HEKEAO / HINDS
WATER ENHANCEMENT TRUST

Hekeao/Hinds Environmental Enhancement Projects

Year 10 Annual Report

(June 2025 – May 2026)

Dr Brett Painter (HHWET Executive Director)

	Name	**Date**
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Hekeao/Hinds River mouth sunrise, July 2025 (Source: HHWET)

Chairman's Foreword

HHWET achievements in the year ended June 2026 include a recharge volume achieved by MAR/NRR sites of 9.07 million m^3. 62% of recharge volume was achieved at MAR01 and NRR1, with the remainder at MAR02 to 18 following an ECan decision in September 2025 which allowed those sites to operate again. The 10-year nitrate-N levels down-gradient of MAR01 show an average of 2.3 mg/l.

The Windermere Drain enhanced TSA project has continued in partnership with Eiffelton Community Group Irrigation Scheme (ECGIS) and includes the installation of a 120 kw solar panel array, which was completed in May 2026. The 95-percentile nitrate-NN 2035 PC2 target for this drain has been achieved for the second year in a row.

The 'Missing N' Vadose Monitoring System (VMS) project, a joint venture between MPI and HHWET (on behalf of Hekeao/Hinds Science Collaboration Group) was contracted and is scheduled to be installed in July 2026.

The Northern Drain eClean bioreactor trial has concluded. While the technology is promising, design improvements are required for the bioreactor to be robust enough for a rural setting.

Design and consenting for three constructed wetlands in the lower catchment continued this year, with the required land obtained.

All consents to expand the scheme to catchment scale were granted in April 2025. Unfortunately, these consents were appealed to the Environment Court soon after, with a hearing to be held in June 2026.

As this report details the 10th year of MAR operations, it is timely to reflect on what has been achieved over those ten years and also what could have been achieved:

- New Zealand's first Manged Aquifer Recharge site constructed and successfully operated, followed by 16 "test" sites.
- The first Near River Recharge site in the world constructed and successfully operated.
- Development funding obtained from Central Government through MPI and the Provincial Growth Fund.
- Local funding obtained from irrigation companies, Ashburton District Council and ECan.
- Business case developed to prove the cost effectiveness of HHWET activities.
- Catchment wide water monitoring commenced in partnership with MHV Water and BCI.
- Operational agreements signed with Croys, MHV Water and RDRML.
- MAR governance evolved from an advisory group to the community non-profit trust HHWET.
- 10-year targeted rate funding secured.
- The first HHWET Executive Director appointed.
- The majority of consents to abstract from the Hekeao/Hinds River surrendered.
- Water supply for MAR and NNR sites secured courtesy of Ashburton District Council.
- Initial MAR/NRR consents transferred from ECan to HHWET Ltd.
- Windermere Drain enhanced TSA project partnership signed with ECGIS.
- Consents to expand the scheme applied for and granted following a publicly notified hearing.

The consents to expand this project to catchment scale operations were lodged in December 2022. At the time of writing, this process has taken 44 months, and cost Hinds Plains ratepayers close to $1 million, with the end result yet to be decided. What could have been achieved is more progress toward HHWET's core objectives of:

- Protecting drinking water supplies;
- Enhancing groundwater quality;
- Improving baseflows to spring-fed streams and rivers for ecological, cultural, and social values; and
- Improving and sustainably managing groundwater levels.

The people that live, work and recreate in the Hekeao/Hinds Plains want clean groundwater and healthy waterways. That is what HHWET is tasked to achieve and HHWET is of course funded by those same people. Because HHWET progress has been stalled, the loser is the environment we live in and the people of the Hekeao/Hinds Plains.

Acknowledgements

Trustees Mayor Neil Brown and Alister Arygle have retired as trustees this year, I sincerely thank them for their valued contribution. Mayor Liz McMillan and Campbell Tait are welcomed as new trustees. Fra Mills was a trustee for part of the year, covering for Fleur Tompsett's maternity leave. HHWET also welcomed Craig McKenzie as a CSIF&G observer to the trust.

Again, many thanks go to HHWET Executive Director Brett Painter and Operations Manager Murray Neutze in their respective roles. Both have carried large workloads during the year and have performed to a very high standard in progressing HHWET workstreams and objectives.

I would like to acknowledge the support of Ashburton District Council and the partnerships with MHV Water, RDRML and ECGIS. Also, the landowners that have made meaningful contributions to the Hekeao/Hinds Environmental Enhancement Scheme.

Finally, my sincere thanks to HHWET Trustees for again providing excellent governance expertise in 2026.

Peter Lowe
Chairperson
Hekeao/Hinds Water Enhancement Trust

Acknowledgements

The author wishes to thank the Hekeao/Hinds Water Enhancement Trust (HHWET) for governance support, Ashburton District Council for access to land and water, Pattle Delamore Partners for technical support, Ben Williams for legal support, MHV Water, Rangitata Diversion Race Management Ltd (RDRML), and Hydrometrics field staff for monitoring information, Eiffelton Community Group Irrigation Scheme (ECGIS) for collaboration on the Windermere Drain enhanced TSA project, local contractors, and all report reviewers.

Executive summary

Background:

New Zealanders want clean rivers, streams, and waterways. We want to be able to swim in, fish, gather kai, enjoy and most importantly drink from our freshwater sources. We also want our future generations to enjoy that same opportunity.

The Hekeao/Hinds catchment is within the borders of Mid Canterbury. The Pacific Ocean forms the eastern coastline, and the Southern Alps form the western boundary. The area is bordered to the north by the Hakatere/Ashburton River and to the south by the Rangitata River. This farming area is among the most productive irrigated agricultural districts in New Zealand. Local residents are the most likely people to drink local groundwater and recreate in local waterways.

Hekeao/Hinds Water Enhancement Trust (HHWET) is a community-led charitable trust established in 2019, currently governed by 11 Trustees representing Ashburton District Council (ADC), Environment Canterbury (ECan), Ashburton community, Hinds Drains Working Party, Mid Canterbury Federated Farmers, Rangitata Diversion Race Management Ltd, MHV Water, and Ashburton District irrigation companies other than MHV Water. This year HHWET welcomed Craig McKenzie as a meeting observer (representing Central South Island Fish and Game). Mid Canterbury Catchment Collective representatives also attend monthly meetings. HHWET employ an Executive Director and contract out other services.

The Challenge:

Increased farming intensity, climate cycles, climate change and other influences on our water resources have resulted in adverse environmental effects – namely reduced water quantity during dry periods and reduced water quality due to increased nitrate concentrations (and microbial contamination in some places). The Hekeao/Hinds community have recognised this and are addressing these catchment scale environmental issues, through both on-farm changes and catchment-scale nature-based enhancements. These efforts are focussed on achieving the following 2035 targets as detailed in Plan Change 2 (PC2) to Canterbury's Land and Water Regional Plan (LWRP PC2, 2018):

- Reducing on-farm nitrogen losses by 36%;
- Reducing median annual shallow groundwater concentrations of nitrate-N to less than 6.9 mg/l;
- Reducing median annual hill-fed lowland waterway concentrations of nitrate-N to less than 3.8 mg/l; and
- Reducing median annual spring-fed plains waterway concentrations of nitrate-N to less than 6.9 mg/l.

The primary aim of PC2 can be summarised as improved ecosystem health, which includes water quantity, water quality and ecological/biodiversity components. HHWET's goals are to assist ecosystem health improvements by:

- Targeting and protecting drinking water supplies;
- Enhancing groundwater quality;

- Improving baseflows to spring-fed streams and rivers for ecological, cultural, and social values; and
- Improving and sustainably managing groundwater levels.

To achieve these goals, HHWET are contributing to an Integrated Catchment Management (ICM) approach for developing a Hekeao/Hinds Environmental Enhancement Scheme via four complementary focus areas (as presented in Figure ES 1-1). These are:

- On-farm improvements via the Hekeao/Hinds Science Collaboration Group, including managing the 'Missing N' Vadose zone Monitoring System (VMS) project.
- Managed Aquifer Recharge (MAR) and Near River Recharge (NRR) for groundwater and river ecosystem health improvements. Additional ecological/biodiversity gains occur in the vicinity of MAR and NRR sites due to waterway fencing, land retirement, native plantings, lizard, bird, and fish habitat.
- Supporting the trialling and implementation of Targeted Stream Augmentation (TSA), bioreactors and constructed wetlands for groundwater-fed waterways.
- Supporting sustainable water allocation approaches by ensuring that MAR, NRR and TSA activities are not covering for overuse or overallocation situations. For example, HHWET will not support any future surface water take consent applications from the Hekeao/Hinds River (thus maximising the benefits of NRR) and have confirmed that no surface water takes from the Hekeao/Hinds River mainstem have occurred for >10 years by anyone. HHWET have also committed to only applying for supplementary/shadow take and/or use consents rather than applying for new consents.

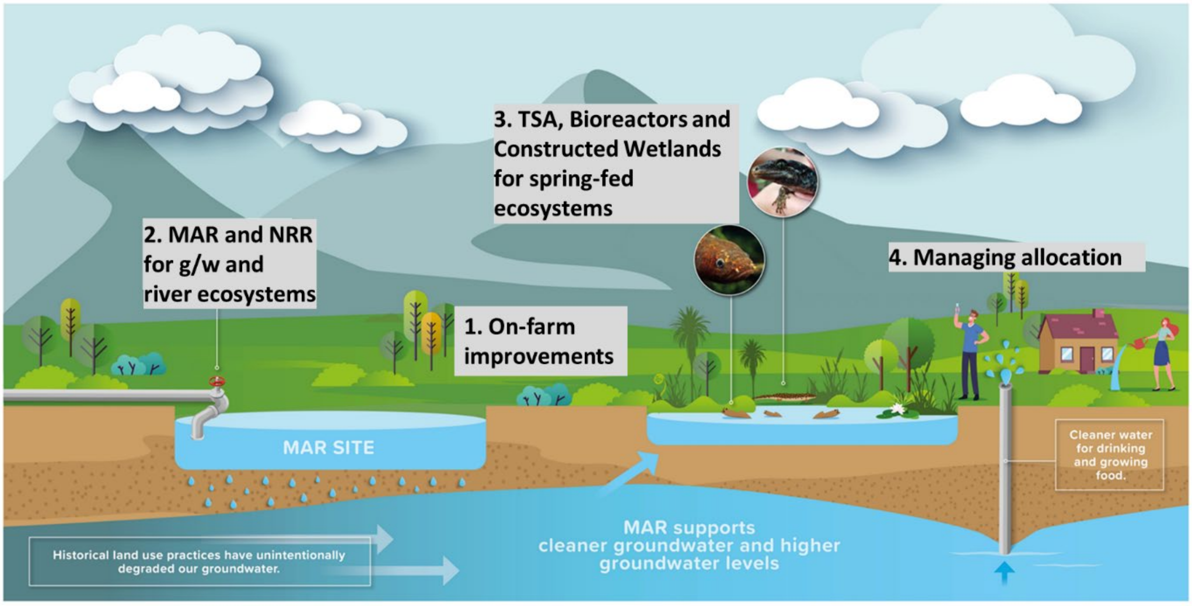

Figure ES 1-1: Hekeao/Hinds Integrated Catchment Management (ICM) approach.

2025/26 progress:

During Year 10 (2025/26), HHWET continued the project phase that began in 2021, which comprises a ten-year catchment-scale implementation plan funded by a targeted rate to Hekeao/Hinds Plains landowners through Environment Canterbury's Long-Term Plan. Arrangements continued with project partners Ashburton District Council (ADC), Rangitata Diversion Race Management Ltd (RDRML), and MHV Water. During 2025/26 HHWET thanked and farewelled retiring Trustees Mayor Neil Brown and Alister Argyle, and welcomed new Trustees Mayor Liz McMillan and Campbell Tait. Fleur Tompsett took maternity leave for part of the year, with Fra Mills covering Trustee responsibilities in addition to secretarial responsibilities during this period. HHWET met monthly except for January, with meetings focussed on agreements, arrangements, operations, health and safety, permissions and policies, financial accountability, analysis of evidence, external reporting, and progress monitoring toward 2025/26 objectives.

The primary technical focus for 2025/26 has been continuing consenting, operations and development of the Hekeao/Hinds Environmental Enhancement Scheme, which includes MAR and NRR sites, TSA, and trials of bioreactor and constructed wetland concepts (Figure ES 1-2). MAR01 and NRR1 sites operated for the full year, with MAR02, 07, 08, 09, 10, 12, 17 and 18 sites also operating after Environment Canterbury provided updated directions in September 2025 regarding operations during re-consenting processes. Resource consent applications for new MAR/NRR sites were lodged in December 2022, granted in April 2025 and appealed in May 2025, with an Environment Court hearing scheduled for June 2026.

HHWET also supported the Northern Drain eClean bioreactor trial from 2023-2025. Nitrate removal efficiency ranged from 30-60%, with removal rates positively correlated to water temperature (i.e., increased removal rates with increased water temperature). Operations were significantly constrained by design challenges (e.g., intake resilience and power supply continuity) and the bioreactor was removed in 2026 at the conclusion of the trial.

The Windermere Drain enhanced TSA project has continued in collaboration with Eiffelton Community Group Irrigation Scheme (ECGIS), with a new 120 kW solar panel array (joint venture between ECGIS and HHWET) installed in May 2026 to support this project. Assessments for three potential constructed wetland sites have progressed, with HHWET's O'Shaughnessy's Drain (New Park Road) wetland chosen by Environment Canterbury as one of three Canterbury constructed wetlands to go through a new streamlined approvals process.

