Delmore Fast Track Application

Appendix 8: A17 (Water Treatment) to Response to Comments letter

From: Apex, McKenzie & Co, and Barker & Associates

Date: 5 June 2026

Re: Response to Annexure 17 to Auckland Council Response – Water Treatment

1.1 Introduction

This memorandum responds to the Technical Specialist Memo prepared by Auckland Council (Water Treatment) in relation to the above fast-track application. This response addresses:

- Further information requests / technical queries; and
- Recommended amendments to consent conditions.

The following attachments are included to this memorandum:

- **Attachment A: McKenzie & Co Water Supply Memorandum**

1.2 Response to Further Information Requests / Technical Comments

Information Request / Technical Comment from Council under section 53 FTAA	Applicant Response under Section 55 FTAA
7.1. The Water take consent has been granted, however there is no water quality data for design of the treatment plant. The sample used is from 2016, from a bore located outside of the property.	*Apex response:* The physical infrastructure proposed in the Substantive Application has been designed to accommodate a worst-case scenario where a high level of removal is required to meet the Drinking Water Standards for New Zealand, such as a membrane-based treatment process. While the available water quality data is from a 2016 sample taken from a bore on an adjacent site, the information is sufficient at this stage to confirm the feasibility of the proposed water treatment approach. Updated sampling and confirmation of final treatment requirements can be undertaken through the detailed design process prior to operation and secured through consent conditions (see table below).
7.2. The application does not provide a water balance sufficient to demonstrate how the water shall be supplied reliably to the development during increased use periods, which will typically coincide	*McKenzie & Co response:* A water balance for the proposed development has been prepared and is set out in the attached memo from Mckenzie & Co. This is included as **Attachment A** to this memo. The broader supply strategy is also detailed in

with drought conditions. Water harvesting is mentioned but not detailed.	Section 7 of the Water, Wastewater and Utilities Report (included at **Appendix 27 to the AEE** as part of the lodged substantive application). The key components include: • Four production bores for supply resilience; • Balancing reservoirs at the water treatment plant; • A raw water storage tank at the water treatment plant; • Water efficient fittings for both stages; • For stage 2 - further water efficiency measures, including Rainwater harvesting tanks and water recycling; and • For stage 2, additional reservoir for pressure and firefighting purposes. The balance accommodates drought conditions as identified in the memo included as **Attachment A** to this document. The resulting Stage 2 annual demand of 78,498 m³ (and combined Stage 1+2 demand of 195,707 m³/year) corresponds to the take limits granted under WAT60456696 Conditions 8(a)–(f). The combination of conservative per-capita demand, peak factor, drought-scenario modelling with rainwater tanks empty in summer, lower-quartile rainfall assumption, multi-bore redundancy, and 24–48 hour balancing storage demonstrates that supply will be reliable during increased use periods. The balance is explicitly modelled around the worst-case drought month, not annual averages.
7.3. A "Hydroloop" system is also referred to, however the figure of 30-40% water re-use is not tested, nor detailed as to how this would be integrated into the overall water supply for the development. Is this going to be a condition for developing dwellings on the site?	*McKenzie & Co Response:* The proposed water re-use strategy for the site includes: • **Stage 1 and 2:** Water efficient fittings; • **Stage 2 only:** Site-wide rainwater harvesting tanks (supplying outdoor irrigation and toilet flushing); and • **Stage 2 only:** Household-scale greywater recycling (Hydraloop or equivalent, supplying toilet flushing and laundry where toilet demand is not already met by rainwater). The modelled engineering performance of measures 2 and 3, results in a 31.9% decrease from the re-use tanks, and a further 23.9% decrease from the greywater recycling. This is an annual reduction of 55.8% in average annual demand. This re-use target % is consistent with Branz and Auckland Council data. The conservative 35% greywater re-use target has been set to provide a further buffer. The justification for this is detailed in within **Attachment A** to this memorandum. Conditions have been proposed to ensure these requirements are met prior to occupation of dwellings (refer

	Conditions 68 and 69 of the land use consent) as well as in perpetuity (refer Condition 119 of the subdivision consent), as detailed in the table below.
7.4. There is likely to be a waste stream from the water treatment plant, while this is likely to be small when compared to the wastewater from the balance of the development, can this please be quantified and its management confirmed?	*Apex response:* The residual stream from the water treatment plant (WTP) will be directed to the wastewater treatment plant (WWTP). The WWTP has been designed to accommodate this additional hydraulic load and there is sufficient flexibility within the treatment process to accommodate additional nutrient loading at the expected raw water quality whilst maintaining the required discharge quality. During the detailed design process, once the raw water quality on the project site has been fully established, the basis of design shall be reviewed to confirm all operational parameters. A conservative recovery of 85% has been used to determine the hydraulic loading from the WTP on the WWTP. This will allow for a range of technologies to be utilised. The following change is proposed to the existing conditions to allow for the increase in volume relating to the wastewater discharge (refer Condition 13 of the wastewater discharge permit). • *During the summer period (December through February), the average volume of treated wastewater discharged onsite shall not exceed a total of 101.5m3/day (as a 3-month rolling mean from December through February) made up of an average of no more than:* *38.5m3/day to the land infiltration trench* *63m3/day to land irrigation* *The remainder of the treated wastewater must be disposed of offsite at an appropriate facility.* *Outside the summer period (March to November), the daily average volume of treated wastewater discharged to the irrigation field (or the land contact infiltration trench, or a combination of both) must not exceed ~~257~~ 314m3/day (as a 9-month rolling mean from March to November).* The proposed conditions ensure the discharge volumes appropriately account for the WTP residuals. Final residual

	volumes and characteristics will be confirmed during detailed design once raw water quality testing is completed.
7.5. The application material indicates that the proposed reticulation network and treatment plant are to remain in private ownership of a private infrastructure company that will seek network operator status. However, the application does not clearly identify the proposed legal entity that will own the water and wastewater assets, nor does it explain whether ownership and governance will sit with a network utility operator, body corporate, incorporated society, or another structure. Please refer to suggested condition below.	*B&A:* New conditions have been proposed which require the consent holder to establish a utility company to own, operate and maintain the water and wastewater infrastructure. Please refer to the updated set of conditions (refer Condition 41 of the subdivision consent). These conditions have been prepared with property lawyers Alexander Dorrington. The conditions ensure that the utility company has the long-term responsibility for operation, maintenance, compliance etc., as well as renewal of any required consents (relating to both the groundwater take and wastewater discharge permit). The fees will be collected through levies as part of the Resident's Society. Additionally, letters have been received from several utility operators confirming that that they have the capacity and capability to undertake this work. This is included in **Appendix 10 to the Response to Comments letter (Vineway Memorandum).**
7.6. The application also does not clearly allocate long-term responsibility for operation, maintenance, renewal, compliance, auditing, customer interface, charging/revenue collection, emergency response, and asset replacement across the proposed private water and wastewater systems. The supporting material refers variously to a private infrastructure company, a utility company, Apex as operator, and the owner of the plants carrying out audits, but without a single clear governance and responsibility framework. Please refer to suggested condition below.	

