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CONSULTING ENGINEERS

132 WHANGAPOURI FAST-TRACK REFERRAL APPLICATION WASTEWATER SERVICING REPORT

132 Whangapouri Road
Karaka, Auckland

132 WHANGAPOURI DRURY LIMITED

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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 development at 132 Whangapouri Road, Karaka. The Project comprises approximately 904 residential lots, a retirement village, a local centre, as well as significant open space, wetlands and drainage reserve provision.

The site is not serviced by Watercare or any similar servicing entity, and therefore a self-sufficient wastewater servicing solution is required. A preliminary wastewater flow assessment estimates an average daily flow (ADWF) of approximately 580 m^3/day and a peak wet weather flow (PWWF) of 1,160 m^3/day at full development, applying a peaking factor of 2.

A concept-level wastewater servicing strategy has been developed based on a centralised treatment system approach. Wastewater will be collected via a reticulation network, with a gravity sewer system likely to be the preferred option and conveyed to a centralised wastewater treatment plant (WWTP).

A Membrane Bioreactor (MBR) or hybrid Membrane Aerated Biofilm Reactor (MABR)/MBR system is recommended to meet nutrient and pathogen removal targets suitable for land disposal and/or reuse. The treatment plant is designed to be scalable and capable of staged delivery, allowing infrastructure investment to align with development sequencing. The final discharge approach will be confirmed at the substantive application stage following further site investigations and environmental assessment.

The MABR-MBR 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 $cBOD_5$ 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. It has recently been effectively deployed by Watercare at Raglan WWTP and Te Kauwhata WWTP, into similarly sensitive receiving environments.

The final disposal pathway has not been confirmed at this stage. Both discharge to surface water and land-based disposal remain under consideration, and the preferred approach will be determined through further site investigation and environmental assessment at the substantive application stage.

Preliminary assessment indicates that potential adverse effects on surface water, groundwater, soils, amenity, and public health can be mitigated through the advanced treatment, appropriately designed land contact systems, and ongoing operation and maintenance.

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, setbacks from sensitive receptors, operational controls, monitoring, and ongoing maintenance.

Overall, the assessment confirms that a feasible, reliable, and sustainable wastewater servicing solution is achievable for the Project. No constraints have been identified that would preclude the development at the Fast-Track referral stage.

1 INTRODUCTION

This report has been prepared to support the Fast-Track referral application for the proposed development at 132 Whangapouri Road, Karaka (the Project).

The Project involves the development of a large-scale residential community with supporting commercial and retirement living components, for which a self-sufficient wastewater solution is required.

This report provides a preliminary, concept-level assessment of wastewater servicing, including anticipated wastewater generation and a proposed servicing strategy based on the current masterplan.

2 PURPOSE AND SCOPE

The purpose of this report is to provide a high-level assessment of wastewater servicing for the Project.

The scope of this assessment includes:

- Estimation of wastewater generation based on the proposed development layout and industry-standard design assumptions.
- Development of a concept-level wastewater servicing strategy.
- Consideration of relevant regulatory requirements and compliance obligations.

The level of detail is appropriate for a Fast-track referral application and will be refined during the substantive application stage.

3 EXISTING ENVIRONMENT

The Project is located between Karaka and Drury, west of the Southern Motorway and south of Drury Creek Islands Recreation Reserve, with a total land area of approximately 73.5 hectares. The land is generally flat, with a gentle east/southeast aspect, and the current land use is predominantly rural and farmland.

Auckland Council GIS viewer (GeoMaps) indicates a water course traverses the Project area, with an associated 1-in-100-year floodplain and various tributaries / overland flow paths (OLFPs) directed to it. These surface water features will require consideration in the design and location of wastewater treatment and disposal infrastructure.

There is no immediate connection to a Watercare public wastewater reticulation network available. Accordingly, a self-sufficient wastewater servicing solution is required for the Project to manage wastewater on-site.

Treated wastewater disposal is expected to involve discharge to surface water and/or land-based systems, with the preferred approach to be confirmed through further investigation and environmental assessment at the substantive application stage.

4 DEVELOPMENT OVERVIEW AND ASSUMPTIONS

4.1 Development Summary

The Project comprises a predominantly residential subdivision located at 132 Whangapouri Road, Karaka. The current concept masterplan (Appendix A) includes:

- Approximately 904 residential lots.
- A retirement village comprising approximately 200 villas.
- A local centre supporting commercial and community activities.
- Approximately 28 hectares of open space, wetlands, and drainage reserves.

