing philosophy.
- Indicative treatment and disposal concepts.
- Regulatory and environmental considerations.

This report does not include detailed design or site-specific investigations, which will be undertaken at the substantive application stage.

3 EXISTING ENVIRONMENT

The project is located in Dairy Flat, Auckland, and comprises an overall land area of approximately 77.9 hectares.

Based on the site plan prepared by Isthmus Group. (Figure 1), the development consists of a number of lots with access from Horseshoe Bush Road (southern boundary) and from Kahikatea Flat Road (north-eastern boundary). The Site is zoned Mixed Rural Zone under the Auckland Unitary Plan, and existing land use is predominantly rural, including lifestyle and/or agricultural activities.

Existing residential dwellings and other larger land holdings in the surrounding area are typically serviced by on-site septic tanks and more advanced secondary or tertiary treatment systems with land-based disposal.



Figure 1: Location of the Site

Auckland Council GIS mapping indicates that a main watercourse traverses the Site, with the central portion identified as a floodplain. These features represent key constraints and will require careful consideration in the design and location of wastewater treatment and disposal infrastructure.

Topographic mapping indicates that the Site gently slopes from Horseshoe Bush Road towards the central and north-eastern areas (towards Kahikatea Flat Road), with the overall landform being relatively flat with minor elevation variation.

At this stage, it is assumed that no immediate connection to a Watercare public wastewater reticulation network is available. Accordingly, all wastewater generated by the development will be managed on-site via a centralised wastewater treatment and disposal system.

4 PROPOSED DEVELOPMENT

The proposed Horseshoe Bush Road development is a large-scale greenfield subdivision at Dairy Flat, Auckland, extending across approximately 77.9 ha of land with access provided from Horseshoe Bush Road to the south and Kahikatea Flat Road to the north-east. The Site is currently rural in character and is intended to be comprehensively redeveloped for primarily residential purposes.

The current illustrative masterplan indicates a predominantly residential layout structured around an internal roading network, with development arranged in a series of neighbourhood precincts separated and connected by linear open space and stormwater/gully corridors. The masterplan identifies a total yield of approximately 1,020 lots, and a commercial area of approximately 1,200 m² GFA. The lot mix shown on the masterplan includes a range of section sizes, with most lots falling within the 220–499 m² range, alongside a smaller number of larger rural-residential type lots around the periphery.

For wastewater servicing purposes, the development should be understood as a predominantly residential community with a small supporting commercial component. At this stage, wastewater generation is expected to be overwhelmingly domestic in nature, arising from typical household activities such as kitchens, bathrooms, laundries, and general residential occupancy. Any non-residential wastewater contribution associated with the identified commercial area is expected to be minor at this stage of assessment. The assessment will be refined during subsequent design phases once land use activities and tenancing assumptions are defined in more detail.

The development is also expected to be delivered in stages, reflecting the scale of the Site and the modular nature of the proposed infrastructure. Accordingly, wastewater servicing infrastructure, including reticulation, treatment, and disposal components, should be designed to accommodate staged implementation while ultimately servicing the full development build-out. This approach aligns with the current report assumptions for a centralised treatment solution and allows flexibility as the masterplan is further refined through the substantive application and detailed design stages.

5 WASTEWATER FLOW AND LOAD ASSESSMENT

Wastewater generated from the development is expected to be predominantly domestic in nature, including wastewater from bathrooms, kitchens, and laundry facilities.

Wastewater flows have been estimated in accordance with Watercare's Code of Practice (CoP), Chapter 5. Based on Section 5.3.12.3.3, peak design flows for low pressure sewer (LPS) systems are calculated by applying a peaking factor of 1.2 to the average dry weather flow (ADWF), with wet weather flows excluded.

This approach is appropriate for LPS systems, as infiltration and inflow are expected to be minimal due to the pressurised and sealed nature of the network. The absence of manholes and limited potential for stormwater ingress means wet weather flows are expected to be comparable to dry weather conditions.

While the reticulation network is designed based on peak flow conditions, the wastewater treatment plant and the network will incorporate buffering and/or equalisation to manage peak inflows and maintain stable treatment performance.

Table 1: Wastewater Design Flow

	DWELLING UNIT	OCCUPANCY	DESIGN WASTEWATER FLOW ALLOWANCE (L/p/day)	ADWF m ³ /day	PF	PWWF m ³ /day
Full Residential Development	1,020	3	180	550	1.2	660
Commercial Area	1,200m ²		15 L/day/m ²	18	1.2	21.6

Table 1 corresponds to a total average daily wastewater volume of approximately 682 m³/day. This can be further refined through the specification of low water use fixtures in the dwellings, and water re-use options shall also be investigated at the substantive application stage.