HHWET continued to support Justin Legg's PhD research into Hekeao/Hinds Plains nitrate mitigation options. This research includes a Field Lead role for Justin in the 'Missing N' Vadose Monitoring System (VMS) project, a joint venture between MPI and HHWET (on behalf of the Hekeao/Hinds Science Collaboration Group).

Operational highlights for 2025/26 include:

- The Windermere Drain 95 percentile annual nitrate-NN achieved the 2035 PC2 target (9.8 mg/l) for the second year in a row.
- 2025/26 was the best year to date for Windermere Drain annual median nitrate-NN (7.7 mg/l), which is only 11% above the 2035 PC2 target.
- In three out of the last four years, MAR01-influenced average groundwater nitrate-N has been less than 2 mg/l (as measured in the 29 m deep monitoring well BY20/0152).
- Annual median shallow groundwater nitrate-N was 6% lower than 2024/25, as calculated from approximately 80 bores monitored quarterly.

What we learned:

Key learnings from Year 10 (2025/26) include:

- The high volume of regularly monitored sites covering the Hekeao/Hinds Plains continues to provide valuable data for analysis and decision support (including MAR site planning and performance assessments). In 2025/26 this analysis included environmental enhancement solutions for the ‘Tinwald nitrate hotspot’, groundwater abstraction influences on seasonal variation in nitrate concentrations near Winslow, and background information for the ‘Missing N’ VMS project.
- Catchment scale monitoring of groundwater nitrate concentrations continues to show that seasonal and annual rainfall variation is the primary contributor to nitrate concentration variation (via land surface recharge events) at the catchment scale (i.e., across many monitored sites). Nitrate concentrations for 2025/26 peaked in late winter 2025 and generally decreased since, though March 2026 concentrations were generally higher than December 2025 concentrations due to above average rainfall in early 2026. Ongoing decreases in on-farm nutrient leaching potential are required to reduce the volume of nutrients transported through Hekeao/Hinds water systems during rain-induced leaching events. The ‘Missing N’ VMS project will assist with nutrient leaching reduction assessments by installing a variety of nutrient leaching monitoring systems under a working dairy farm (including the state of the art Sensoils VMS system).
- At the local scale, post graduate research (e.g., Teixeira, 2024) and HHWET annual reports show that HHWET activities are contributing to improved ecosystem health in the targeted surface and groundwater systems. Once the catchment-scale MAR/NRR consents can be activated, HHWET are confident that further improvements in ecosystem health (magnitude and area) will follow.
- The Windermere Drain 95%ile nitrate-NN results for 2024/25 and 2025/26 are the first PC2-specified 2035 target to be achieved (assisted by the enhanced TSA project). This project shows that human requirements (e.g., drainage and water distribution) can work with ecosystem requirements, and that challenging ecosystem health targets can be achieved when collaborative efforts are maintained. A second solar array to support Windermere Drain augmentation (for irrigation and TSA) has been installed in May 2026.
- The pilot scale lower Hekeao/Hinds constructed wetland (on Wairuna Farm) has continued to show that constructed wetlands are a technically and economically feasible method for converting nitrate to nitrogen gas under local conditions. Three additional sites to upscale this contribution to Hekeao/Hinds Plains ecosystem health targets have therefore been progressed.
- The three year project to trial an eClean bioreactor in a rural setting showed that nitrate removal performance was promising, but power supply security and intake design were not robust enough for local conditions. Following the conclusion of the trial, the bioreactor was relocated back to its Christchurch base for design refinements.

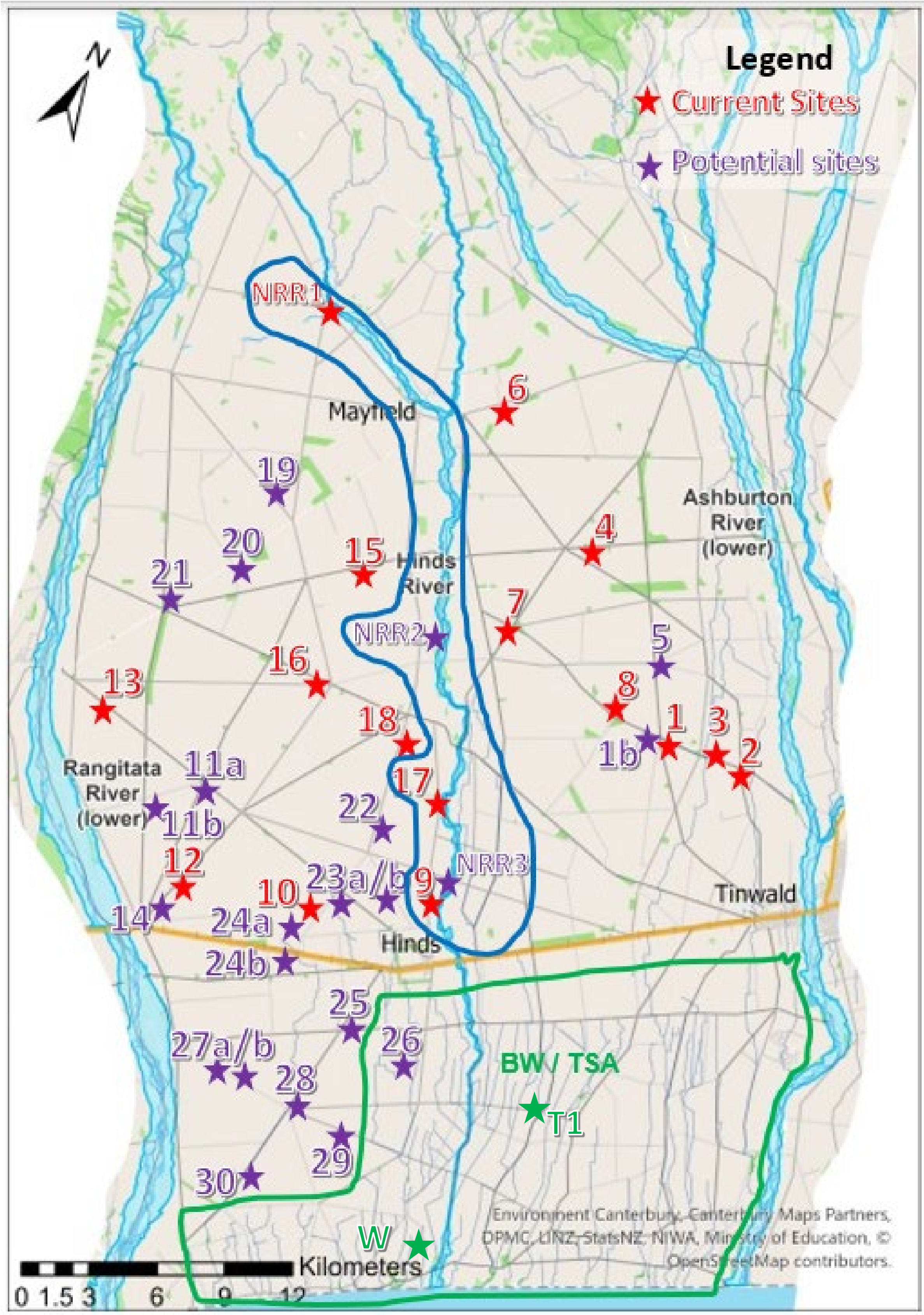

Figure ES 1-2: HHWET Environmental Enhancement Scheme 2025/26

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1 Introduction

1.1 Plan Change 2 to Canterbury's Land and Water Regional Plan (PC2)

Plan Change 2 (PC2) to Canterbury's Land and Water Regional Plan (LWRP) provides the following introduction to the Hekeao/Hinds Plains and the community-led Solutions Package (AZC, 2014):

The Hinds/Hekeao Plains Area today is highly modified. Drainage of the wetland area east of State Highway 1 began in the 1850s, allowing the establishment of one of Canterbury's most productive agricultural areas. An artificial channel, cut in the 1860s-1870s, created a permanent outlet for the river to flow to the sea. A small hāpua (lagoon) is present at the river mouth, although this is blocked to the sea most of the time. Many of the artificial drains, stock water races and modified channels which replaced the wetlands and waterways, provide substitute habitats for a variety of fish and invertebrate species.

The Hinds/Hekeao Plains Area was historically, and is currently, an important area for food production. It currently provides significant employment in the area, both on-farm and in processing and servicing industries. The social and economic wellbeing of the community is reliant on the agricultural industry, and it is important that it is retained so that the communities can thrive.

Agricultural development, however, has had a significant impact on the cultural, ecological and recreational values and opportunities of the area. Today, drainage remains a primary function of many of the lowland water bodies, however they continue to be a taonga and source of mahinga kai for Ngāi Tahu and support significant ecological and recreational values.

During 2013 and 2014 the Ashburton Zone Committee engaged with the local community and stakeholders to develop a package of actions (the 'Solutions Package') that was considered the most effective to protect cultural values and opportunities to gather mahinga kai safely, maintain water quality and quantity in the Upper Hinds/Hekeao Plains Area, and improve water quality and quantity in the Lower Hinds/Hekeao Plains Area, while also sustaining a healthy economy and community.

The Committee's Solutions Package consists of four main parts with both regulatory and nonregulatory recommendations:
- *catchment scale actions (e.g. on-farm mitigation measures, managed aquifer recharge);*
- *local scale actions (e.g. riparian fencing, planting, and well-head protection);*
- *investigations, monitoring and review of the Solutions Package; and*
- *community engagement.*

The primary aim of PC2 can be summarised as improved water ecosystem health, which includes water quantity, water quality and ecological/biodiversity components. In previous decades, water ecosystem health was assisted by a combination of lower intensity farming systems and higher levels of unmanaged aquifer recharge (from leaky water distribution systems, low efficiency irrigation systems and direct by-wash discharge from water races and irrigation races into waterways). The more recent reductions in water ecosystem health have been influenced by increased land use intensity combined with lower levels of unmanaged aquifer recharge (from less leaky water distribution systems, more efficient irrigation systems and reductions in direct by-wash discharge from water races and irrigation races into waterways). Climatic changes (e.g., increased intensity and regularity of droughts and floods) have also influenced ecosystem health over time. Ecological/biodiversity (e.g., via riparian planting) coverage has remained at low levels compared to the pre-1850s era, though has measurably increased in the last few years.

PC2 water quality targets include requirements to reduce on-farm nitrogen leaching by 36% by 2035 and reduce median annual shallow groundwater concentrations of nitrate-N to a target of <6.9 mg/l by 2035. The PC2 2035 target for the lower Hekeao/Hinds River is a median annual concentration of 3.8 mg/l nitrate-N and for other lowland waterways is 6.9 mg/l nitrate-N. PC2 water quantity actions include new groundwater allocation limits, new minimum flows for waterways, support for groundwater abstractors to move from stream depleting takes to deep groundwater, plus managed aquifer recharge (in contrast to the unmanaged recharge of previous decades) and targeted stream augmentation. The Hinds Drains Working Party (HDWP) was established as part of the PC2 process to support PC2 implementation in the lower catchment via recommendations, monitoring and review. Key HDWP recommendations focussed on the development of management plans for the main lower catchment water bodies. These plans included habitat, fish passage, water quantity and quality aspects.

Reports received by HHWET from Hekeao/Hinds irrigation companies and independent irrigators as submissions to HHWET's December 2024 resource consent hearing suggests that on-farm nitrogen leaching reductions are on track to achieving the PC2 targets, including the largest local irrigation company (MHV Water) reporting that they had already achieved the 2030 PC2 nutrient leaching interim target and had 94% of shareholders at Farm Environment Plan (FEP) audit grades of A or better. During 2025/26 ADC continued its Stockwater Exit Transition Programme, which is intended to conclude in mid-2027. HHWET are an active party in future water race management discussions, with the aim of maintaining key water races for environmental benefit and MAR supply.

1.2 HHWET operations and monitoring summary for 2025/26

Table 1-1 shows that the total recharged MAR/NRR volume in 2025/26 (via one MAR site and one NRR site for the whole year and a further nine MAR sites since October 2025) was 9.07 million m^3. This is 20% higher than the 2024/25 result, but significantly less than the 13.8 million m^3 recharged in 202/21 when all 17 constructed MAR/NRR sites were consented to operate year round. Table 1-1 also includes the opening and closing water balance. The water balance is required as sometimes water is ordered but cannot be used (usually due to a site shutdown during an operational day). This water is 'stored' in the MHV distribution system until it can be used.

Table 1-1: 2025/26 Hekeao/Hinds MAR/NRR recharge

	MAR / NRR Volume (cubic metres)
June 2025 opening balance – taken but not delivered	9,996
2025-26 ordered through RDR	**9,048,299**
Water delivered to NRR1 Site	-3,699,333
Water delivered to MAR01	-1,829,577
Water delivered to MAR02 – MAR18	-3,458,174
Race losses	-84,400
Total 2025-26 recharged volume	**-9,071,484**
2025-26 closing balance – delivered but not taken	-13,189

MAR and NRR sites are shut down when a consent condition trigger level is reached. Different MAR and NRR sites can contain different combinations of triggers (e.g., rainfall, river flow, groundwater level, turbidity and/or *E. coli*). HHWET's consent compliance and performance monitoring is undertaken on behalf by MHV Water staff. During 2025/26, source water from the Rangitata River was variable for turbidity (3-3000 NTU), as for previous years. Turbidity spikes in the RDR are caused by Rangitata River freshes which result in MAR/NRR shutdowns when triggers were reached. MAR/NRR turbidity is highest at the NRR1 offtake from the RDR (resulting in NRR1 site shutdowns ~18% of the time during 2025/26);

however, it reduces as sediment settles out while water travels through the distribution system (particularly in water storage ponds). NRR1 also ceased operations twice during 2025/26 when the adjoining South Branch Hekeao/Hinds River exceeded its 5 m^3/s trigger level.