1.3 Response to Recommended / Amended Conditions

Condition Request from Council	Applicant Response
New condition: ***Private Utility Ownership and Governance Plan*** *Prior to the commencement of operation of any private water supply or wastewater reticulation,*	The following condition has been proposed which has been prepared with Alexander Dorrington (property lawyers), as outlined above. Refer to Condition 31 of the subdivision consent.

treatment plant, reservoir, bore, pump station, or associated private utility infrastructure authorised by this consent, the consent holder shall submit to Council for certification a Private Utility Ownership and Governance Plan. The plan shall identify: • *the legal entity that will own the infrastructure;* • *the party responsible for operation, maintenance, renewal, compliance monitoring, emergency response, customer interface and complaints management;* • *the intended pathway and timeframe for obtaining any required network operator status, registrations, or approvals from the relevant regulator(s);* • *the arrangements for long-term funding and asset management; and* • *contingency arrangements if the nominated owner or operator ceases to act.* *No operation of the private potable water supply system shall commence until the consent holder has provided to Council evidence that all approvals, registrations, and operator requirements required by the relevant drinking water regulator, including Taumata Arowai where applicable, have been obtained.*	*1. Prior to the issue of a s224(c) certificate for the first subdivision stage, the consent holder must provide evidence that a Utility Company has been legally established to operate the WWTP, the WTP and associated infrastructure. The evidence provided must include a copy of the company constitution. The constitution shall outline that the utility company must:* *(a) Operate and maintain the private wastewater and water infrastructure including the reticulation network, treatment plants, reservoirs, bores, pump stations, and dispersal fields to meet the requirements of this consent and WAT60456696;* *(b) Hold a registered leasehold over the land on which the WWTP and WTP are located, at the completion of the relevant subdivision stage;* *(c) Be responsible for ensuring that any necessary future consents or alternative management of wastewater discharges and water supply are in place prior to the expiry of this consent and WAT60456696;* *(d) Ensure that all water supplied for human consumption from the development complies at all times with the applicable requirements of the Water Services Act 2021, the Drinking Water Standards for New Zealand, and the Drinking Water Quality Assurance Rules issued or administered by Taumata Arowai, including any amendments or replacements in force from time to time.*
New condition: ***Hazardous Substances – Water Treatment Plant*** *Prior to the commencement of operation of the water treatment plant, the consent holder shall submit to Council for certification a Hazardous Substances Storage and Management Plan for the water treatment plant and associated potable water infrastructure.*	This condition is accepted and has been included within the updated set of conditions (refer to Condition 65 of the land use consent).
New condition: ***Water Supply Management Plan*** *Prior to commissioning of the on-site potable water supply system, the consent holder must submit to Council for certification a Water Supply*	This condition is accepted and has been included within the updated set of conditions (refer to Condition 64 of the land use consent).

Management Plan prepared by a suitably qualified water engineer and drinking-water specialist. The Plan should include: • *source description and bore construction details;* • *sustainable yield assessment;* • *peak day, average day, and seasonal demand calculations for each stage and full build-out;* • *treatment process description and design capacity;* • *storage volumes for operational, emergency and fire-fighting purposes;* • *backup power and critical spares;* • *network layout and pressure management;* • *monitoring, sampling, reporting and incident response procedures;* • *water conservation and demand management measures;* • *triggers for restricting use, staging occupation, or augmenting supply;* • *operation, maintenance and asset renewal responsibilities.*	
New condition: *Demonstrated Source Capacity* *Prior to the issue of section 224(c) certification for any subdivision stage, and prior to occupation of any dwelling within that stage, the consent holder must provide certification from a suitably qualified hydrogeologist and water engineer confirming that:* • *the groundwater take authorised for the development is sufficient to service that stage and all previously completed stages;* • *adequate residual capacity remains for later stages consistent with the approved staging plan; and* • *the abstraction regime will not compromise the long-term sustainable yield of the source or any minimum performance requirements specified in the groundwater take consent.*	This condition has been partially accepted and included within the subdivision consent (refer Condition 39 of the subdivision consent). The "occupation of any dwelling within that stage" has been removed as this condition relates to subdivision only.
New condition: *Demonstrated Source Capacity* *Prior to occupation of more than a specified threshold number of dwellings, such as 250, 500, 1,000, and 1,300 dwellings, the consent holder must submit an updated Water Security*	This condition is not accepted, as it is more appropriately linked to subdivision (see condition and row above). As the purpose of the condition is to ensure that sufficient groundwater allocation and source capacity exists to service the development, this assessment is most

Assessment demonstrating that the source, treatment plant, storage, pumps, and reticulation have sufficient capacity for the occupied dwellings plus the next stage, under: • *average demand,* • *peak day demand,* • *summer demand,* • *drought conditions,* • *plant outage contingency,* • *and fire-flow requirements where applicable.*	appropriately undertaken prior to the creation of additional lots. Requiring further certification prior to the occupation of individual dwellings would not materially assist in managing source capacity or water security. The relevant demand assumptions, servicing requirements, and infrastructure capacity are established and assessed at the subdivision stage, when the number of lots to be serviced is known and infrastructure planning decisions are made. By the time dwellings are occupied, the allocation of source capacity to those lots will already have been provided for through the subdivision process.
New condition: ***Compliance with Taumata Arowai drinking water requirements*** *The consent holder must ensure that all water supplied for human consumption from the development complies at all times with the applicable requirements of the Water Services Act 2021, the Drinking Water Standards for New Zealand, and the Drinking Water Quality Assurance Rules issued or administered by Taumata Arowai, including any amendments or replacements in force from time to time.*	This condition is accepted and has been included within the updated set of conditions (refer to Condition 66 of the land use consent). This has also been included as a requirement for the Utility Company (refer to Condition 31 of the subdivision consent).
New condition: ***Water efficiency and demand management*** *To improve sustainability, require all dwellings to incorporate water-efficiency measures, such as:* • *low-flow fixtures,* • *maximum flow-rate fittings,* • *efficient appliances,* • *leak detection provisions,* • *and potentially rainwater tanks for non-potable uses where appropriate.* *A useful condition would require the consent holder to demonstrate that projected per-dwelling potable demand assumptions used in the design are enforceable through design standards or consent notices.*	As per the responses to the table above, the following conditions are proposed on the land use consent (refer to Conditions 67 and 68): 1. *All dwellings serviced by a private water supply system must incorporate water efficient fittings and fixtures to minimise potable water demand.* 2. *All dwellings within Stage 2 of the development must install:* (a) *A rainwater harvesting tank sized in accordance with Table 1 of this consent, against the actual roof catchment area, plumbed to supply outdoor irrigation, toilet flushing, and laundry cold-feed; and* (b) *A greywater recycling system (Hydraloop or equivalent) configured to receive light greywater from all showers, baths, handbasins, and laundry within the dwelling, and to*

	supply treated water to laundry cold-feed and supplementary toilet flushing; and (c) *The non-potable reticulation, backflow prevention, and lilac pipework must comply with AS/NZS 3500. Compliance is to be confirmed by Producer Statement PS1 at Building Consent stage and Producer Statement PS4 at Code Compliance Certificate stage.* The following condition is proposed as a consent notice on the subdivision consent (refer to Condition 112): *Stage 2* 1. *Where a dwelling is serviced by a private water supply system, the owner of the allotment must retain and maintain, in perpetuity, the approved rainwater harvesting and greywater recycling system installed to service the dwelling for the purpose of achieving potable water demand reduction. The system shall not be removed, disconnected, or rendered inoperable unless replaced with an alternative system capable of achieving the same or greater level of potable water reduction.*
New condition: ***Drought and low-yield response plan*** *The Water Supply Management Plan should include staged drought triggers and mandatory responses, such as:* • *non-essential use restrictions,* • *irrigation bans,* • *leak detection and repair,* • *temporary reduction in construction water take,* • *use of supplementary tanker supply,* • *and a halt on occupation of further dwellings until security of supply is restored.*	This condition has not been adopted as it appears to be a duplication of the Water Supply Management Plan. Note that Condition 65 of the land use consent includes this requirement.

New condition: *Minimum treated water storage* *The consent holder must provide treated potable water storage sufficient to meet:* • *at least 24 hours of average day demand for occupied dwellings,* • *emergency reserve,* • *and any required fire-fighting storage,* *with the exact volumes certified by a suitably qualified water engineer prior to commissioning.*	This condition is accepted and has been included within the updated set of conditions (refer to Condition 69 of the land use consent).