6 WASTEWATER SERVICING PHILOSOPHY

6.1 Wastewater Flows from the Development

A number of reticulation options are available within New Zealand, and the following are considered suitable for the development:

1. Conventional Gravity Sewer System.
2. Septic Tank Effluent Pumping/Gravity (STEP/STEG).
3. Vacuum Sewer System.
4. Low Pressure Sewer System (LPS).

These options will be evaluated in more detail during the concept design stage, once further information on site conditions and development layout becomes available. Key assessment criteria will include constructability, site topography, operational complexity, reliability, infrastructure requirements (e.g. pump stations), future connections to Watercare and susceptibility to infiltration and inflow.

Based on current assumptions, a LPS system is considered the preferred reticulation approach for the development. Under this system, each lot (or cluster of lots) will be provided with a dedicated pump station located near the property boundary. Wastewater generated within each dwelling will be collected and pumped into a pressurised rising main, which conveys flows to a centralised wastewater treatment plant.

This approach offers advantages in relatively flat terrain, reduces the risk of infiltration and inflow, and allows for flexible network design.

It is noted, however that a gravity sewer would be the preferred option to connect in future to Watercare. This will be confirmed during the substantive application.

7 TREATMENT AND DISPOSAL

7.1 Treatment System

A single centralised wastewater treatment plant (WWTP) is proposed for the development to take advantage of economies of scale and to minimise potential odour and operational effects.

The selection of the treatment technology will be confirmed at the substantive application stage, taking into account:

- Soil characteristics.
- Sensitivity of the receiving environment.

- Cultural considerations, including impacts on Māori values and relationships with land and water.
- Ease of construction.
- Operational complexity and maintenance requirements.
- Reliability and resilience.
- Ability to accommodate staged or modular expansion.
- Ability to meet current and future discharge quality requirements (for land application, reuse, or discharge to water).
- Proven performance within the New Zealand context.

Given the potential for discharge to surface water, a high level of treatment is required, including effective nutrient removal and disinfection.

Treatment technologies currently used in New Zealand and considered suitable for this development include:

- Membrane Bioreactor (MBR) systems.
- Membrane Aerated Biofilm Reactor (MABR) systems.
- Hybrid MBR-MABR systems.

MBR systems combine biological treatment with membrane filtration, providing excellent removal of suspended solids and pathogens and producing low turbidity effluent.

MABR systems provide highly efficient biological nutrient removal, particularly for nitrification, through enhanced oxygen transfer. They typically have lower energy requirements and reduced sludge production but do not provide a physical separation barrier, meaning additional treatment is required to remove solids.

The hybrid MABR-MBR process integrates the advantages of both systems, resulting in a treatment solution capable of:

- Achieving high levels of nutrient removal.
- Providing effective solids and pathogen removal.
- Reducing energy consumption compared to conventional systems.
- Minimising sludge production and associated operational requirements.

The hybrid system also offers a compact footprint and can be designed in a modular configuration, making it well suited to staged residential developments. It is also capable of accommodating variations in hydraulic and organic loading.

Based on these considerations, a hybrid MABR-MBR system is considered an appropriate and reliable treatment solution for the Site, capable of producing high-quality effluent suitable for land application and, if required, further polishing for discharge to surface water. This technology is also increasingly adopted within New

Zealand, including by Watercare in rural developments such as Te Kauwhata, Meremere, Clarks Beach, and Glenbrook.

7.2 Discharge Quality

GWE has undertaken a preliminary assessment of expected discharge quality requirements based on the potential receiving environment options for the Site.

Discharge quality criteria will be developed to ensure that potential effects on the environment, including surface water, groundwater, soil quality, ecological values, and cultural considerations, are appropriately managed. These criteria will be confirmed at the substantive application stage as part of a detailed Assessment of Environmental Effects (AEE).

Based on current industry practice in New Zealand, advanced treatment systems such as hybrid MBR/MABR are capable of producing high-quality effluent suitable for land application and, subject to further assessment, potential discharge to surface water.

Table 2 presents indicative median discharge quality targets that such a system is expected to achieve, consistent with industry experience.