The MAR01 discharge consent contains shut down triggers for rainfall, groundwater level, and *E. coli*. MAR01 was not required to shut down for groundwater level or rainfall trigger breaches during 2025/26 (with MAR01 supply infrastructure already shut down for maintenance during two relevant rainfall events); however, the *E. coli* trigger was exceeded once and the site shut down until an acceptable monitoring result was achieved four days later.

The MAR02-MAR18 discharge consent contains shut down triggers for groundwater level and *E. coli*. No MAR02-MAR18 site was required to shut down for groundwater level trigger breaches during 2025/26; however, the *E. coli* trigger was exceeded ten times and the relevant site shut down until an acceptable monitoring result was achieved. The most common reasons for elevated *E. coli* were birds roosting in trees beside water races and above average Rangitata River flows including *E. coli* attached to sediment. Due to the relatively low animal numbers in the upper Rangitata catchment, this *E. coli* is expected to have moved from animals and acclimatised to living in soil / sediment (e.g., ESR, 2019).

1.3 2025/26 HHWET Annual Report structure

The remainder of this report focusses on NRR and MAR operational updates, key monitoring information and analysis. Updates are also provided on the other catchment-scale nature-based enhancements HHWET are involved in, which are at an earlier stage of development. Consent compliance monitoring results are presented in the HHWET Annual Consent Compliance Monitoring Report.

2 Hekeao/Hinds River and NRR

Chapter 2 of the Year 5 HHWET (2021) Annual Report introduced the Hekeao/Hinds Plains hydrogeology, and HHWET's nature-based enhancement activities focussed on the Hekeao/Hinds River. These activities are being assessed to understand how they can individually and collectively (including with on-farm enhancements) contribute to improved Hekeao/Hinds River ecosystem health. One of the specific goals is to contribute positively to Canterbury's Land and Water Regional Plan (Plan Change 2) 2035 annual median target of 3.8 mg/l nitrate-N (usually measured as nitrate-nitrite-N) in the lower Hekeao/Hinds River for 90% aquatic species protection.

The key upper catchment enhancement activity is the addition of clean water to the river system via Near River Recharge (NRR). NRR is like MAR in that it involves recharging groundwater via leaky basins, wetlands and/or races. However, NRR sites are close enough to contribute directly (via shallow groundwater) to the river reach immediately adjacent and down-gradient of the discharge site/s. Complementary lower catchment enhancement activities currently involve a pilot constructed wetland (see Section 4.3) and a Targeted Stream Augmentation (TSA) project (see Section 4.2).

NRR sites are designed to ensure that NRR source water (in this case, Rangitata River water) is always filtered through alluvial material before mixing with natural river system water. This filtering process blocks the transport of algae (e.g., didymo), modifies the temperature and chemistry of NRR water, ensuring that there is no risk of potential ecosystem harm by direct mixing of NRR water with receiving river water. The shallow groundwater table around NRR sites is raised, which supports local wetlands and the establishment of native plants (aquatic and terrestrial). The aquatic life of supported wetlands and river reaches is therefore enhanced. Other biodiversity initiatives, such as protection of valued existing terrestrial plants and/or wildlife, have also been progressed at HHWET's first NRR site.

Figure 2-1 shows the location of two current and two potential NRR sites. The first site (NRR1) has been operational since September 2018 (Figure 2-2). MAR17b (classified as a MAR site but close enough to the Hekeao/Hinds River to also provide NRR) began operations in June 2020, but was not operational between May 2023 and September 2025 due to Environment Canterbury's discretionary decision to decline consent continuance during HHWET's current resource consenting process. Environment Canterbury withdrew this decision in September 2025, enabling operations to re-start. Assessment and preliminary design processes for NRR2 and NRR3 began in 2021 to support the current suite of consent applications which were lodged in December 2022, with the independent commissioner panel decision to grant consents currently under appeal (see Executive Summary).

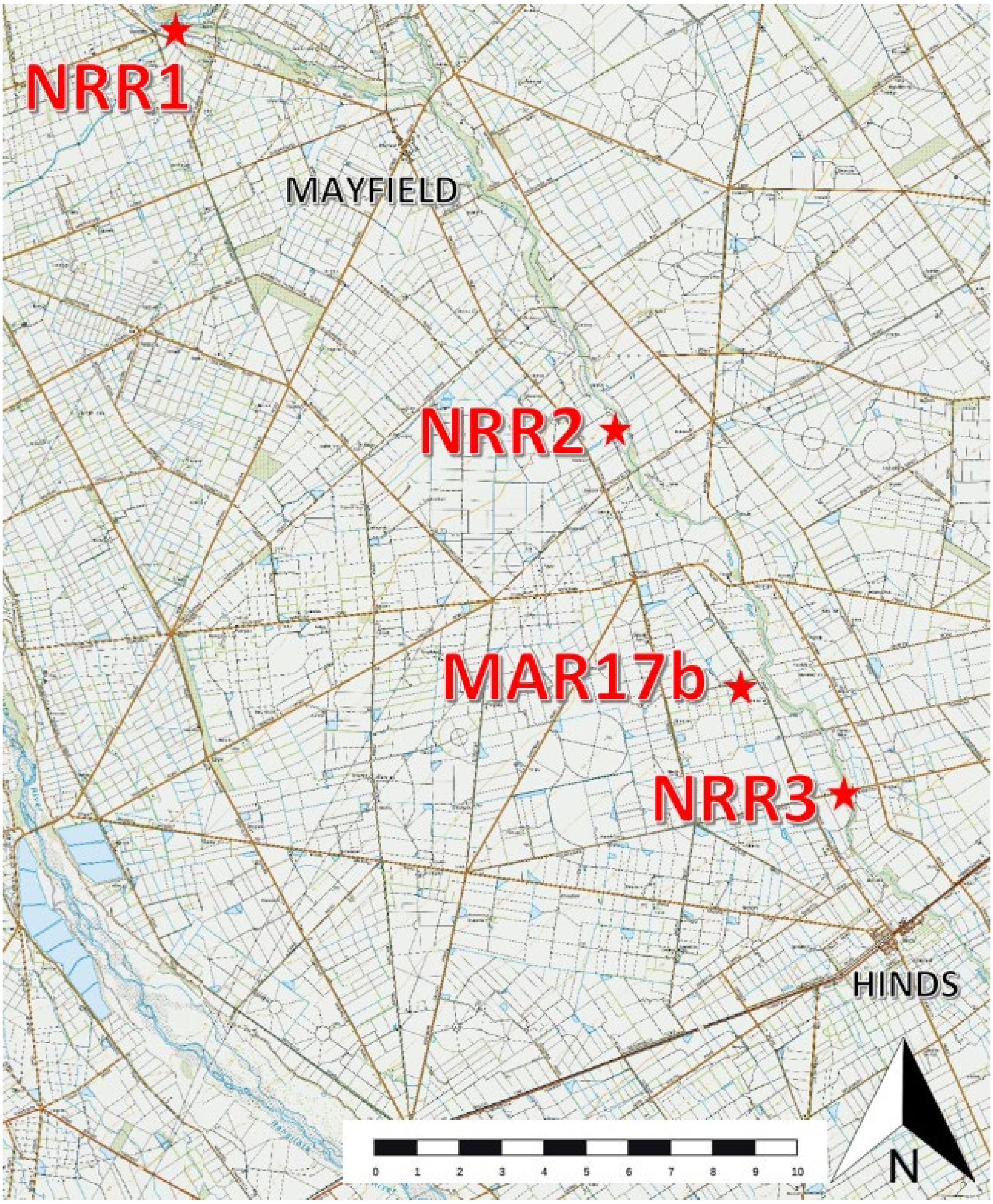

Figure 2-1: Current and potential sites targeting the Hekeao/Hinds River

2.1 NRR1 – South Branch Hekeao/Hinds River

NRR1 (Figure 2-2) receives Rangitata River water, via siphon, directly from the Rangitata Diversion Race (RDR). Current maximum consented supply flow is 210 l/s; however, the construction of additional recharge basins in 2021 has enabled supply flow up to 400 l/s to be trialled (under compliance discretion) as part of assessments for the replacement discharge consent which was lodged in December 2022. HHWET's request for continuance on NRR1 discharge consent CRC210704 was initially declined by Environment Canterbury. HHWET lodged an objection against this decision, with HHWET's objection upheld by an independent commissioner panel. NRR1 operations continued through this period.

In addition to the recharge channels and basins, lizard habitat (under DOC Covenant) has been created away from the flood plain, and an historical oxbow wetland has been rehabilitated and extended for native fish habitat. This wetland is supported by the raised local groundwater due to NRR. Since the site began operations in 2018, approximately 25 hectares of farmland in the vicinity of NRR1 has been fenced and retired by the landowners, and more than 25,000 native plants (wetland and dryland) have been added, including in two further historic wetlands (Figure 2-3 to Figure 2-7). The most recent planting project took place in spring 2025, planted by Brailsfords Ltd, HHWET and Mayfield School students, with funding support from Air New Zealand's Every Corner fund. The native plantings are considered to have contributed to increased bird life in the area, with new birds spotted near NRR1 since 2018 including Australasian Bittern, Marsh Crake, Bellbird, Kingfisher, South Island Pied Oystercatcher and Kōtuku/White Heron.

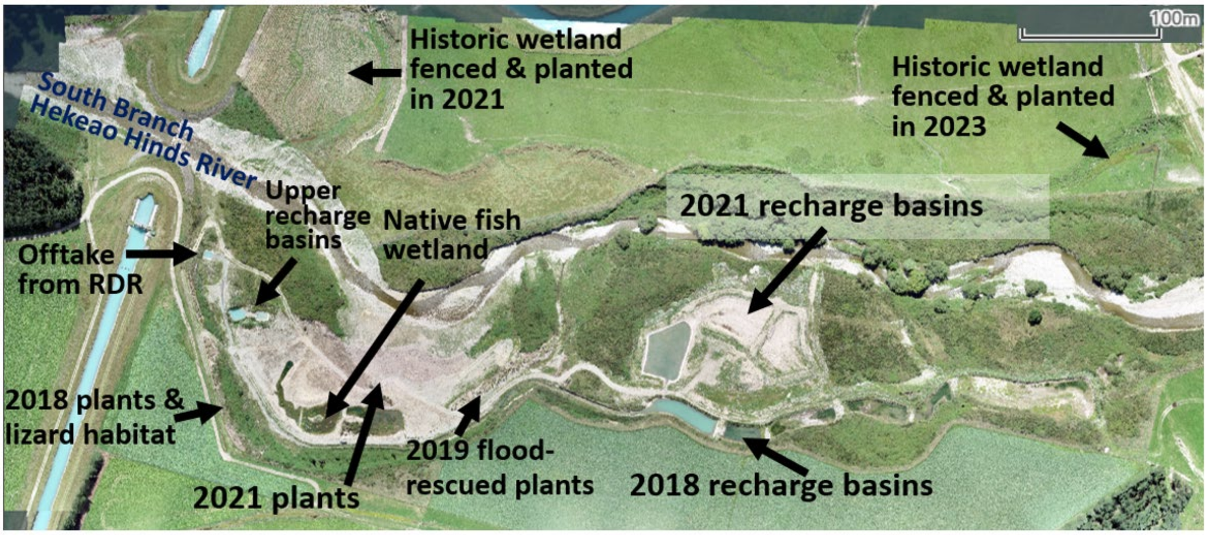

Figure 2-2: NRR1 site overview

Figure 2-3: NRR1 site in January 2026, with the Spring 2025 plantings to the left of centre in the foreground (Source: HHWET)

Figure 2-4: Part of NRR1 DOC Covenant, with rock piles for lizard habitat (Source: HHWET)

Figure 2-5: NRR1 2018 (right) & 2021 (left) recharge basins in January 2026, with colour changes showing glacial sediment drop out through the system and 2021 basin system well below capacity (Source: HHWET)

Figure 2-6: NRR1 upper tributary wetland in January 2026, fenced and planted in spring 2021 (Source: HHWET)

Figure 2-7: NRR1 lower tributary wetland in January 2026, fenced and planted in autumn 2023 (Source: HHWET)

Table 2-1 and Figure 2-8 present the monitoring requirements for NRR1 consent CRC210704, with all compliance monitoring results also presented in the annual compliance monitoring report. Recharge source water has remained low in nitrate-N and *E. coli* since 2018, but turbidity varies significantly with Rangitata River flow (Table 2-2). The turbidity trigger for ceasing MAR operations at this site has been set at 100 NTU. This is a higher trigger than at other MAR sites, as deposited sediment is relatively easy to clean from the sediment traps and recharge basins. Table 2-2 and Figure 2-9 present the turbidity and NRR1 flow analysis for 2025/26. Site shutdowns to date for high turbidity in past years have historically occurred up to 33% of the time, but only occurred less than 18% of the time during 2025/26. If forecast El Niño conditions for 2026/27 eventuate, they could result in above average rain from the west and more regular and extended Rangitata River freshes (with associated elevated turbidity). The NRR1 site is also shut down when there are high flows in the adjacent South Branch Hekeao/Hinds River (>5000 l/s), which, since 2018, have occurred ~1.5% of the time (and on two occasions in 2025/26, see Figure 2-10).