The development is intended to be delivered in stages, with infrastructure designed to support both interim and ultimate build-out conditions.

4.2 Key Assumptions

The assessment is based on various high-level assumptions consistent with early planning and concept-level design. Occupancies and wastewater flow allowances across the Project are consistent with Watercare's Code of Practice (CoP) and industry benchmarks.

The following assumptions underpin the flow estimates and servicing strategy presented in this report:

- Residential dwellings:
  - 3 persons per dwelling at 180 L/person/day.
- Local centre:
  - Gross Floor Area (GFA) / Roof Area = 35% of total lot area
  - 33% dry retail at 1.3 L/m^2/day
  - 67% wet retail at 15 L/m^2/day.
- Retirement Village:
  - 1.5 residents per unit at 220 L/person/day
  - 1 staff per 10 residents at 50 L/person/day.
- Peak flows based on average dry weather flow (ADWF) with a peaking factor of 2 per dwelling unit.

These assumptions will be tested and refined as the Project is progressed through detailed design and supporting technical investigations.

5 WASTEWATER GENERATION

Wastewater generated across the Project is expected to be predominantly domestic in nature from toilets, showers, and kitchen area, with a smaller portion of commercial and retirement village wastewater from their respective wastewater generating areas.

As outlined in Section 4.2, peak design flows have been calculated by applying a peaking factor of 2 to the ADWF to allow for wet weather conditions and infiltration into a new gravity sewer network. Monitoring within the network is expected to be required to manage infiltration, and this will be detailed in proposed monitoring conditions of the consent.

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

The total average dry weather flow (ADWF) for the Project is estimated at 580 m^3/day, with a corresponding peak wastewater flow of 1,160 m^3/day. The wastewater design flows are summarised in Table 1.

Table 1: Wastewater Design Flows

LAND USE	QUANTITY	OCCUPANCY	WASTEWATER FLOW ALLOWANCE	ADWF (M^3/DAY)	PEAKING FACTOR	PEAK FLOW (M^3/DAY)
Residential	904 HUEs	3 persons per HUE	180 L/p/day	488	2	976
Local Centre (Commercial)	~2275 m^2 GFA	-	Dry: 1.3 L/m^2/day Wet: 15 L/m^2/day	24	2	48
Retirement Village	200 HUEs	1.5 residents per HUE + 1 staff per 10 residents	Residents: 220 L/p/day Staff: 50 L/p/day	68	2	136
TOTAL				**580**	**-**	**1,160**

6 WASTEWATER SERVICING STRATEGY

6.1 Regulatory Framework and Compliance

The proposed wastewater servicing system will be designed, constructed, and operated in accordance with all relevant regulatory requirements, including:

- The Auckland Unitary Plan (Operative in Part) (AUP(OP)). Particularly, Chapter E5 – *On-site Wastewater Systems*.
- Auckland Council Technical Publication 58 (TP58) – *On-site Wastewater Systems: Design and Management Manual* (2004).
- Resource consent requirements under the Resource Management Act 1991 (RMA) for discharge of treated wastewater to land and associated infrastructure.
- Applicable Auckland Council engineering standards and guidelines

The specific consent requirements will be refined during the substantive application stage and further during detailed design.

6.2 Wastewater Collection/Reticulation

Several 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 conventional gravity sewer system is likely to be the preferred reticulation approach for the development. This approach is expected to provide a practical and reliable servicing solution that can integrate with a future Watercare connection if and when that becomes available. The preferred reticulation solution will be confirmed through further concept design and assessment during the substantive application stage.

A gravity sewer system is considered appropriate for the scale of the development and can be designed to respond to the site layout, staging, and long-term operational requirements.

The final reticulation arrangement will be confirmed during the substantive application stage once further information on site conditions, network layout, and future servicing interfaces is available.

6.3 Wastewater Treatment

A centralised wastewater treatment plant (WWTP) is proposed for the Project to make use of the economy of scale provided by the proposal and to minimise potential odour and operational effects.

The following evaluation criteria will be used to determine the preferred treatment technology for the WWTP during the design for the substantive application:

- 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).
- Use of technologies that are common within a NZ context and consistent with current and emerging technologies.

A high level of treatment is expected to be required including effective nutrient removal and disinfection. Treatment technologies currently used in New Zealand and considered suitable for the Project include:

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

Due to the requirement for a high level of treatment, it is likely that an MBR or MABR/MBR hybrid (with nutrient removal and disinfection), both consistent with best practice, will be required to service the Project. These are the technologies adopted by Watercare throughout the Auckland and Waikato areas e.g. Te Kauwhata, Meremere, Clarkes Beach and Glenbrook.