Table 2 Anticipated Median Discharge Quality Requirements - Land Disposal

PARAMETER	TYPICAL DOMESTIC EFFLUENT QUALITY ¹	MEDIAN TREATED DISCHARGE	REMOVAL % (MEDIAN)
5-Day Carbonaceous Biochemical Oxygen Demand (cBOD5)	300	10	96.5
Total Suspended Solids (TSS)	350	10	97
Total Nitrogen (TN)	40-70	10	93
Total Phosphorus (TP)	6 - 12	1	98
Faecal Coliforms (FC)	> 1x10 ⁸ CFU/100 mL	<10 CFU/100 mL	>99%

Notes:

¹Based on Table 7.1 of TP58, On-site Wastewater System.

All concentrations in mg/L unless otherwise stated.

The values presented above are indicative and intended for concept-level assessment only. Final discharge quality criteria and compliance requirements will be confirmed at the substantive application stage, taking into account receiving environment characteristics and applicable regulatory standards.

7.3 Treated Wastewater Reuse

Treated wastewater from the proposed treatment system may be suitable for reuse in non-potable applications, such as irrigation of landscaped areas, ecological restoration zones, and amenity areas, or for non-potable washdown purposes (subject to additional treatment if required).

Reuse of treated wastewater can reduce demand on potable water resources and support positive environmental and cultural outcomes. The feasibility, scale, and required treatment standards for reuse will be further assessed at the substantive application stage, once the overall water balance and discharge strategy are confirmed.

7.4 Land-Based Polishing and Cultural Restoration

Land-based application and polishing of treated wastewater is a well-established approach in Auckland and throughout New Zealand, including the use of pressure compensating dripper irrigation, constructed wetlands, and infiltration or irrigation trenches.

For this development, land-based measures are proposed to form part of the overall wastewater management approach. These measures may provide a practical means of further polishing the treated effluent, supporting landscape planting, and contributing to cultural outcomes associated with the restoration of the mauri of the water prior to any interaction with surface water.

The proposed wastewater treatment system is expected to produce a high-quality effluent with low suspended solids, reduced nutrient concentrations, and effective microbial treatment. Subject to detailed design, this treated effluent may be suitable for controlled land application or passage through a constructed wetland, infiltration trench, or similar land-contact system.

The purpose of these measures would not necessarily be to provide full hydraulic disposal of all treated wastewater to land, but rather to provide an additional treatment, polishing, and cultural restoration function before any residual discharge enters the receiving environment. This approach recognises the value of maintaining contact with land, where practicable, while also acknowledging that full land disposal may be constrained by site area, soil characteristics, groundwater conditions, seasonal rainfall, and the scale of the development.

Based on the Geotechnical Assessment Report prepared by KGA Geotechnical Group Limited, the Site is underlain by soils associated with the Tauranga Group, Waitemata Group, Motatau Complex, and Mangakahia Complex.

Further investigation will be undertaken at the detailed design stage to confirm the appropriate scale, configuration, and function of any land-based polishing system. This will include consideration of:

- Site-specific soil and infiltration characteristics.
- Nutrient loading, uptake, and attenuation.
- Groundwater conditions and seasonal variability.
- Setbacks to surface water, groundwater, and site boundaries.
- Slope stability and landform constraints.
- Opportunities for constructed wetland, infiltration trench, or planted polishing systems.
- The extent to which land-based measures can support cultural, ecological, and landscape outcomes.

Accordingly, land-based treatment and polishing will be retained as an important component of the overall wastewater strategy, particularly for cultural and environmental restoration purposes, while recognising that it may operate in combination with, rather than in place of, a controlled discharge to surface water.

7.5 Treated Discharge to Stream

The wastewater servicing strategy for the development is expected to include a highly treated discharge to a nearby watercourse, subject to detailed assessment of the receiving environment and confirmation of appropriate discharge standards. This approach will be developed to ensure that any discharge is of a high quality and can be accommodated without unacceptable effects on water quality, aquatic ecology, or downstream values.

The proposed hybrid MBR/MABR treatment system is capable of producing a high standard of treated effluent suitable for discharge to surface water. The system is expected to achieve substantial reductions in suspended solids, organic load, nutrients, and microbial contaminants. Where required, additional tertiary polishing, disinfection, process optimisation, or advanced treatment may be incorporated to achieve the final discharge quality necessary for the receiving environment.

A full assessment of the assimilative capacity of the receiving stream will be undertaken at the substantive application stage. This assessment will consider, as appropriate:

- Existing water quality.
- Stream flow characteristics, including low-flow conditions.
- Available dilution.
- Ecological values and sensitivity of the receiving environment.
- Downstream uses and receiving environment constraints.
- Nutrient and microbial effects.