The temporary flow gauge at South Branch Hekeao/Hinds River - Lower Downs Bridge (site #69106 on Figure 2-8) was destroyed in the May 2021 floods and has not been reinstated by Environment Canterbury, thus, flow monitoring was unable to be continued at this site. Reporting prior to May 2021 is presented in Sections 2.1.1 and 2.1.2 of the 2020/21 HHWET Annual Report. These results consistently show increased river flows, decreased *E. coli* counts and decreased nitrate-N concentrations between the South Hinds Siphon (site #69101) and Lower Downs Bridge (site #69106). NRR1 recharge provides the primary input to the river systems between these monitoring sites.

Analysis of potential NRR1 influence further down the South Branch Hekeao/Hinds River system (Figure 2-11) was first presented in the 2019/20 HHWET Annual Report, with updates in Section 2.1.1 of the 2023/24 HHWET Annual Report. These assessments concluded that the South Branch Hekeao/Hinds River recharges local groundwater (primarily to the true left) down-gradient from the Lower Downs Bridge (as per BY20/0222 groundwater level records), which contributes spring-fed flows to the Silverstream tributary of the North Branch Hekeao/Hinds River.

In the same analysis, well K37/0278 was shown to be a useful indicator of water quantity effects down-gradient from NRR1 due to its depth (16 m deep) and proximity to the confluence of the North and South Branches of the Hekeao/Hinds River (150 m away). Figure 2-12 shows K37/0278 groundwater levels responding quickly (within days) to flow fluctuations in the South Branch Hekeao/Hinds River. Figure 2-13 presents shallow groundwater levels for the full K37/0278 record (back to 1975), showing that maximum depth to groundwater since NRR1 operations began (September 2018) has been about 3.5 m whereas maximum depth to groundwater prior to 2018 regularly exceeded 5 m. A t-test showing K37/0278 groundwater levels in the first 7 years of NRR1 operation were statistically significantly different to the previous 7 years is presented in the 2024/25 HHWET Annual Report. Figure 2-14 compares (pre and post-NRR1 construction) the percent of time depth to groundwater is exceeded for K37/0278, showing that post-NRR1 groundwater levels are higher than pre-NRR1 60% of the time and that pre-NRR1 groundwater levels were lower than the lowest post-NRR1 level 20% of the time. Collectively, this analysis suggests that K37/0278 groundwater levels are positively influenced by NRR1 recharge, particularly during low rainfall periods.

The Hekeao/Hinds River is a priority for enhancement of ecosystem health and recreation amenity, as part of the Hekeao/Hinds Environmental Enhancement Scheme. To monitor long term changes in fish diversity/population sizes and any potential NRR influence, Central South Island Fish and Game (CSI Fish and Game), along with Environment Canterbury, implemented fish monitoring surveys in 2017. Annual surveys until 2023 and then surveys every five years include two South Branch Hekeao/Hinds River sites (one immediately upstream and one downstream from the NRR1 site). These surveys (see the 2024/25 HHWET Annual Report for the latest results) show a positive step change in downstream populations since NNR1 began operations in late 2018. The surveys also show larger populations of upland bully and Canterbury galaxias in the reach downstream of NRR1 compared to the upstream reach.

Additional aquatic ecological monitoring was also undertaken above (RDR Siphon) and below (Lower Downs Bridge) the NRR1 site for the first 18 months following NRR1 commissioning in September 2018. This consisted of monthly invertebrate monitoring, carried out using the Stream Health Monitoring and Assessment Kit (SHMAK) method, and quarterly fish monitoring, using a single pass electric fishing machine (EFM) method, over a 50 m reach, to provide semi-quantitative estimates of fish abundance and species present. The results of this study showed higher populations of Canterbury galaxias and bully species at the downstream (Lower Downs Bridge) site compared to the upstream (RDR Siphon) site, plus healthy invertebrate communities at both sites. The identified invertebrate communities are reflective of good water quality and habitat under relatively stable flow conditions (see the 2019/20 HHWET Annual Report). A catchment group has been undertaking further monitoring since 2023 across the area, including the upper South Branch and North Branch Hekeao/Hinds River and their tributaries, and are using this monitoring to guide additional catchment enhancements such as fencing, planting, land management enhancements and land retirement. Ongoing improvements in river ecosystem health can therefore be anticipated.

The NRR1 Wetland Management Plan (McMurtrie, 2020) specifies a range of monitoring requirements to assess habitat suitability for native species such as the upland bully and Canterbury mudfish/Kōwaro. Telemetered equipment to monitor temperature, water level and dissolved oxygen in the primary and downstream wetlands was installed in Autumn 2022. A fish survey undertaken in Autumn 2023 by Environment Canterbury and CSI Fish and Game staff identified more than 2100 upland bullies in the three NRR1 wetlands. An Environmental DNA (eDNA) sample was taken at each of the three connected NRR1 wetlands in April 2026. 900 unique eDNA strands were identified, with the top 5 total counts comprising Upland bully, Myriophyllum propinquum (a key aquatic plant for fish habitat), two freshwater invertebrates, and Pukeko.

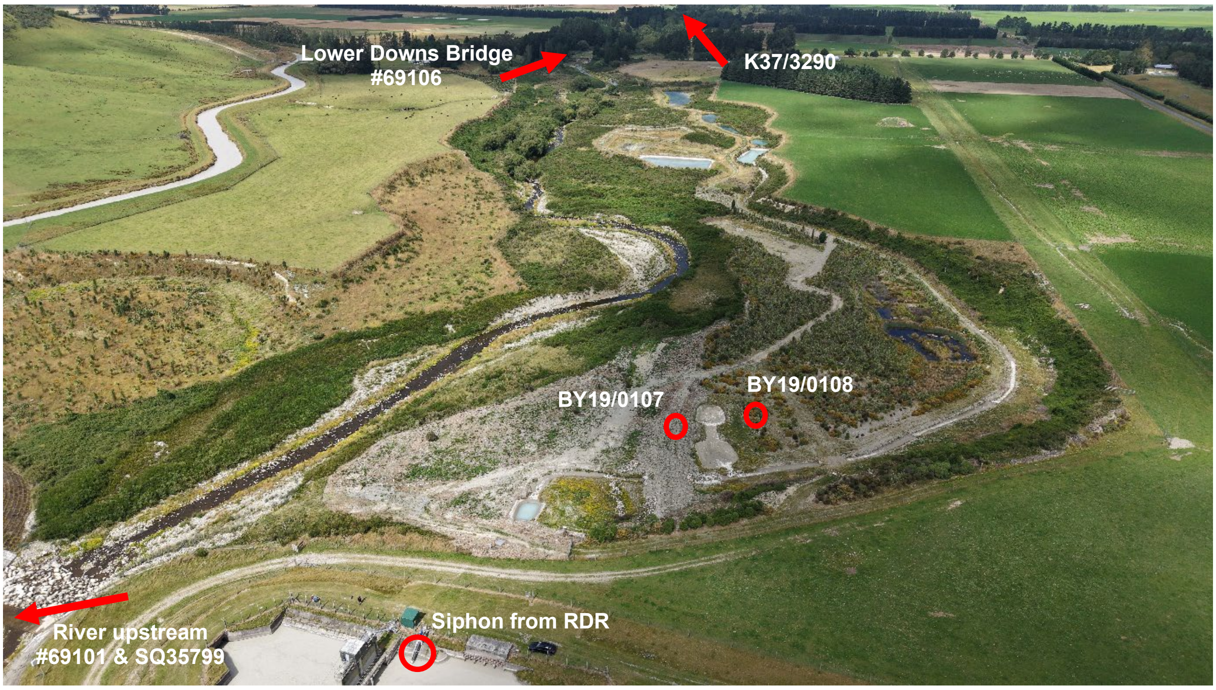

Figure 2-8: NRR1 monitoring points (Source: HHWET)

Table 2-1: NRR1 Monitoring - CRC210704 (Source: HHWET)

Monitoring Category	Parameter	Location	Parameters	Minimum Sampling Frequency
Quantity	Recharge source water	Project Siphon from RDR	flow/stage	15-minute
	River upstream (control)	ECan South Branch upstream of project (#69001)	flow/stage	15-minute
	River downstream (effects)	Temporary Gauge on South Branch at Lower Downs Bridge	flow/stage	15-minute
	Site groundwater Levels	BY19/0107	water level	Hourly
	Groundwater Levels	ADC monitoring information from Mayfield Community Supply - K37/3290	water level	Hourly
Quality	Groundwater Quality	ADC monitoring information from Mayfield Community Supply - K37/3290	Nitrate-Nitrogen, *E. coli* bacteria	Monthly sampled by ADC
	Site groundwater quality	BY19/0107	Nitrate-Nitrogen, *E. coli* bacteria	Monthly
	Source (recharge) water	Project Discharge Siphon	Nitrate-Nitrogen, *E. coli* bacteria, Turbidity, TSS	Monthly, except Turbidity which is measured hourly
	River upstream (control)	Site Inflow Source (#SQ35799)	Nitrate-Nitrogen, *E. coli* bacteria, Turbidity, TSS	Monthly
	River downstream (receiving waters)	Temporary Gauge on South Branch at Lower Downs Bridge	Nitrate-Nitrogen, *E. coli* bacteria, Turbidity, TSS, DRP	Monthly
Aquatic Ecology	River downstream (effects)	Recharge Above Temporary Gauge on South Branch at Lower Downs Bridge	Electro-fishing Survey, didymo	Annually (Fish and Game, ECan)

Table 2-2: NRR1 intake turbidity distribution for the period from 1/6/2025 to 31/5/2026 (percent of flow less than prescribed turbidity) (Source: HHWET)

Percentile	Turbidity, 1/6/2025 - 31/5/2026 (NTU)
10	6
20	9
30	14
40	21
50	29
60	42
70	62
80	89
90	183
100	3000

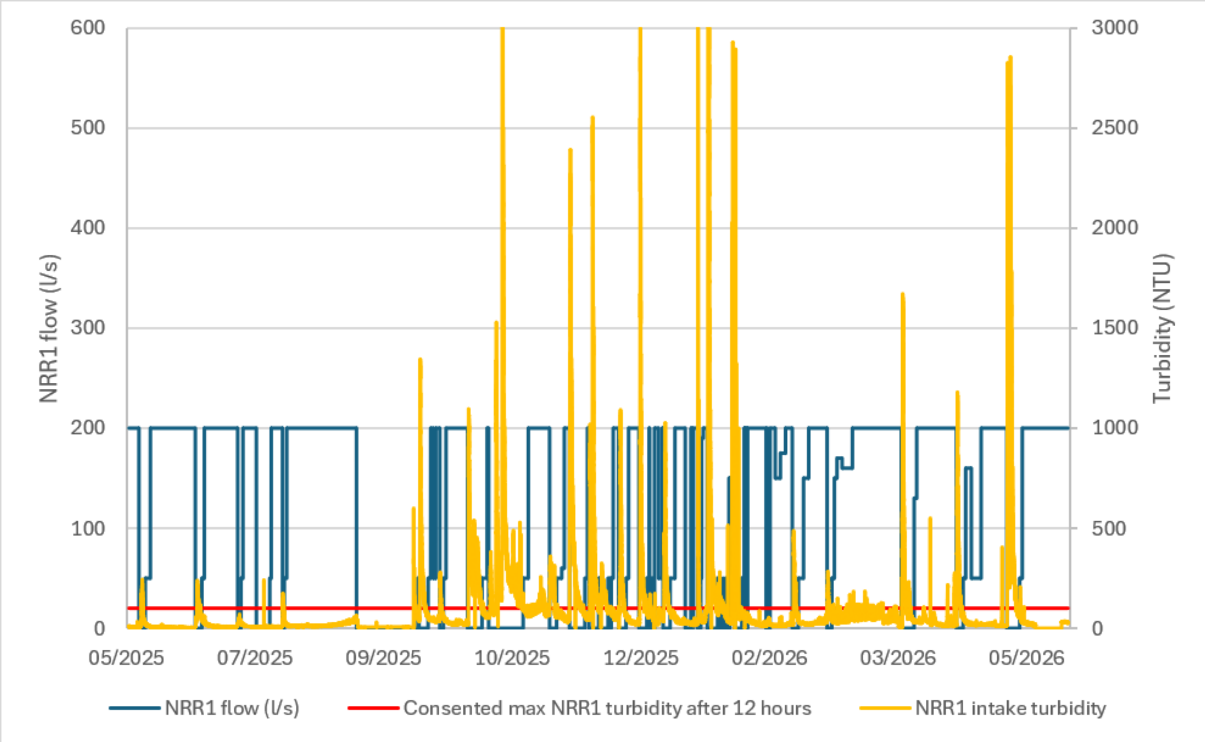

Figure 2-9: 2025/26 NRR1 intake turbidity and flow monitoring (Source: RDRML/HHWET)