6.4 Target Discharge Quality

At this stage, the final treated wastewater disposal pathway has not been confirmed. Both discharge to surface water (via land contact or polishing systems) and land-based disposal remain under consideration and will be assessed further at the substantive application stage.

Discharge quality criteria will be developed to manage and mitigate potential adverse effects on the environment including surface water, groundwater, soil quality, amenity and cultural values, and public health. This will be determined during the substantive application stage as part of a detailed Assessment of Environmental Effects (AEE).

The expected average discharge quality targets the WWTP would be required to reliably achieve in line with industry best practice are outlined in Table 2.

Table 2: Anticipated Median Effluent 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:

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

All concentrations in mg/L unless otherwise stated.

6.5 Treated Wastewater Disposal

The final disposal pathway for treated wastewater has not been confirmed at this stage. Both discharge to surface water and land-based disposal are being considered, and the preferred approach will be determined through further site investigations, environmental assessment, and engagement with Auckland Council, iwi, and other stakeholders during the substantive application stage.

The feasibility of land-based disposal will depend on a range of site-specific factors, including available land area within the masterplan, soil permeability, groundwater conditions, and seasonal moisture variability. These factors have not yet been confirmed through detailed investigation.

Where land-based disposal is not feasible or only partially achievable, discharge to surface water may be required, subject to additional treatment and appropriate mitigation measures.

The final disposal strategy will be informed by further site investigations, environmental assessment, and consultation with Auckland Council, iwi, and other stakeholders.

6.5.1 Discharge to Water

Discharge of treated wastewater to surface water is a potential primary disposal pathway for the Project. This would involve discharge via a polishing wetland, land contact system, or similar device to provide additional treatment and to support cultural outcomes.

The feasibility and design of a surface water discharge pathway will depend on the characteristics and classification of the receiving environment, which will be confirmed through further ecological and water quality assessment at the substantive application stage.

6.5.2 Land Disposal

Land-based disposal remains a potential option for the Project, either as a primary or supplementary disposal pathway, and could involve irrigation via pressure-compensating drip systems or similar land application methods.

The feasibility of land-based disposal will depend on the availability of suitable land within the masterplan, soil permeability, groundwater conditions, and seasonal moisture variability. These factors have not yet been confirmed through detailed investigation. No land area has been specifically allocated for disposal within the current masterplan, and this will need to be addressed if land-based disposal is to be pursued.

6.5.3 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 ASSESSMENT OF ENVIRONMENTAL EFFECTS

A preliminary assessment of the environmental and operational effects of the proposed wastewater servicing infrastructure for the Project has been undertaken based on the concept-level designed outlined in Section 6.

- The assessment indicates that a suitable and sustainable wastewater servicing solution can be achieved for the Project.
- Potential adverse effects on surface water, groundwater, soils, amenity values, and public health will be managed through the implementation of:
  - Advanced wastewater treatment processes to achieve a high standard of treated effluent
  - Appropriately designed disposal systems, whether land-based or via discharge to surface water, to manage potential effects on receiving environments.
  - Separation and buffer distances to sensitive receptors including identified watercourses, drainage features, and property boundaries.
- Ongoing operation, maintenance, and monitoring of the system will ensure continued performance and compliance.

The nature and extent of potential environmental effects will depend on the disposal pathway adopted and will be assessed in detail once the receiving environment and disposal strategy are confirmed.

8 CONCLUSION

The concept-level assessment indicates that a feasible and reliable wastewater servicing solution can be achieved for the Project. A centralised wastewater system incorporating collection, treatment, and disposal is considered appropriate and achievable to service the proposed development.

Estimated wastewater flows of approximately 580 m^3/day (ADWF) and 1,160 m^3/day (peak) can be effectively managed through a gravity sewer reticulation network and a centralised treatment plant incorporating advanced treatment processes.

Treated wastewater disposal is expected to involve discharge to surface water and/or land-based systems, with the preferred approach to be confirmed through further investigation and environmental assessment at the substantive application stage. These approaches will be refined through further investigation, environmental assessment, and engagement during the substantive application stage.

No constraints have been identified that would preclude the provision of a suitable wastewater servicing solution for the Project at the Fast-Track referral stage. Further investigations and more detailed design will be undertaken at the substantive application stage.

9 LIMITATIONS

This report has been prepared for the sole benefit of **132 Whangapouri Drury Limited** 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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