Table 1

Stage 2 - Minimum required rainwater harvesting tank size by roof catchment area	**Roof area**	
	Min	**Max**
3,000 L	49 m^2	74 m^2
4,000 L	74 m^2	98 m^2
5,000 L	98 m^2	123 m^2
6,000 L	123 m^2	147 m^2
7,000 L	147 m^2	172 m^2
8,000 L	172 m^2	197 m^2
9,000 L	197 m^2	221 m^2
10,000 L	221 m^2	246 m^2

Attachment A: McKenzie & Co Memorandum

MEMO

To:	Auckland Council
From:	McKenzie & Co. (Romeo De la Cruz / James Kitchen)
CC:	Vineway Ltd; Barker & Associates
Date:	3 June 2026
Subject:	Response to Section 53 Comments (Items 7.2 and 7.3 — Water supply, drought reliability, and water re-use system performance)
Project:	**Delmore Development, 55 Russell Road / 88 Upper Orewa Road, Orewa**

1.0 INTRODUCTION

This memorandum responds to the Section 53 Comments from Auckland Council (Items 7.2 and 7.3 in the Water Treatment Memo) in respect of the Delmore subdivision. The quest

ions raised relate to:

- 7.2 — whether the application provides a water balance sufficient to demonstrate reliable supply during increased use periods and drought conditions; and
- 7.3 — the basis for the 30–40% Hydraloop re-use figure, integration with the overall water supply, and whether a Consent Notice will apply to dwellings.

This memo provides a consolidated response, supported by the engineering documents lodged with the application and the granted bore take consent WAT60456696. It draws on BRANZ research to support the performance basis of the water conservation measures.

2.0 RESPONSE TO ITEM 7.2, WATER BALANCE AND DROUGHT RELIABILITY

2.1 Water balance source documents

A water balance for the proposed development has been prepared and is included in Appendix 1 to this memo, with the broader supply strategy detailed in Section 7 of the Water, Wastewater and Utilities Report (Appendix 29 to the AEE).

2.2 Balance assumptions and design measures

The water balance model was undertaken using the below parameters, and considers increased use periods and drought conditions:

Component	Approach
Demand basis	180 L/p/day adopted, conservative against Auckland Council benchmark of 177 L/p/day
Occupancy	3.7 persons per dwelling, reflecting masterplan typology of 3–5 bedroom dwellings
Peak factor	Peak Day Demand = 2 x Average Daily Demand

Component	Approach
Drought scenario	Stage 2 modelled with rainwater tanks empty January–February (zero rainwater contribution during peak summer/drought)
Rainfall basis	Lower-quartile monthly rainfall for all non-drought months, Henderson station, 1990–2024 (34-year record)
Roof capture efficiency	90% applied (conservative for membrane and profile metal roofing)
Storage / balancing	24–48 hour operating reserve (1,500–3,000 m^3) sized against the modelled peak day of 1,385 m^3/day
Bore redundancy	Four production bores (two per stage), providing redundancy during maintenance, outage, and operational rotation
Pump duty	18 hours on, 6 hours off, to ensure storage recovery time and asset longevity

2.3 180 L/p/day demand basis

The 180 L/p/day per capita demand basis adopted in the Water Demand Memo compared against regulatory and technical reference points:

Reference	Figure (L/p/day)	Context
Watercare Code of Practice for Land Development and Subdivision 2024	220	Default for water supply design at full demand without efficiency measures
Delmore Water Demand Memo (adopted basis)	**180**	Adopted as conservative working figure with water-efficient fittings for both stages as the minimum specification
Auckland Council (residential potable demand)	177	Auckland council benchmark for typical residential potable demand, Refer Appendix 2.

GD06, On-Site Wastewater Management in the Auckland Region - Table 18: Minimum domestic wastewater flow allowances, shows that comparing the discharge for the following categories –

- C - Households with dual flush toilet/s and standard fixtures, low water use dishwasher and no in-sink grinder – 160 L/p/d; and
- E - Households with full water reduction fixtures on all water outlets and no garbage grinder – 120 L/p/d

Equates to a reduction of 40 L/p/d for water reducing fixtures. Therefore, a reduction of the same amount has been applied to the Watercare COP figure, to allow for these fixtures. The demand of 180 L/p/d is higher than the Auckland Council's online calculator figure, for estimating tank sizes.

Alignment summary

The following table demonstrates that the Delmore Stage 2 modelled figures align with three regulatory and research benchmarks:

Stage 2 component	Delmore modelled	Benchmark	Alignment
Total demand (gross per-capita)	**180 L/p/day**	Watercare CoP: 220 less 40 (water-saving features) = 180	Watercare CoP with standard water-saving deduction (scale of reduction consistent with GD06)
Hydraloop greywater recycling saving	**43.1 L/p/day**	BRANZ theoretical max ~70 L/p/day · Maraetai NZ field result: 41.9 L/p/day	Within NZ field range; ~61% of BRANZ theoretical maximum
Demand reduction from water saving measures	**55.8%**	GD06 Cat C to Cat H reduction: 39–47%	Delmore exceeds GD06 recognised reduction because tanks add to recycling

2.4 Outcome against granted consent caps

The resulting demand aligns with the take limits granted under WAT60456696 Conditions 8(a)–(f):

Cap	Stage 1	Stage 2	Combined
Daily abstraction (m^3/d)	642 (Cond 8a)	743 (Cond 8c)	1,385 (Cond 8e)
Annual abstraction (m^3/yr)	117,209 (Cond 8b)	78,498 (Cond 8d)	195,707 (Cond 8f)

These are achieved with the following mitigation measures –

Stage	Stage 1	Stage 2
Water saving fixtures	yes	yes
Water re-use tanks	No	Yes
Greywater recycling	No	Yes
Balancing reservoirs	Yes	Yes

2.5 Drought-period performance

The water balance has been explicitly modelled around the drought scenario in which rainwater tanks are empty for a 60-day period (January to February). During this scenario:

- Rainwater tanks contribute zero water (empty by drought modelling).
- Hydraloop (or equivalent) maintains its design performance of 4.85 m^3/month per dwelling, because greywater generation is independent of rainfall.
- The bore supply covers the remaining 15.41 m^3/month per dwelling, which aggregates to a Stage 2 average daily bore demand of 371 m^3/day, or 742 m^3/day at the peak factor of 2 — within the granted Condition 8(c) cap of 743 m^3/day.

Greywater recycling continues to operate at design performance throughout the drought period. This provides the resilience: when the rainwater-dependent measure (tanks) is unavailable, the greywater-dependent measure continues to reduce potable demand by approximately 24%.

Stage 2 daily bore demand during drought averages 371 m^3/day, with the peak day (x2 factor) at 742 m^3/day. This sits within the granted daily abstraction limit of 743 m^3/day under WAT60456696 Condition 8(c), with the 24–48 hour balancing storage absorbing minor operational variability. The granted combined daily cap of 1,385 m^3/day (Condition 8(e)) accommodates the simultaneous Stage 1 + Stage 2 peak drought day within ordinary operational tolerance.

The four-bore configuration (two per stage) provides further redundancy during maintenance, outage, or operational rotation. Storage and balancing infrastructure provides an additional 24–48 hour buffer above the peak day demand, ensuring that any short-term variability in greywater generation or recycling system performance can be absorbed without affecting supply continuity.

Figure 3 illustrates the monthly water balance for a typical Stage 2 dwelling, showing the drought period (January–February) where tanks contribute zero and Hydraloop maintains its constant performance.

2.6 Storage and bore supply infrastructure

The water balance is delivered through a four-bore, three-tank configuration. At a high level:

Production bores: Four bores (PB1–PB4), each rated at 4 L/s, providing a peak combined capacity of 16 L/s (~1,384 m^3/day).