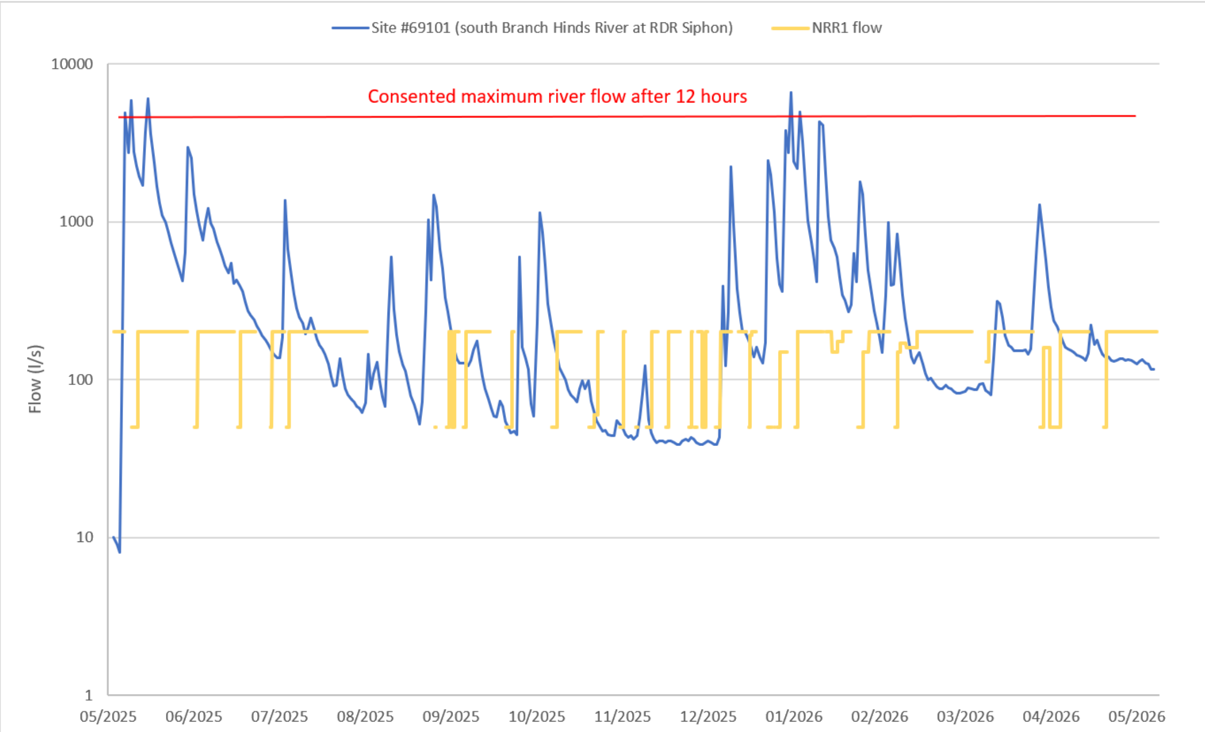

Figure 2-10: 2025/26 NRR1 and Hekeao/Hinds River flow (Source: RDRML, CRC)

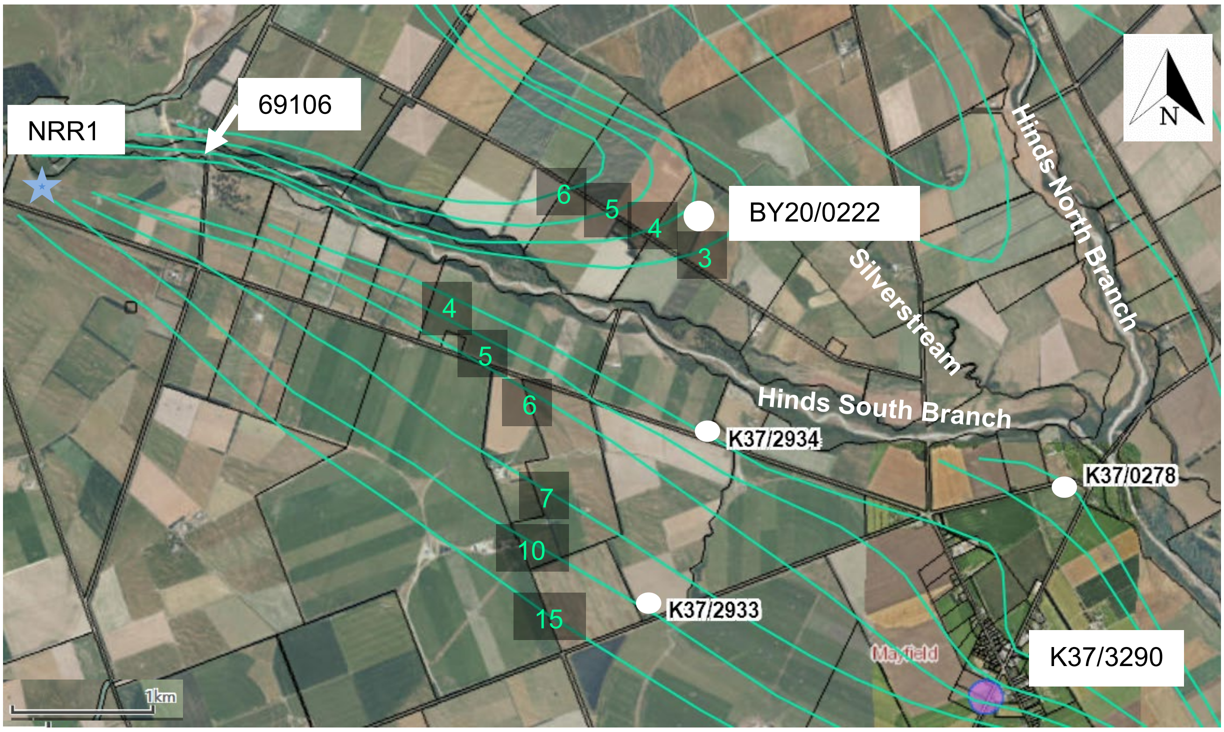

Figure 2-11: NRR1 down-gradient monitoring wells and minimum depth to groundwater contours (in m) (Source: Canterbury Maps)

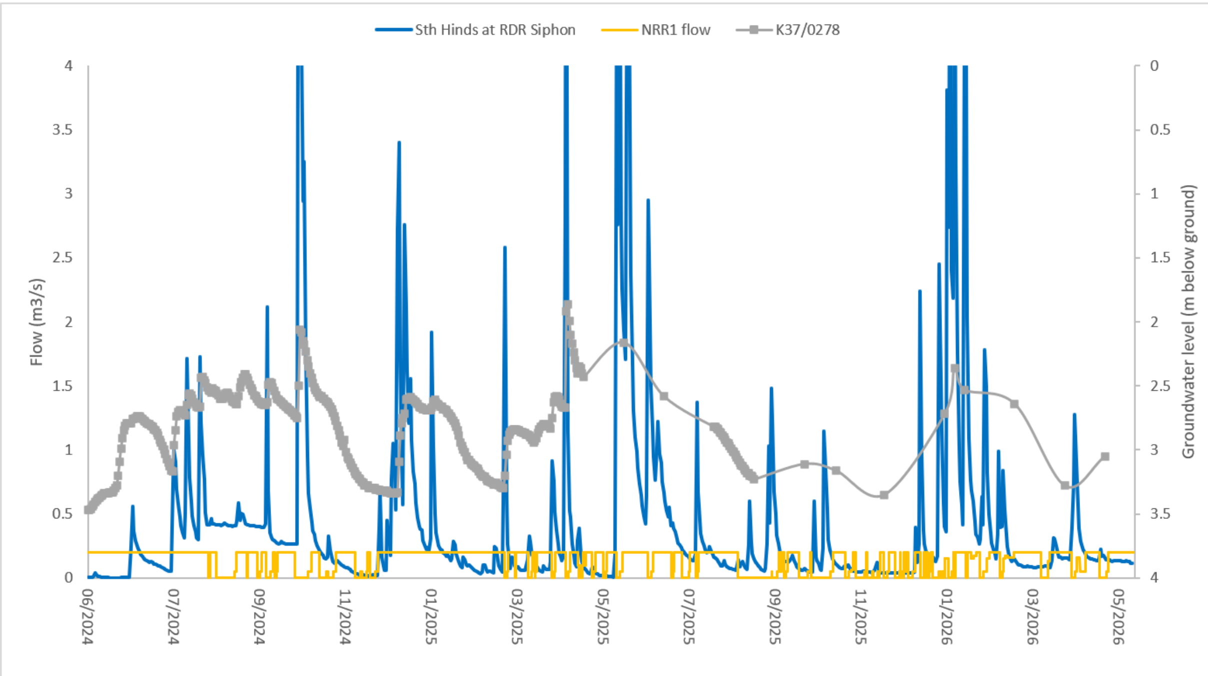

Figure 2-12: South Hekeao/Hinds River flow, NRR1 flow and K37/0278 groundwater level comparison (Source: CRC, HHWET)

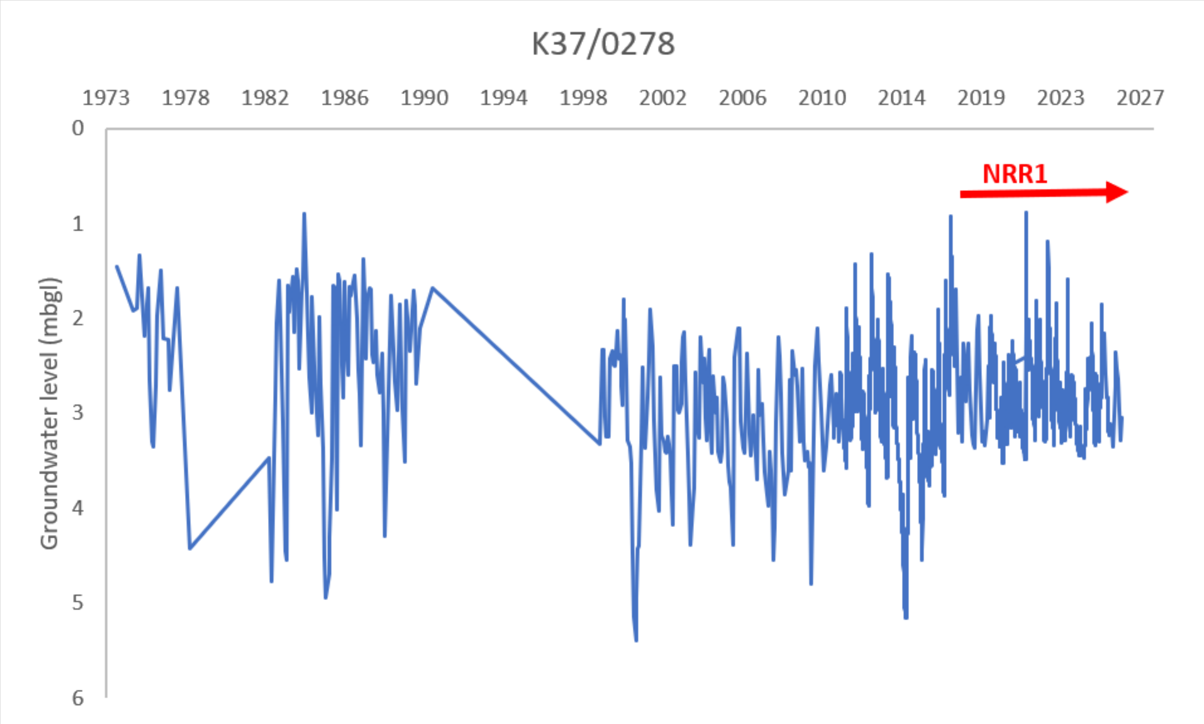

Figure 2-13: Full record of K37/0278 groundwater levels (Source: CRC)

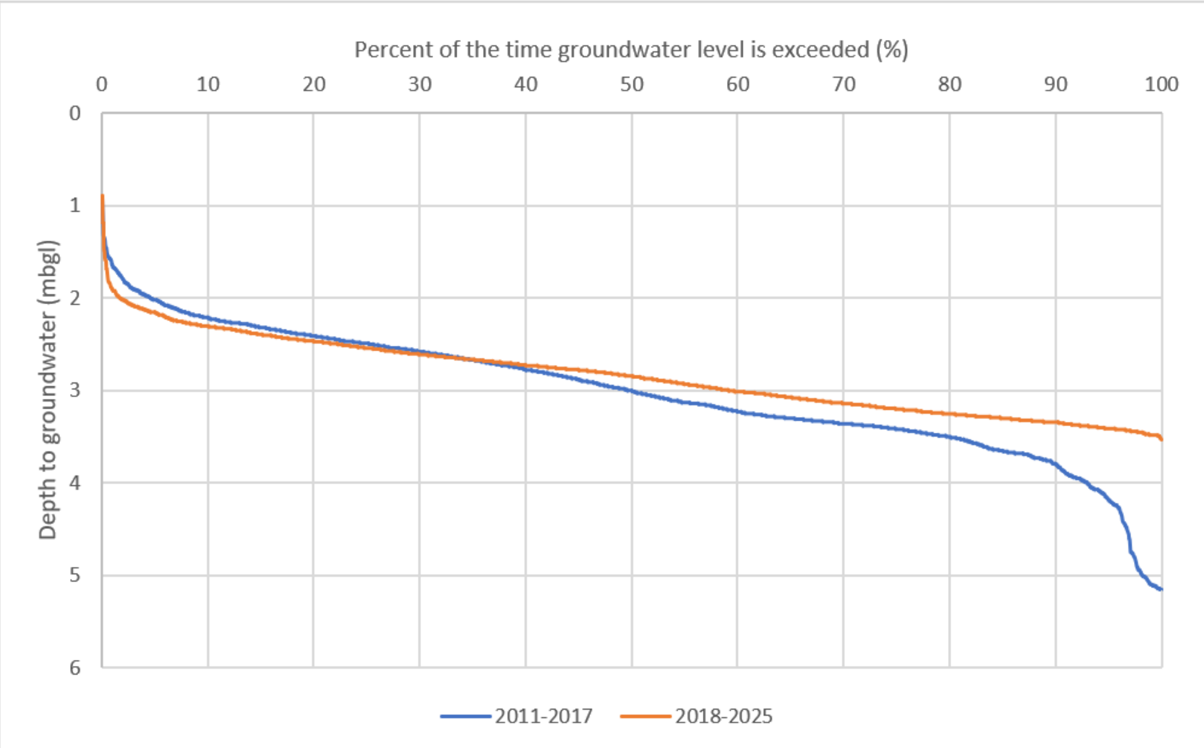

Figure 2-14: Percent of time depth to groundwater level is exceeded for K37/0278, pre and post-NRR1 construction (Source: CRC)

2.2 Lower Hekeao/Hinds River

The lower Hekeao/Hinds River is a groundwater-fed waterway most of the time, supplied via springs in and near the riverbed as well as by its four groundwater-fed tributaries (Northern, Taylors, O'Shaughnessy's, and Montgomery's Drains – see Figure 2-15). When mid to upper catchment groundwater levels are sufficiently high (usually following above average rainfall recharge), the river mainstem also flows. Water quality and quantity at the Hekeao/Hinds River Lower Beach Road monitoring site is therefore influenced by climate, land management and enhancement activities through the central portion of the Hekeao/Hinds Plains up to the foothills. No other single current monitoring site across the catchment represents a greater proportion of the catchment. This site also has the most challenging 2035 PC2 nitrate-N target of all waterways in the lower catchment (annual median of 3.8 mg/l, compared with 6.9 mg/l for the other waterways).