- Cumulative effects.
- The relevant regulatory requirements and performance standards.

The assessment will consider key discharge parameters including:

- 5-Day Carbonaceous Biochemical Oxygen Demand, cBOD₅.
- Total Suspended Solids, TSS.
- Total Phosphorus.
- Ammonia/Ammoniacal Nitrogen.
- E. coli.
- Enterococci.

Prior to discharge to surface water, treated effluent is proposed to pass through a constructed wetland, irrigation trench, infiltration trench, or similar land-contact polishing system. This measure is intended to provide an additional environmental and cultural treatment step, including supporting the restoration of the mauri of the water before it enters the stream environment.

The final discharge limits and any dilution requirements, including those arising under regulation 47 of the Water Services (Wastewater Environmental Performance Standards) Regulations 2025, will be confirmed through the substantive application process. These limits will be informed by the detailed receiving environment assessment, the sensitivity of the stream, and the demonstrated performance of the proposed treatment system.

On this basis, the proposed discharge strategy is expected to provide a robust and precautionary wastewater management solution, combining advanced mechanical treatment, land-based or wetland polishing where practicable, and a receiving environment assessment to ensure the discharge can be appropriately managed.

7.6 Regulatory Framework and Resource Consents

The development will be subject to relevant statutory requirements, including:

- The Auckland Unitary Plan (Operative in Part), particularly provisions relating to on-site wastewater systems and discharges to land and water (e.g. Chapter E5 – On-site Wastewater Systems).
- Auckland Council Technical Publication TP58 – *On-site Wastewater Systems: Design and Management Manual* (2004), which provides guidance on design, treatment, and land application of wastewater.
- Taumata Arowai regulatory requirements, including the Wastewater Environmental Performance Standards and associated water services legislation.

For this project, the following resource consents are anticipated to be required:

- Discharge of treated wastewater to land.
- Discharge of treated wastewater to stream.

- Associated land use consents for construction and operation of wastewater infrastructure.

The specific consent requirements will be confirmed at the substantive application stage.

7.7 Environmental Effects

Potential environmental effects associated with the proposed wastewater system include impacts on surface water and groundwater quality, soil saturation and nutrient accumulation, ecological values, and potential odour and amenity effects. These effects will be managed through the implementation of advanced wastewater treatment processes to achieve a high standard of effluent quality, along with the appropriate design and sizing of land disposal systems to prevent ponding and runoff.

Buffer distances and setbacks from sensitive receptors, including watercourses, identified gully features (based on the KGA Geotechnical Assessment Report) and neighbouring properties, will be incorporated into the design to further mitigate potential impacts.

In addition, ongoing operation, maintenance, and monitoring of the system will ensure continued performance and compliance. A detailed AEE will be undertaken at the substantive application stage to evaluate these matters comprehensively.

8 CONCLUSIONS

This assessment demonstrates that wastewater generated by the proposed Horseshoe Bush Road development can be effectively collected, treated, and managed through a centralised wastewater servicing system.

Based on the current concept design assumptions, an LPS or gravity reticulation network conveying flows to a centralised wastewater treatment plant is considered an appropriate and feasible servicing solution for the Site. A modular hybrid MABR/MBR treatment system is considered capable of producing a high-quality treated effluent suitable for land-based polishing and, subject to detailed assessment and regulatory approval, controlled discharge to surface water.

The proposed servicing strategy has been developed recognising the scale of the development, the staged nature of delivery, the characteristics of the receiving environment, and the need to achieve a high standard of environmental performance. The incorporation of land-contact polishing measures, such as constructed wetlands, infiltration systems, or irrigation-based treatment areas, is expected to provide additional environmental and cultural benefits prior to any residual discharge entering the receiving environment.

Further investigations and detailed design will be undertaken at the substantive application stage, including geotechnical, hydraulic, ecological, and receiving environment assessments, together with confirmation of treatment performance requirements, discharge standards, and resource consent conditions.

Subject to these further assessments and approvals, the proposed wastewater servicing approach provides a practical, scalable, and environmentally responsible solution capable of supporting the long-term development of the Site.

9 LIMITATIONS

This report has been prepared for the sole benefit of **Tuakiri Property Ltd** as our Client, and their appointed representatives, according to their instructions, for the specific objectives described herein. This report is qualified in its entirety and should be considered in the light of our Terms of Engagement with the Client and the following:

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