Storage tanks: Tank 1 (2,100 m^3, untreated balancing) and Tank 2 (700 m^3, treated buffer) are located in the south of Stage 1 adjacent to the treatment plant and service Stage 1 demand. Tank 3 (1,000 m^3, treated buffer) is located in the north of Stage 2 at approximately 90 mRL and will be constructed with Stage 2.

Pumping regime: Each bore operates on an 18-hours-on / 6-hours-off duty cycle, delivering approximately 346 m^3/day per bore. The 6-hour rest period allows aquifer recovery and asset rotation.

This configuration provides 24–48 hours of operating reserve against the modelled peak day demand and inherent redundancy through paired bores in each stage.

3.0 RESPONSE TO ITEM 7.3, WATER RE-USE SYSTEM PERFORMANCE AND INTEGRATION

3.1 The three-measure water conservation strategy

The water re-use strategy for Stage 2 layers three measures, consistent with Section 7.1 (Water Conservation Measures) of the Water, Wastewater and Utilities Report:

- Water-efficient fittings throughout each dwelling.
- Site-wide rainwater harvesting tanks, supplying outdoor irrigation and toilet flushing.
- Household-scale greywater recycling (Hydraloop or equivalent), supplying toilet flushing and laundry where toilet demand is not already met by rainwater.

3.2 Modelled engineering performance

The Water Demand Memo and supporting Watersmart modelling calculate the per-dwelling and aggregate Stage 2 savings as follows:

Component	Per dwelling (m^3/yr)	S2 aggregate (m^3/yr)	% of S2 unmitigated
Unmitigated demand (180 L/p/d × 3.7 occ × 365)	243.1	178,119	100%
Rainwater tank saving (irrigation + toilets)	77.5	56,898	31.9%

Component	Per dwelling (m^3/yr)	S2 aggregate (m^3/yr)	% of S2 unmitigated
Greywater saving (laundry + toilet top-up)	58.2	42,722	23.9%
Combined modelled saving	**135.7**	**99,620**	**55.8%**
Stage 2 demand on bore after mitigation	**107.4**	**78,498**	**44.2%**

The Stage 2 demand of 78,498 m^3/yr aligns with the granted bore take cap of WAT60456696 Condition 8(d).

3.3 Performance basis

The modelled performance is supported by three evidence streams:

1) NZ research (BRANZ) establishing the theoretical demand
2) Auckland Council tank calculation tool for different uses
3) Watersmart, Hydraloop NZ field data from the proposed technology supplier confirming achievable performance.

1) NZ research (BRANZ)

BRANZ SR469 - Residential water use in New Zealand (2022) monitoring study identifies the following NZ-residential demand components that can be offset by water re-use measures for summer, being the most demanding period.

Study Report SR469 Residential water use in New Zealand

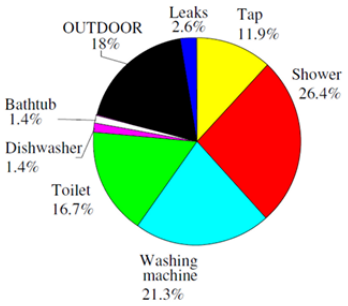


Figure 5. Summer water end-uses from Auckland.

End use	Summer end-use % for greywater suitable uses
Outdoor	18%
Toilet flushing	16.7%
Laundry/Washing	21.3%
Total theoretical maximum available for re-use	**56%**

2) Auckland Council online Tank calculation tool

A comparison of

a. All water usage (e.g. drinking water, toilet, garden watering) at 177 L/p/d
b. Indoor non-drinking water and outdoor activities (e.g. toilet, laundry, garden watering) at 98 L/p/d

Gives a proportion of 98/177 = 55%.

3) Watersmart, Hydraloop NZ field data (RFI response, Hydraloop NZ)

Watersmart has provided recent Hydraloop Device Manager (HDM) telemetry. The data is provided as Appendix 3 to this memo.

To allow direct comparison with the Delmore modelled figure, the supplier data has been normalised to a per-person basis. Both the field data and the Delmore figure relate to the Hydraloop (greywater recycling) system only — rainwater tank savings are excluded from this comparison to keep it apples-to-apples:

Site / source	Occ	Monitoring period	L/yr (total)	L/p/yr	L/p/day	% of BRANZ max
Piha residential — year 1	2	2024 (12 months)	25,434	12,717	34.8	50%
Piha residential — year 2 (same dwelling)	2	2025 (12 months)	21,995	10,998	30.1	43%
Fletcher LowCo House, Takanini (low-flow pilot)	2	2025 (12 months)	18,325	9,162	25.1	36%
Maraetai lifestyle block (2-month annualised)	**3**	**Mar–Apr 2026**	**45,852**	**15,284**	**41.9**	**60%**
Delmore Stage 2 modelled — Hydraloop only	**3.7**	**Modelled**	**58,200**	**15,730**	**43.1**	**61%**
BRANZ theoretical maximum (toilet + laundry, 39% of demand)	**any**	**BRANZ**	**—**	**~25,623**	**~70.2**	**100%**

Notes: Per-person figures derived by dividing each site's total annual recycled volume by stated occupancy. The BRANZ theoretical maximum assumes 180 L/p/day total demand × 39% (17% toilet flushing + 22% laundry). The '% of BRANZ max' column shows each per-person figure as a fraction of that ceiling.

Key observations from the supplier data:

- The two consecutive years of Piha data demonstrate stable performance with no degradation in output over time, and repeatable seasonal patterns.
- The Takanini LowCo pilot demonstrates the system operates effectively under reduced demand (low-flow fixtures, smaller household), with output scaling proportionally with available greywater.
- The Maraetai site, at 3-occupant typical residential occupancy, demonstrates higher per-person recycled volumes consistent with greater greywater generation, validating the supplier's demand-supply balance performance model.

The Delmore Stage 2 modelled figure of 15,730 L/person/yr sits at the upper end of the measured NZ range, with the Maraetai data point (15,284 L/p/yr) at 3-occupant typical residential occupancy as the closest comparator to the Delmore design profile.

Expressed against the BRANZ-supported theoretical maximum (the 39% of demand that could in principle be displaced by recycled greywater, toilet flushing plus laundry), the Delmore modelled figure represents approximately 61% of the BRANZ ceiling. with Maraetai (the closest comparator to the Delmore profile) at 60%. This shows there is a meaningful engineering margin within the BRANZ envelope, for what could be accommodated by the Hydraloop or alternative greywater system.

It is important to note that Hydraloop is a supply-limited rather than capacity-limited system, ie the low flows shown in the table above, indicates that the actual flows per person are actually lower than the modelled flows, of 180 L/p/d.

The volume of water recycled is governed by the volume of greywater entering the unit (primarily from showers, baths, and handbasins), not by any treatment capacity ceiling. The NZ field data therefore demonstrates that the units comfortably process whatever greywater is supplied to them, across a range of household sizes and demand profiles, with no degradation in performance over two consecutive years of operation at the Piha site. The supplier confirms the system operates on a demand-supply balance, with output scaling proportionally with available greywater inflow.

On this basis, the modelled Delmore figure of 15,730 L/person/yr is expected to be achieved when greywater inflow at the modelled design occupancy and demand profile (3.7 persons, 180 L/p/day) is supplied to the unit. The Piha and Takanini sites recycle less in absolute terms because they generate less greywater (low-flow fixtures, off-grid water sources, smaller households), not because the system is under-performing relative to design.

The Delmore modelled figure is supported by:

- The supplier's stated performance envelope (30–40% potable demand offset under typical conditions).
- The Maraetai field result, demonstrating per-person recycled volumes at comparable occupancy to the Delmore design profile.
- The system's documented behaviour as a demand-supply-balanced unit, where output scales with available greywater inflow.
- The BRANZ and Auckland Council data confirming that the underlying end-use demand exists to support recycling at this level (55% theoretical maximum across irrigation, toilets, and laundry).