The lower catchment waterways support valued mahinga kai, native fish, and non-native fish habitat. Due to the complexities of the catchment influences on these waterways and their high ecosystem values, the Ashburton Zone Committee recommended the formation of the Hinds Drains Working Party in 2014 to develop a set of action/management plans (AZC, 2014). The Hinds Drains Working Party Final Recommendations were duly delivered in early 2016 (HDWP, 2016). In mid-2022 a 5-year summary of progress to date was prepared and discussed with the Hinds Drains Working Party (HDWP, 2022). Progress of relevance to HHWET activities is presented in Section 2.4 of the HHWET 2021/22 Annual Report (HHWET, 2022).

To inform actions and progress toward relevant HDWP and LWRP objectives, Environment Canterbury and CSI Fish and Game undertook surface water quality and aquatic ecosystem health monitoring along the Hekeao/Hinds River and some of its lower catchment contributing drains. Additional surface water quality monitoring of O'Shaughnessy's and Montgomery's Drains was also initiated by MHV Water in 2020/21. These waterways are of relevance to lower Hekeao/Hinds River water quality. Key surface water monitoring points in the lower catchment are noted on Figure 2-15, with Hekeao/Hinds River flow (at Poplar Rd), quality and ecosystem health analysis (at Lower Beach Rd) presented on Figure 2-16.

Figure 2-16 shows that the 2025/26 year included sustained above average flows during winter 2025 followed by mostly below average flows, except for a fresh during January 2026. Nitrate-nitrite-nitrogen (NNN) concentrations increased during winter 2025 and remained well above average until a sudden drop to the lowest equal recorded result during the January 2026 fresh, followed by increasing concentrations for the remainder of the year. PC2 requires 95% of monthly NNN samples each year for the lower Hekeao/Hinds River to be a maximum of 5.6 mg/l by 2035. Only four monthly samples were 5.6 mg/l or less during 2025/26, so this target was not met. QMCI (Quantitative Macroinvertebrate Community Index) was similar to 2024/25, short of the PC2 target and occurring during a combination of low flows and elevated nitrate concentrations.

Figure 2-17 presents Hekeao/Hinds River at Lower Beach Rd annual median and 95%ile nitrate (as NNN) concentrations, alongside Hinds Plains rainfall. Both 2025/26 metrics were higher than the equivalent 2024/25 metrics (and above their PC2 targets), and were the second highest in the last 6 years.

Figure 2-18 compares annual median NNN for the four lower Hekeao/Hinds Drains with their 2035 PC2 target (plus annual rainfall for context). For 2025/26, the drains to the west (true right) of the Hekeao/Hinds River produced higher annual median NNN than 2024/25, while the drains to the east (true left) of the Hekeao/Hinds River produced lower annual median NNN than 2024/25. The highest nitrate concentration increase (13%) was in the drain with the largest average flow (Northern Drain).

Figure 2-19 provides some context for Hekeao/Hinds River nitrate concentration results, comparing monthly nitrate (as NNN) concentrations at the lowest monitoring sites for the Hekeao/Hinds River and its tributaries. For June 2025 to May 2026, the increasing Hekeao/Hinds River nitrate concentrations were initially driven by increasing O'Shaughnessy's and Taylors Drain nitrate concentrations during winter 2025, followed by prolonged and elevated Northern Drain nitrate concentrations in spring 2025 (a similar but less severe result compared to winter 2021). The lowest equal Hekeao/Hinds River nitrate concentration (1.8 mg/l) was achieved in January 2026 following sharp decreases in tributary concentrations (except for Montgomery's Drain) and a 15 m^3/s mainstem fresh.

The above results support the more detailed analysis presented in Section 2.2 of [HHWET, 2025](), which concluded that Hekeao/Hinds River at Lower Beach Road nitrate-NN concentrations are likely to be highest when the lower plains river flow is dominated by groundwater and lowest when the river flow is dominated by upper catchment river water. Groundwater-fed tributaries contribute different flows, nitrate concentrations and response (lag) times to rainfall events. Northern Drain has a larger catchment, flow and longer response time to rainfall events than Taylors or O'Shaughnessy's Drain. Additional proposed NRR sites are expected to further improve the upper catchment river water quantity and quality, while some of the additional proposed MAR sites are expected to improve groundwater quality in the vicinity of springs supplying Hekeao/Hinds River tributaries.

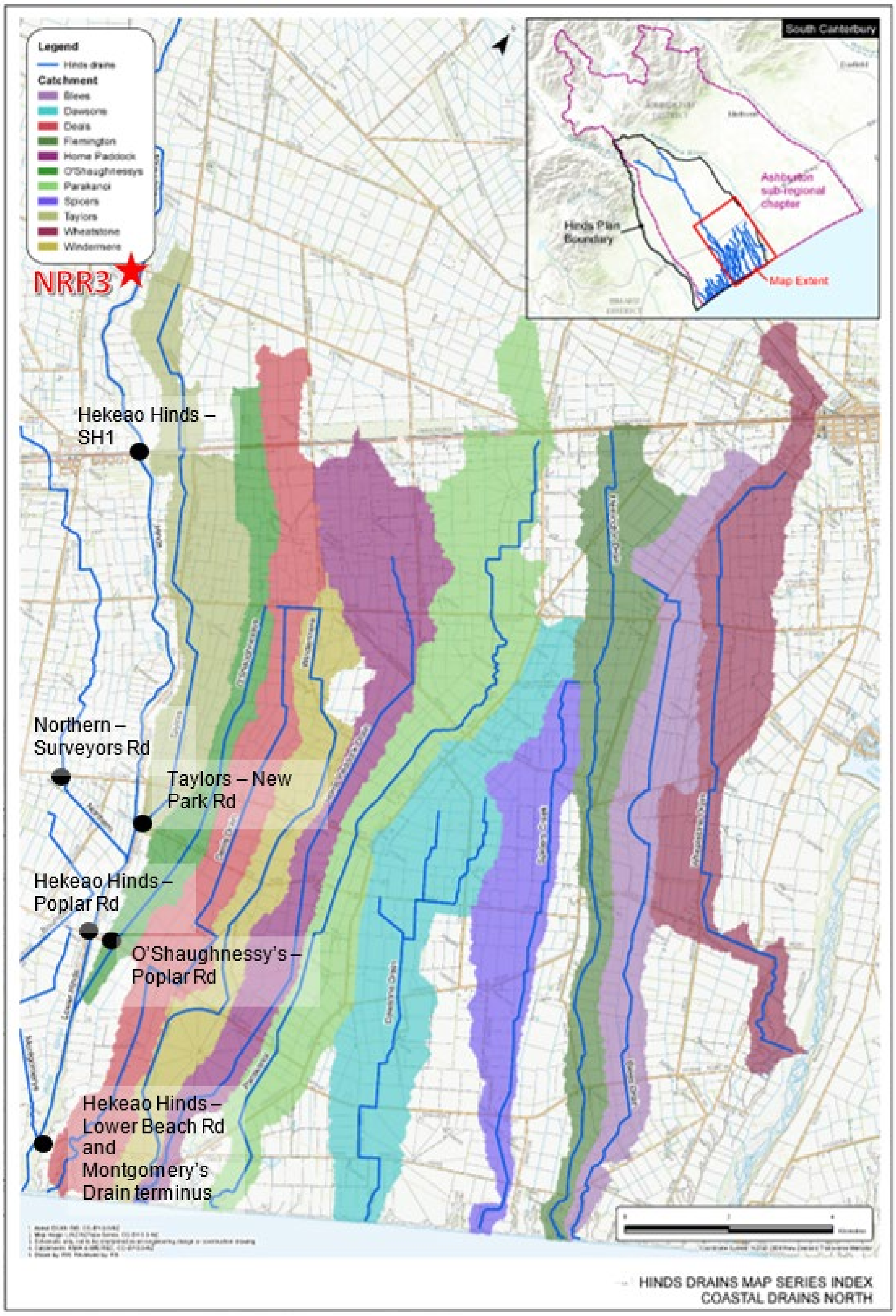

Figure 2-15: Hekeao/Hinds River monitoring sites (Source: HDWP)

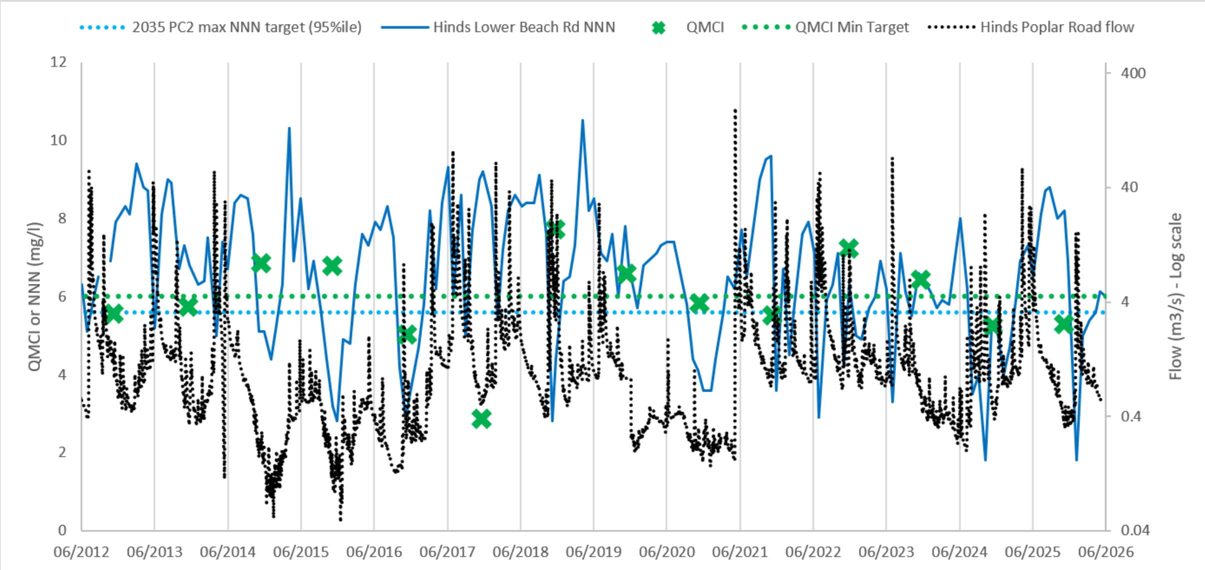

Figure 2-16: Hekeao/Hinds River flow, NNN and QMCI (Source: CRC[1])

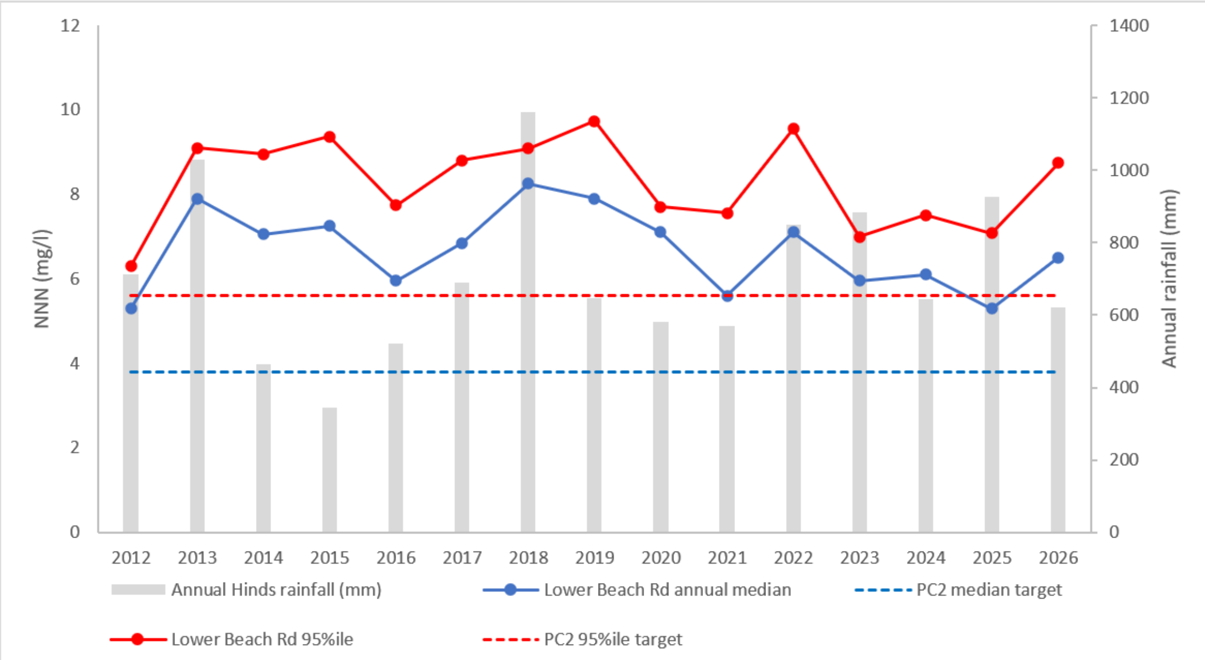

Figure 2-17: Annual (year ending 30 June) Hinds Plains rainfall and annual median Nitrate-Nitrite-Nitrogen concentrations for the Hekeao/Hinds River at Lower Beach Rd (Source: CRC)

[1] This work uses QMCI material sourced from Hilltop Manager database and the SOE streamhealth dataset stored in the Streamhealth MS Access database, which is licensed under a Creative Commons Attribution 4.0 International licence by Environment Canterbury.

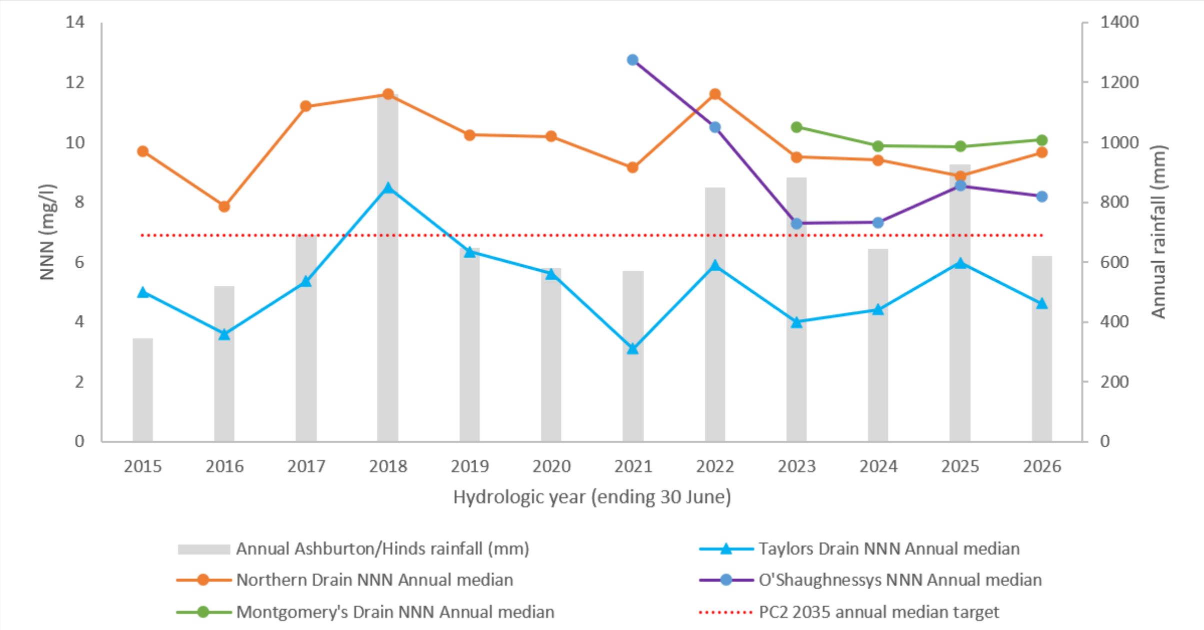

Figure 2-18: Lower Hekeao/Hinds River tributary median NNN concentrations (Source: CRC, MHV)

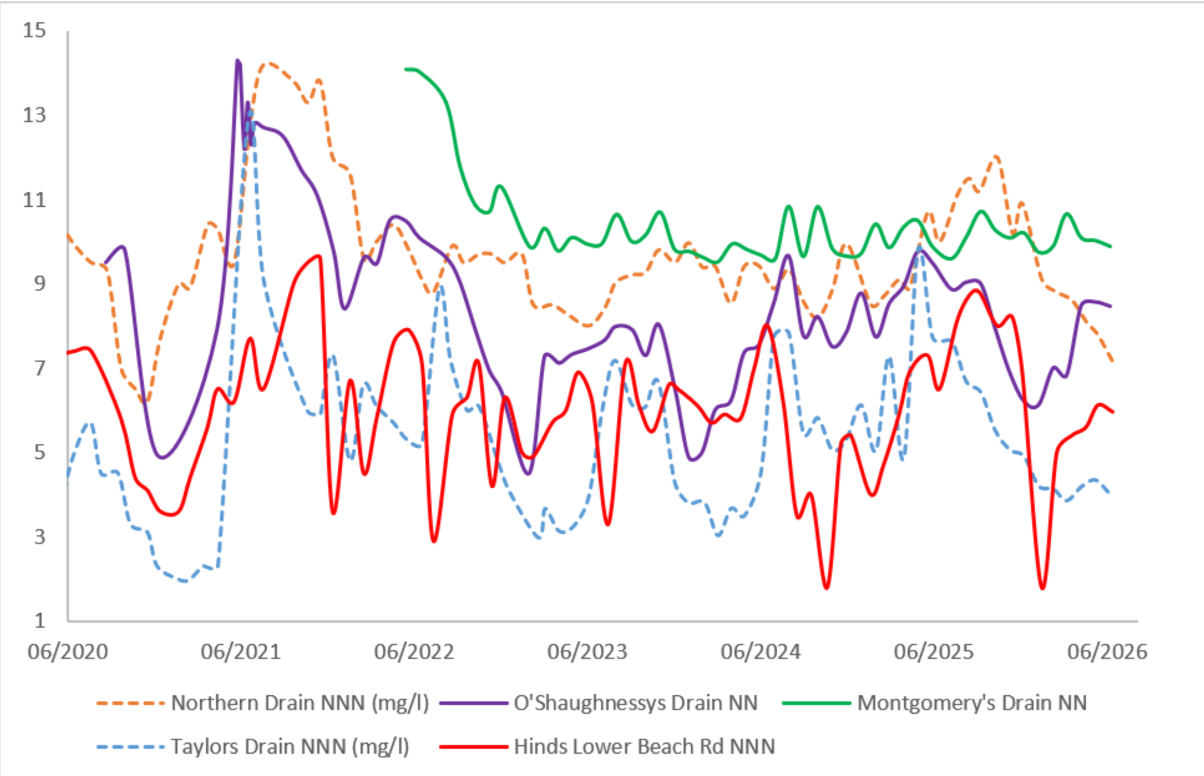

Figure 2-19: Monthly nitrate concentrations at lowest monitoring site for Hekeao/Hinds River and tributaries (Source: CRC, MHV, HHWET)

Lower Hekeao/Hinds River ecosystem analysis also includes 5-yearly eDNA (environmental DNA) samples (last collected in winter 2024) and fish surveys (annually until 2023 and then 5-yearly), as most recently reported in Section 2.2 of HHWET, 2025. Trail cameras were also placed at sites overlooking the Hekeao/Hinds River mouth and Boundary Creek mouth in October 2024 to assist with identifying mouth opening timing and regularity. Based on the twice daily photos, during 2025/26 the Hekeao/Hinds River mouth was open approximately 28% of the time and the Boundary Creek mouth was open approximately 42% of the time. This was about half the opening lengths of the previous year, reflecting the annual rainfall difference. While Boundary Creek usually has a lower flow than the Hekeao/Hinds River, its mouth is open more regularly due to its high starting point on the beach head and short steep drop to the sea. The effects of the late January 2026 15 m^3/s mainstem fresh on the Hekeao/Hinds River mouth are presented via trail camera photos in Figure 2-20, showing how the mouth opening develops between January 23rd and 26th.

Figure 2-20: Trail camera photos of Hekeao/Hinds River mouth opening 22-26 January 2026 (source: HHWET)

3 Hekeao/Hinds Plains Groundwater and MAR

3.1 Hekeao/Hinds Plains groundwater quality

PC2 specifies a groundwater nitrate-N target of 6.9 mg/l to be met by 2035, as an annual median of up to thirteen PC2-specified "shallow" wells (screened within 30 m of the water table) across the Hekeao/Hinds Plains. MHV Water, BCI Water and HHWET measure groundwater nitrate-N concentrations at other wells for consent conditions and related projects. Since September 2016, MHV Water have been monitoring groundwater and surface water nitrate-N at additional sites across the Hekeao/Hinds Plains, starting with 29 wells in 2016 and increasing to 163 wells and 101 surface water sites in 2024/25. HHWET have been a monitoring project partner since 2020. Samples are tested with a portable nitrate sensor that is regularly calibrated and maintained. A portion of samples are also sent to Hill Laboratories as a quality assurance measure. Database practices adhere to quality assurance and quality control protocols, which (along with the database) have been externally audited.

The annual median groundwater nitrate-N update to 30 June 2026 in Figure 3-1 shows annual median nitrate-N concentrations in PC2-specified “shallow” wells across the Hekeao/Hinds Plains alongside the larger dataset from MHV/HHWET/PC2 “shallow” wells (also screened within 30 m of the water table). Annual rainfall from the Hinds Plains site has been added for context. Rainfall for the 2020/21 and 2021/22 hydrologic years is presented as a complete line (for measured rainfall) and a dotted line (where the 155 mm of rainfall that fell from 29-31 May 2021, is moved to the following year). The dotted line provides a more useful comparison with measured nitrate-N concentrations, as the heavy rain event resulted in significant transport of nutrients through the soil profile, groundwater and surface water systems which were measured throughout 2021/22 and into the 2022/23 hydrologic years.

For the period of dataset overlap (September 2020 to June 2026), the annual medians of the quarterly site medians of the PC2-only wells shows greater variation than the larger MHV/HHWET/PC2 “shallow” wells dataset, with both datasets remaining above the 6.9 mg/l PC2 2035 target. For 2025/26, the PC2 dataset suggests that the annual median nitrate was slightly higher than 2024/25; however, the larger dataset suggests a 6% decrease on the previous year and a return to 2021/22 to 2023/24 levels. The annual medians are calculated from samples collected quarterly. Figure 3-2 presents the median nitrate-N concentrations for each quarterly sample and dataset, alongside the number of wells in each sample (ranging from 8-13 for the PC2 dataset and from 44-82 for the larger dataset). The median quarterly nitrate-N concentrations in the PC2-only dataset vary by 4.7 mg/l, while the median quarterly nitrate-N concentrations of the larger dataset only vary by less than 2.4 mg/l.

Various evidence shows that rainfall recharge can be a strong driver of changes in nitrate concentrations in groundwater by transporting available nutrients through the unsaturated zone and groundwater system (e.g., Rutter and Rutter, 2019; CRC, 2023). Changes in nutrient concentrations can be measured in some nearby wells within days (to weeks) of a rainfall event but can then take much longer (e.g., years to decades) for those nutrients to travel through the catchment to the ocean. There can be significant variability in nutrient transport times, as some pathways (e.g., buried historical river channels) allow much faster nutrient transport than other pathways.

Low nutrient water from a MAR or NRR site travels to and through the groundwater system in a similar way. The travel time (in terms of what is measured at a monitoring site) is known as the lag time. The water sampled at a particular monitoring site can represent a blend of water that has taken many different pathways and hence will have numerous different lag times. Aquifer recharge can be from rainfall recharge on the land surface, river recharge or MAR. Land surface recharge can not only transport nitrate stored in the soils and unsaturated/vadose zone, but the recharging water can increase hydraulic gradients and shorten lag times. Furthermore, the availability of nitrogen in the subsurface affects the amount of nitrate that can be transported. For example, good management practices can uptake most applied nitrogen, meaning there is limited “excess” nitrate available to leach. These complexities create challenges when assessing the relative contributions of on-farm improvements, MAR/NRR, and rainfall to nitrate-N concentration variation in a set of groundwater monitoring wells.

Both datasets in Figure 3-2 show nitrate-N concentration increases in early winter 2021, spring 2023 and late spring 2024. The Hinds Plains rainfall site records shows that these periods had above average rainfall, including large rainfall events. Nitrate-N concentration variations are usually greater in the PC2 dataset than the larger dataset, as large sample variations in a small number of wells are more likely to influence the median value of a smaller dataset than a larger dataset. The larger variation in quarterly values for the PC2 dataset also translates to a larger variation in annual median values, as is evident in

Figure 3-1. The introduction of a new monitoring site can also have a disproportionate influence on the median of a smaller dataset, as occurred when a new PC2 monitoring well was added in 2022/23 (with nitrate-N concentrations higher than any other PC2 well). A five-year moving average for the PC2 dataset has been added to Figure 3-1 to smooth out the annual variations, however this is still 7-14% higher than the larger dataset annual medians.