3.4 Compliance

The 23.9% modelled greywater saving represents aggregate household performance and is not directly observable at the individual dwelling level. The applicant therefore proposes a hybrid compliance approach, combining prescriptive installation requirements (rainwater tank sized in accordance with the requirements of Appendix 4, and greywater recycling unit) with PS1 and PS4 certification at Building Consent and Code Compliance Certificate stages, and ongoing operational oversight by the development's utility company.

3.5 Integration with the overall water supply

The greywater recycling system (Hydraloop or equivalent) operates as a secondary, non-potable supply circuit within each dwelling. Treated greywater is reticulated to laundry cold-water connections and supplementary toilet flushing via dedicated lilac piping in accordance with AS/NZS 3500. The primary supply (bore-sourced potable water, treated to drinking water standards via the on-site WTP) remains connected and automatically supplements the non-potable circuit when recycled supply is insufficient.

Backflow prevention will be installed at each cross-connection in accordance with the Watercare Water Services Code of Practice for Land Development and Subdivision 2024 and AS/NZS 3500. The system is therefore fully integrated with the overall water supply and does not create a dependency or supply continuity risk.

3.6 Consent Notice provision and verification framework

Yes. The applicant intends to register a Consent Notice against each Stage 2 residential title pursuant to s221 of the Resource Management Act 1991.

4.0 SUPPORTING FIGURES

4.1 Typical Stage 2 dwelling — water flows and savings

Figure 1 below shows the water sources, end uses, and savings for a typical Stage 2 dwelling. The dwelling is supplied by three sources (rainwater tank, Hydraloop, bore) feeding six end uses, with each saving percentage indicative only.

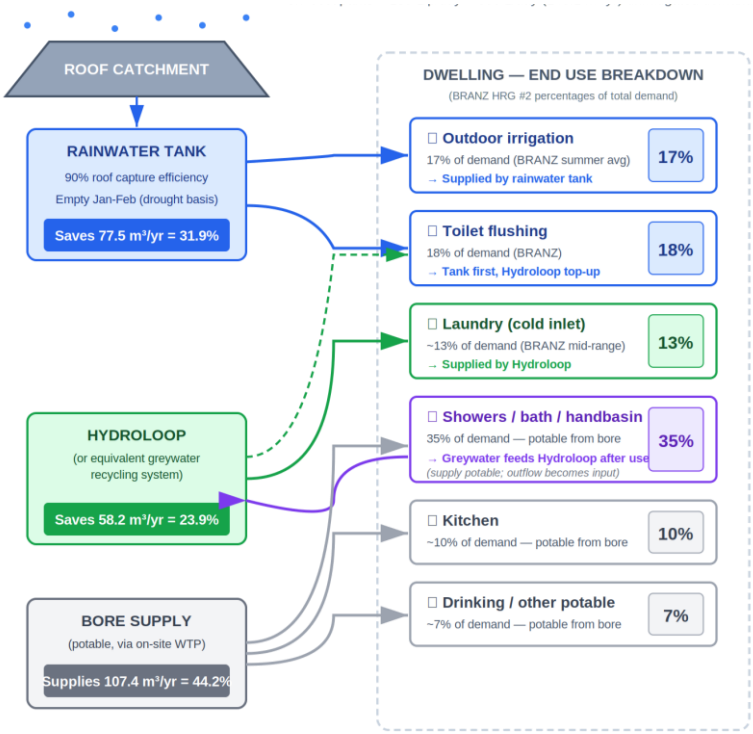


Figure 1: Typical Stage 2 dwelling — water saving measures and end-use breakdown (% indicative only)

4.2 Development-wide water supply infrastructure

Figure 2 below shows the development-wide water supply infrastructure. Four production bores draw from the Orewa Waitemata Aquifer, feeding the on-site Water Treatment Plant via a collection tank. Treated water is held in a buffer tank, then distributed to Stage 1 (via booster pump) and Stage 2 (via reservoir at 85 m RL, gravity-fed). Real-time telemetry is reported to Council under Condition 12 of WAT60456696.

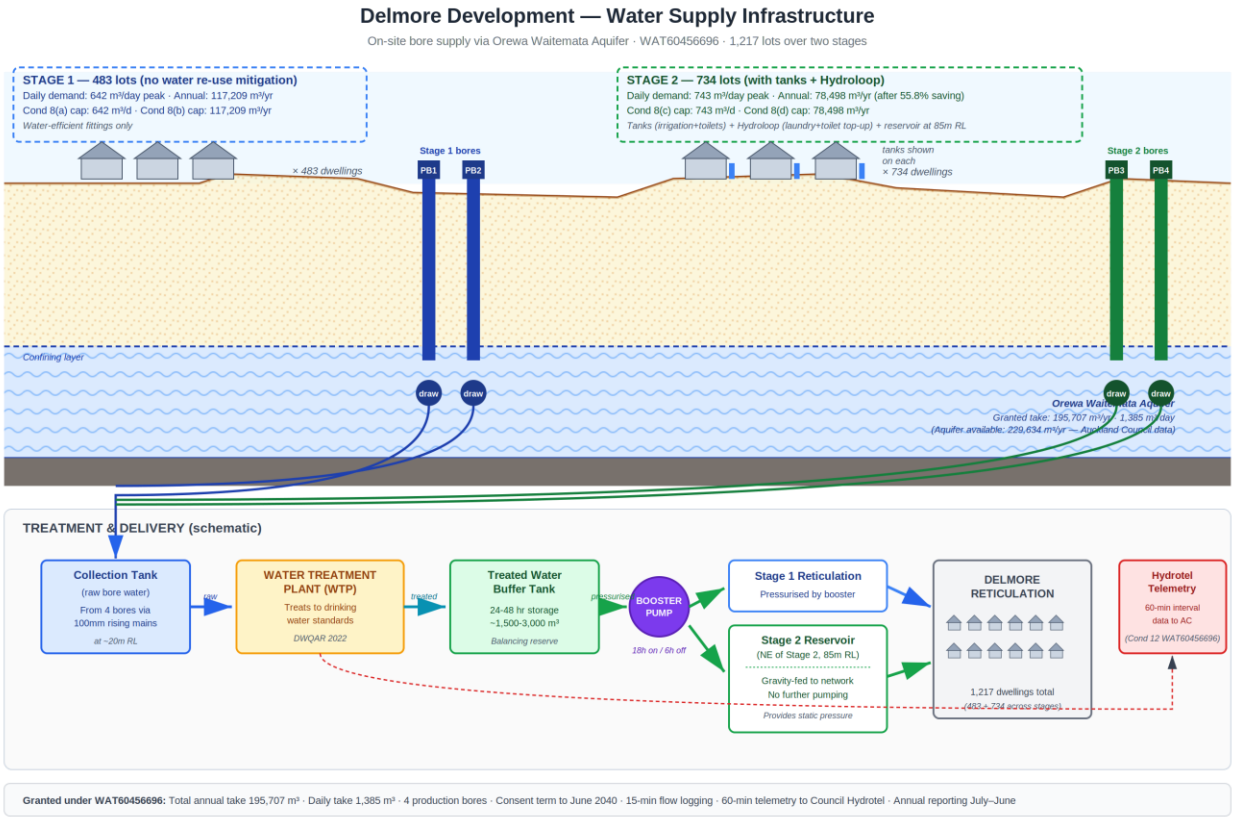


Figure 2: Delmore development — water supply infrastructure (schematic)

4.3 Monthly water balance — typical Stage 2 dwelling

Figure 3 below shows the monthly water source breakdown for a typical Stage 2 dwelling across the calendar year, including the drought scenario (January–February shaded). The chart demonstrates the strategic resilience of the layered system: in drought months, the rainwater tank contributes zero, but Hydraloop maintains its constant performance of 4.85 m^3/month (greywater-driven, rainfall-independent). The bore supply absorbs the remainder within the granted daily abstraction limits.

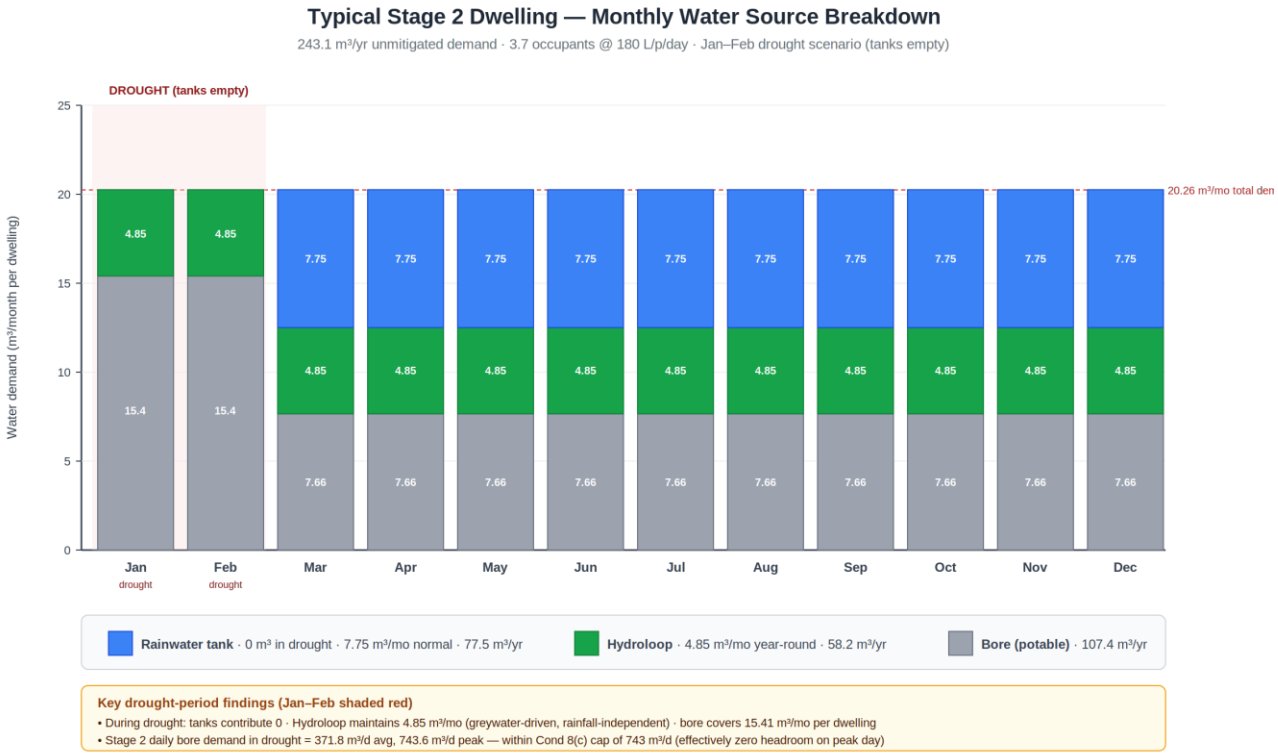


Figure 3: Monthly water source breakdown — typical Stage 2 dwelling (drought January–February shaded)

5.0 CONCLUSION

This memorandum responds to Items 7.2 and 7.3 raised by Auckland Council by demonstrating that:

For Item 7.2 (water balance and drought reliability):

The water balance, set out in the Water Demand Memo and summarised in this response, is built on conservative assumptions (180 L/p/day per capita, 3.7 occupants per dwelling, peak day factor of 2, and a 60-day drought scenario with rainwater tanks empty). The modelled Stage 2 demand of 78,498 m^3/yr aligns with the granted bore take cap under WAT60456696 Condition 8(d), and the modelled drought peak day of 742 m^3/day sits within the Condition 8(c) daily cap of 743 m^3/day. The four-bore configuration, 24 to 48 hour balancing storage, and rainfall-independent greywater recycling provide layered resilience against the drought scenario.

For Item 7.3 (water re-use system performance and Consent Notice):

The three-measure water conservation strategy (water-efficient fittings, rainwater harvesting, greywater recycling) is supported by three independent evidence streams: BRANZ peer-reviewed research on NZ residential end-use demand, the Auckland Council Tank Calculator demand split, and two years of NZ field data from the proposed Hydraloop supplier. The modelled per-dwelling figures sit at the upper end of the measured NZ range and are consistent with the manufacturer's stated performance envelope.

A Consent Notice will be registered against each Stage 2 title.

On this basis, the application demonstrates a robust water supply strategy meeting the granted bore take consent caps under all modelled conditions, including drought, and provides Council with a multi-layered framework of design, installation, and operational assurance for the duration of the development.

APPENDIX 1 – WATER BALANCE

Delmore Water Demand
Prepared by JK 18/09/2025
Checked by RC

		Stage 1	Stage 2 (unmitigated)	Total	Comments
1	**Overall data**				
a	Number of dwellings	483	734	1,217	From Masterplan
b	Occupancy	1,784	2,711	4,495	people per dwelling, from stage 1. Stage 2 pro-rata'd
c	Flow L/p/d	180	180	180	Watercare water COP
d	Average Daily Demand (m3) - Residential	321	488	809	1b x 1c / 1000
e	Average Daily Demand (m3) - Commercial	0	11		1066m2 lot, 70% site coverage, 15 l/d/m2. Table 6.1.c, wet retail.
	Total Average Daily Demand (m3)	321	499	809	
g	**Peak Day Demand (m3/d)**	**642**	**998**	**1841**	1d x1e. No efficiency savings.
i	Annual Demand with no efficiencies	117,209	178,119	295,327	1d x 365
j	Aquifer available		229,634.00		From Auckland Council data
2	**Tanks**				
c	**Total Saving per dwelling (m3/yr/dwelling)**		**77.52**		**Average annual water saving - refer watersmart spreadsheet x 90%**
d	Tank Saving (m3)	37,441.12	56,898.09	94,339.21	1a x 2c = Total saving per stage
e	Annual Demand with Tanks (m3)	79,767.68	121,220.45	200,988.14	1i - 2d = Annual demand, after tank savings
3	**Hydroloop**				
a	**Hydroloop saving per month (L/Month)**	**2,342,736.00**			Watersmart calculations, 180l/p/d. 35-38% reduction in demand
b	Hydroloop Saving (m3/yr)	28,112.83	42,722.19	70,835.02	3a x 12 / 1000
	Total Average Daily Demand (m3)	**321.12**	**370.95**	**692**	
	Maximum Daily Demand (m3/d), Stage 2 with hydroloop	**642.24**	**741.90**	**1,384**	

	Summary	Stage 1 - no mitigation	Stage 2 - Tank & Hydroloop	Total		
6	Average Annual Demand - Tanks & Hydroloop - stage 2 only	117,209	78,498	195,707	85%	Preferred option

APPENDIX 2

Auckland Council Demand - 177 L/P/D

https://www.aucklandcouncil.govt.nz/en/environment/looking-after-aucklands-water/rainwater-tanks/rainwater-tank-size-calculator.html

Search Auckland Council

Indoor non-drinking water and outdoor activities (e.g. toilet, laundry, garden watering).

All water usage (e.g. drinking water, toilet, garden watering).

What size of roof area will contribute rainwater to the tank?

This is the estimated roof area with gutters that will collect water and distribute it into your rainwater tank.

100 m^2

How many people live in your household?

1

Calculate licence fee | Reset

Rainwater tank size recommendations

We have calculated that you need **177 litres** per day. Based on your roof size, you could collect an average **100,000 litres** per year.

We have rounded these tank sizes up to the nearest 100 litres.

Tank size options	Potential water savings per month	Average days without tank water per year	Reliance on tank water
7,300 litres	5,200 litres	14 days	95.7%

Watercare Q&A on water demand – 140 - 170 L/P/D

Watercare

Ngā nama Accounts | Ngā rarureru ā-wai Faults and outages | He āwhina Help and support | Akona Learn | Ngā mahi me ngā kōrero hou Projects and updates | MyAccount

- Find and read my water meter
- Who is responsible?
- Who is responsible for pipes?
- Customer forms
- Residential FAQs
- Water FAQs
- Wastewater FAQs

Typically, what is the average water use per person per day?

A study of water use in Auckland found that people typically use between 140 and 170 litres of water a day.

What is the difference between wastewater and stormwater?

What is wastewater?

Where does my drinking water come from?

APPENDIX 3

Watersmart Information

RFI Response – Delmore

The Hydraloop system's 30–40% water reuse figure is based on measured operational performance. Data from three NZ residential installations, monitored via the Hydraloop Device Manager (HDM), shows consistent greywater recycling volumes that equate to approximately 30% reduction in potable water use, depending on household size and demand.

The percentage reflects the portion of household water demand that can be offset by reusing greywater for toilet flushing and laundry, which are the primary non-potable uses in a home.

In terms of integration, Hydraloop operates as a secondary, non-potable supply system, treating greywater from showers and redistributing it to toilets and washing machines. A primary water source (mains or rainwater) remains connected and automatically supplements supply when needed, ensuring seamless integration into the overall water system.

Depending on typologies, Hydraloop may be integrated into each home, or centralized to feed multiple dwellings.

Site	Occupancy	Water Source	Reuse Applications	Context
Piha	1-3 people	Rainwater (off-grid)	Toilets + Laundry	Coastal, low-density community
Maraetai	3 people	Rainwater (off-grid)	Toilets + Laundry	Semi-urban lifestyle property
Low-Carbon (Takanini)	2 people	Rainwater (self-sufficient) + mains	Toilets + Laundry	Urban low-carbon pilot home

Piha Family Home

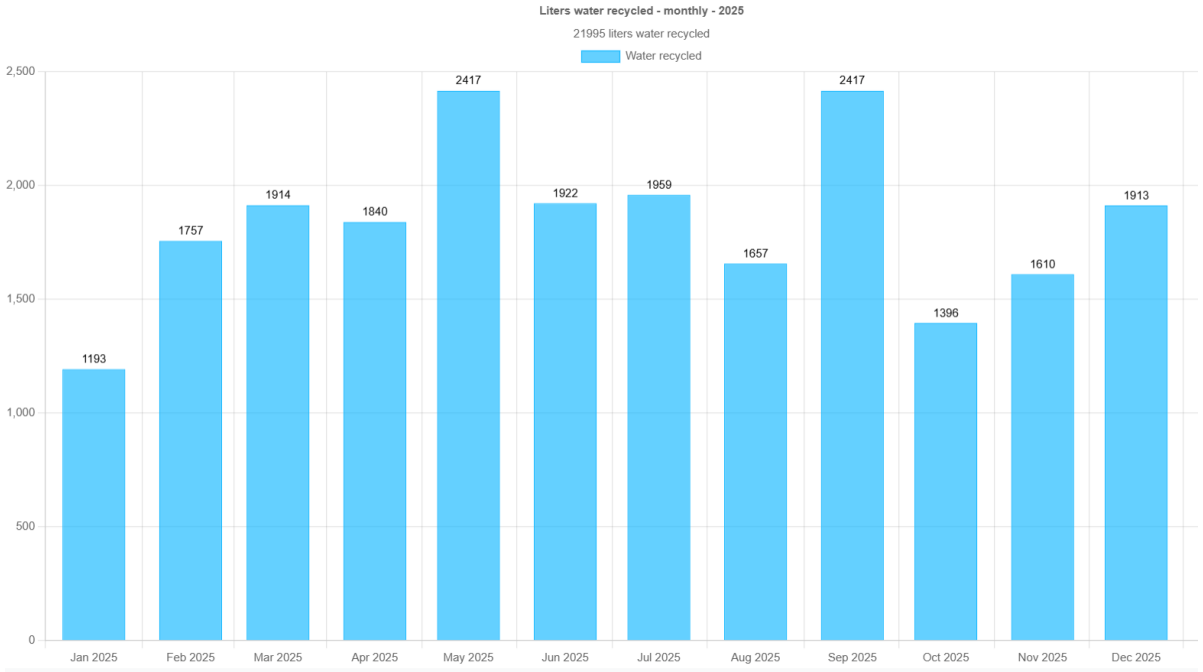
Long-Term Operational Data

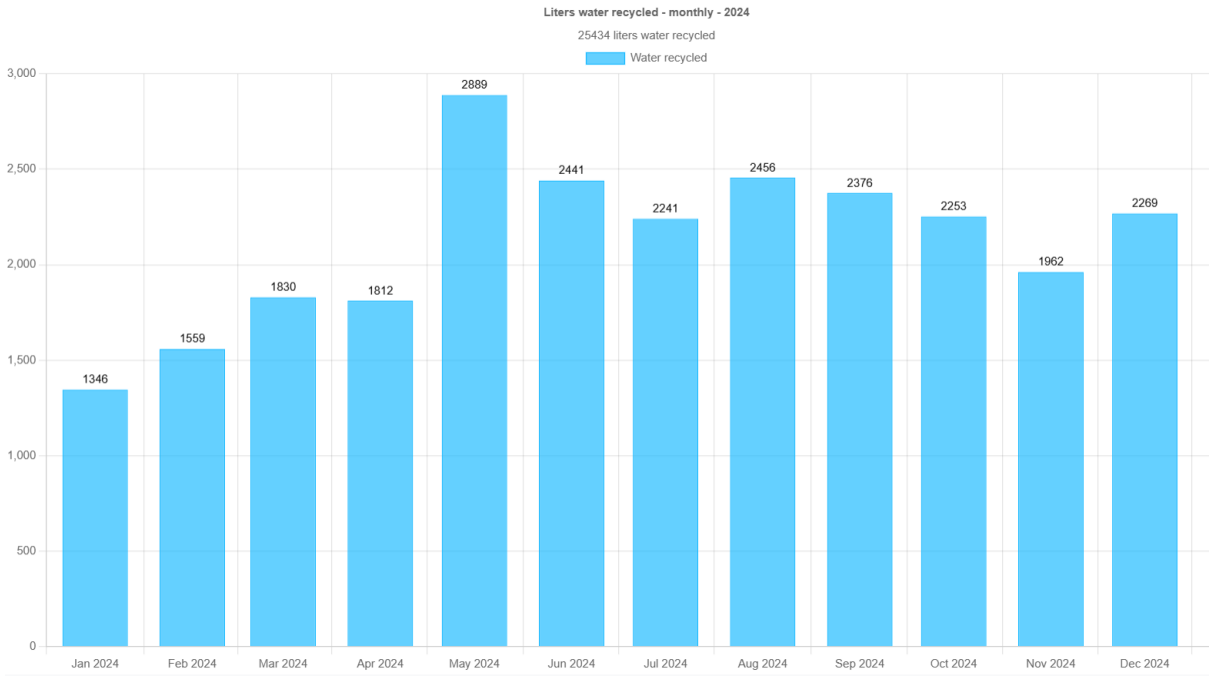
Monitoring period: 2024–2025

- 2024: 25,434 L/year
- 2025: 21,995 L/year
- Monthly range: ~1,200 – 2,400 L

Key outcomes:

- Stable performance over two full years
- Repeatable seasonal patterns
- No degradation in output over time


Liters water recycled - monthly - 2025
21995 liters water recycled
Water recycled
2,500
2,000
1,500
1,000
500
0
1193
1757
1914
1840
2417
1922
1959
1657
2417
1396
1610
1913
Jan 2025
Feb 2025
Mar 2025
Apr 2025
May 2025
Jun 2025
Jul 2025
Aug 2025
Sep 2025
Oct 2025
Nov 2025
Dec 2025


Liters water recycled - monthly - 2024
25434 liters water recycled
Water recycled
3,000
2,500
2,000
1,500
1,000
500
0
1346
1559
1830
1812
2889
2441
2241
2456
2376
2253
1962
2269
Jan 2024
Feb 2024
Mar 2024
Apr 2024
May 2024
Jun 2024
Jul 2024
Aug 2024
Sep 2024
Oct 2024
Nov 2024
Dec 2024

Fletcher's LowCo House – Takanini, Auckland

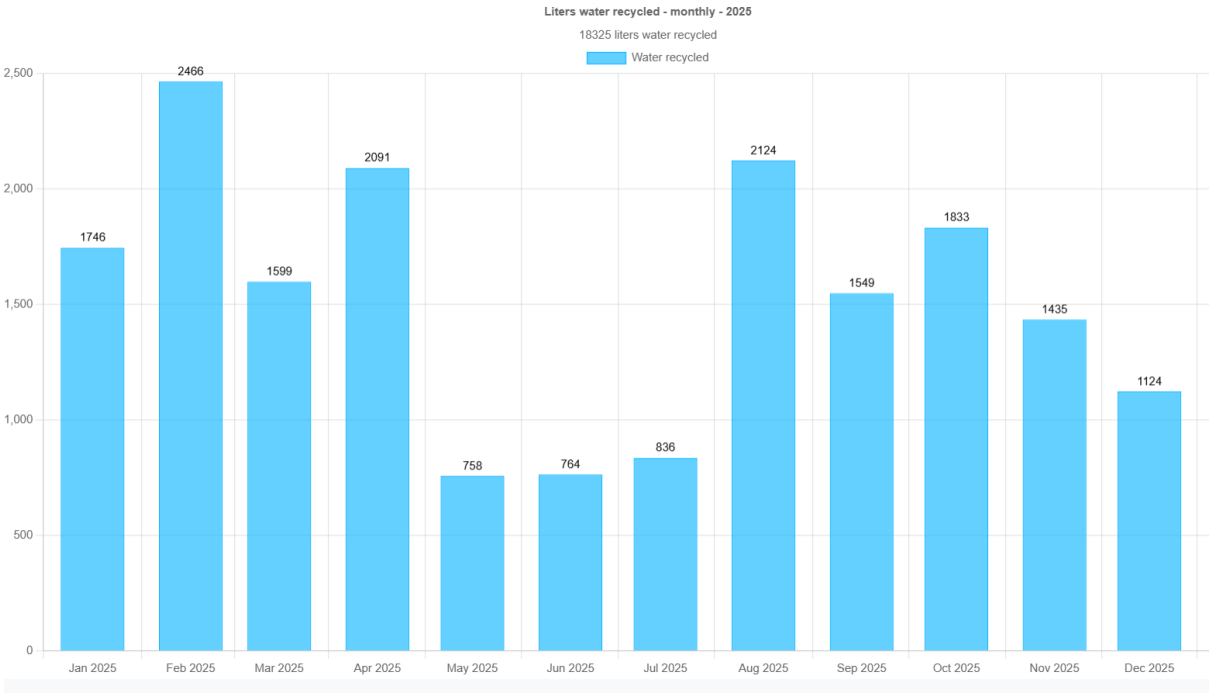
Reduced Demand Scenario

Monitoring period: 2025

- Annual total: 18,325 L/year
- Monthly range: ~750 – 2,450 L

Key outcomes:

- Lower volumes align with reduced water use (low-flow fixtures, smaller household)
- System continues to operate effectively under constrained demand
- Output scales proportionally with available greywater



Maraetai Lifestyle Block

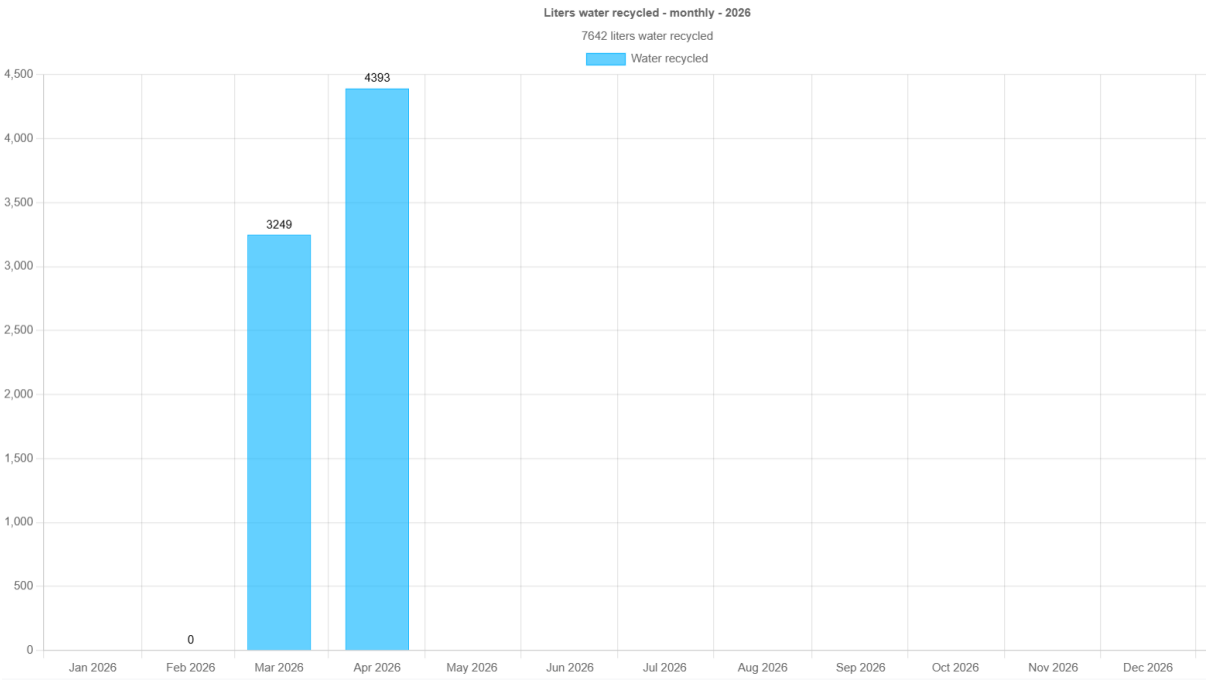
Early-Stage and High Demand Scenario

Monitoring period: First 2 months (2026)

- March: 3,249 L
- April: 4,276 L

Key outcomes:

- Rapid ramp-up to full operating output
- Higher monthly volumes reflecting larger household and increased demand
- Independent replication of system performance at a separate site



Notes:

Hydraloop system output is directly linked to the volume of greywater generated (primarily from showers) and the demand for non-potable uses such as toilet flushing and laundry. As a result, recycled water volumes vary with occupancy, fixture efficiency, and user behaviour. The system is not capacity-limited under typical residential conditions, but instead operates on a demand-supply balance, where available greywater is treated and reused in proportion to household consumption patterns.

Hydraloop is an internationally deployed greywater recycling solution used for potable water reduction and wastewater minimisation across residential and commercial applications; additional international case studies and performance data can be provided on request.

APPENDIX 4

Minimum required Water Re-use Tank sizes in Delmore Stage 2

Minimum Required Re-use Tank Size	Roof area	
	Min	Max
3,000 L	49 m^2	74 m^2
4,000 L	74 m^2	98 m^2
5,000 L	98 m^2	123 m^2
6,000 L	123 m^2	147 m^2
7,000 L	147 m^2	172 m^2
8,000 L	172 m^2	197 m^2
9,000 L	197 m^2	221 m^2
10,000 L	221 m^2	246 m^2