A comparison of annual Hinds Plains rainfall totals in Figure 3-1 shows the 2025/26 year was below the 20 year average. However, an assessment of daily Hinds Plains rainfall from January 2025 to May 2026 (see Figure 3-3) shows that the two most significant rainfall events occurred in mid-March 2025 (65 mm in a day) and late April 2025 (160 mm in 2 days). The previous significant rain event (150 mm over 4 days) was in July 2023. The next two most significant rainfall events since January 2025 were in early June 2025 (78 mm over 3 days followed by a further 42 mm the following week) and early-August 2025 (48 mm over 3 days).

Considering lag times and the absence of >30 mm rainfall events between July 2023 and March 2025, the elevated winter and spring 2025 nitrate concentrations in both datasets in Figure 3-2 are not unexpected. Figure 3-3 shows no >30 mm rain events between the late September and late December 2025 monitoring, with the median nitrate concentration decreasing accordingly for both datasets. Unseasonally regular rainfall occurred from late December 2025 to early March 2026. The larger dataset shows an increase in median nitrate concentration in response to this rainfall, while the PC2 dataset median nitrate concentration decreased. Autumn 2026 rainfall was below average, with no daily rainfall exceeding 20 mm. The larger dataset shows a decrease in median nitrate concentration in response to this below average rainfall, while the PC2 dataset median nitrate concentration increased. The differences between datasets are likely to be influenced by the relative size of the datasets, their combination of lag times, and the effect of missing a site or sites in a sampling round.

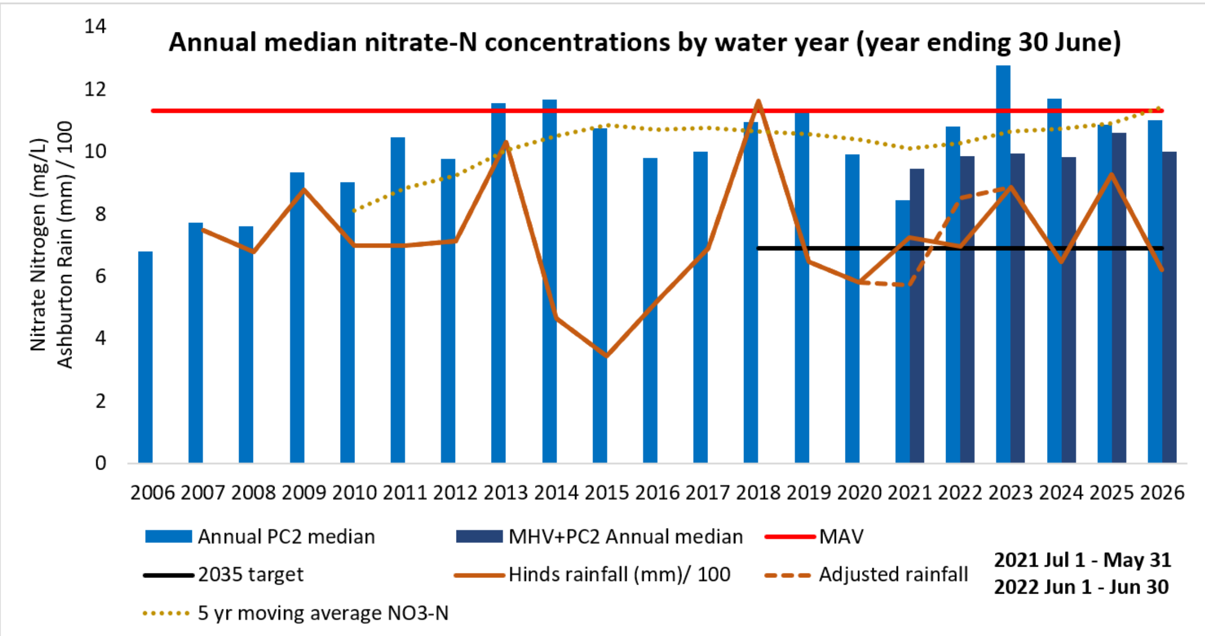

Figure 3-1: Hekeao/Hinds Plains PC2 and MHV Water + PC2 median annual nitrate-N concentrations, plus Hinds Plains annual rainfall (Source: CRC, MHV Water, HHWET)

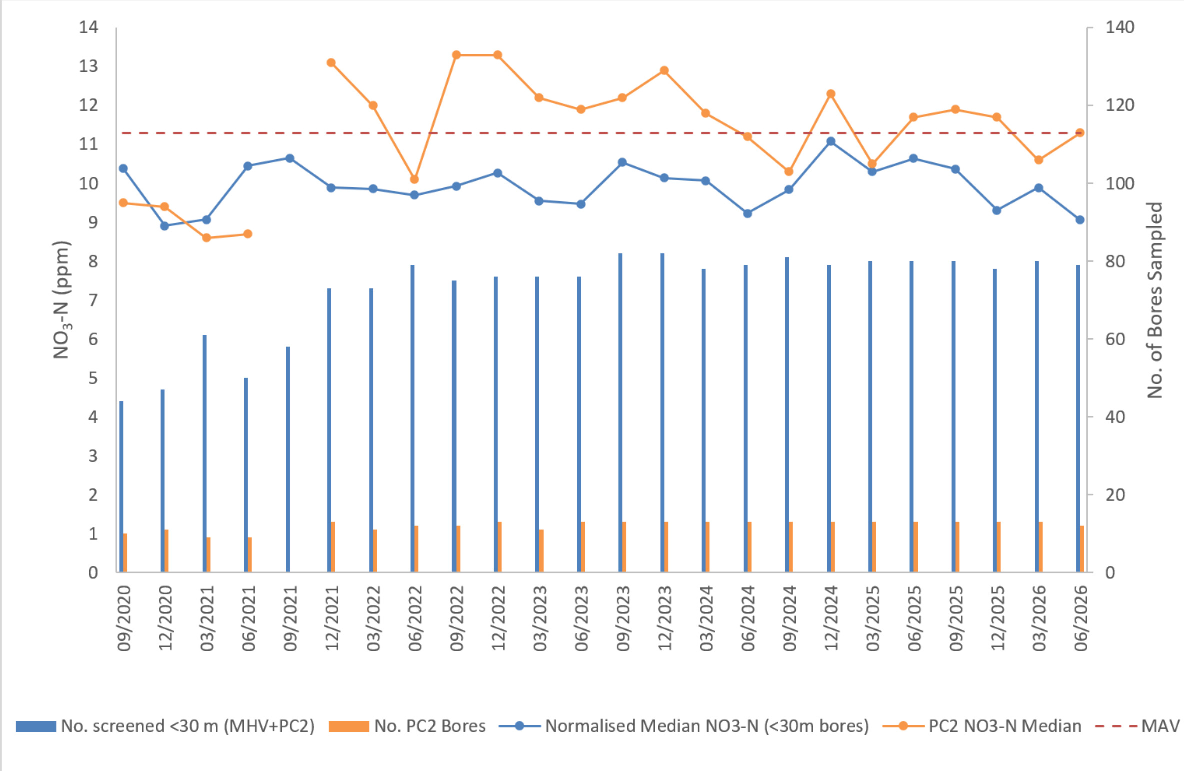

Figure 3-2: 2020-26 Hekeao/Hinds quarterly groundwater nitrate-N monitoring (Source: MHV Water, CRC, HHWET)

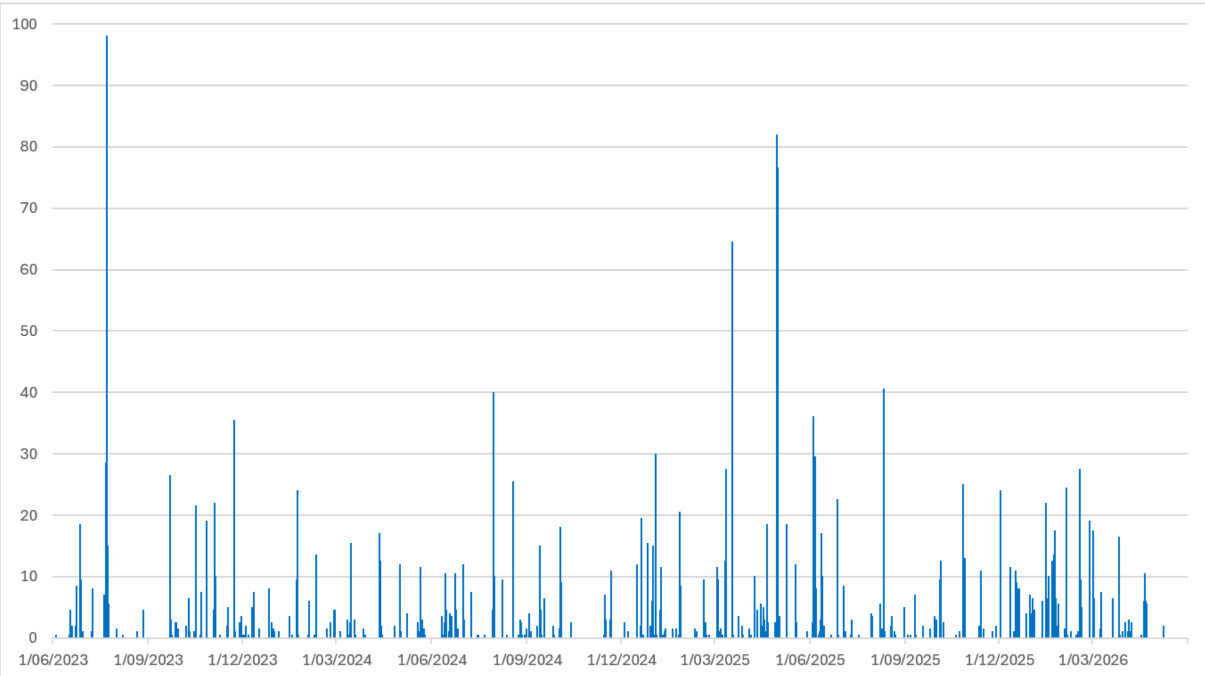

Figure 3-3: Hinds Plains daily rainfall from June 2023 - May 2026 (Source: CRC)

3.2 MAR operations and monitoring

The Executive Summary and Introduction provide an overview of relevant aspects of PC2 and the role of catchment scale enhancements such as MAR in achieving PC2 targets. Figure ES 1-2 shows the location of existing and potential (which are awaiting the outcome of a resource consenting process)

MAR sites. June 2026 marked the 10 year anniversary of MAR Pilot Site (MAR01) operations. During 2025/26, no MAR sites operated from the beginning of June until the beginning of October, due to a maintenance shutdown on the Valetta distribution system and Environment Canterbury decisions regarding MAR02-18 operations during re-consenting. MAR01 was the first site to operate in early October 2025 following the maintenance shutdown, followed by MAR02, 07, 09, 10, 12, 17 and 18 from October/November 2025 after Environment Canterbury confirmed MAR operations could continue during re-consenting processes. MAR16 (see Figure 3-4) began operations in April 2026 following infrastructure upgrades and MAR08 (see Figure 3-5) began operations in late May 2026 following infrastructure upgrades.

Figure 3-4: New MAR16 flow control device and connection to recharge area (Source: HHWET)

Figure 3-5: New MAR08 flow control device and connection to recharge race (Source: HHWET)

MAR01 also received an upgrade during 2025/26. MAR01 is supplied by a water race beside Timaru Track Road (which is connected to an MHV Water storage pond) when there is sufficient capacity in the MHV Water distribution system, or alternatively via an ADC water race that runs between MAR01 and Frasers Road (see Figure 3-6). For testing purposes, MAR flow down the ADC water race utilised an existing ADC manual gate to supply the MAR01 race. Following successful testing, a new Rubicon gate with internal flow monitoring was installed in March 2026 to connect the ADC water race directly to MAR01 (see Figure 3-7).

BY20/0152, a 29 m deep well 1 km down-gradient from MAR01 (see Figure 3-6) continues to provide the longest and most detailed groundwater level and nitrate monitoring record for Hekeao/Hinds Plains MAR. The most recent detailed assessment of results can be found in Section 3.1 of HHWET, 2025, which concludes that MAR01 operations increase groundwater levels and decrease nitrate-N concentrations at BY20/0152. Figure 3-8 provides the full ten-year record of results. Discharge flows (in hundreds of litres per second) are shown in yellow and in 100 l/s increments on the right axis. Measured nitrate-N concentrations are shown in purple and on the right axis, with an in-situ continuous nitrate-N sensor (in green) providing detailed monitoring until late 2019. Groundwater levels are presented in dark blue on the left axis, with reasonably rapid level changes when MAR begins or ceases. The nitrate-N monitoring record in Figure 3-8 shows nitrate-N at 6-7 mg/l immediately pre-MAR, reducing to 1–3 mg/l with MAR. Concentrations exceed 3 mg/l after a period of no MAR (e.g., after October 2025) and after significant rainfall events (e.g., May 2021 and July 2023), but quickly drop back to below 2 mg/l once MAR resumes (i.e., the nitrate concentration increase is due to a combination of land surface leaching caused by rainfall and/or the cessation of MAR). The average nitrate-N concentration at BY20/0152 was 2 mg/l in 2025/26, and 2.3 mg/l for the full ten-year record.

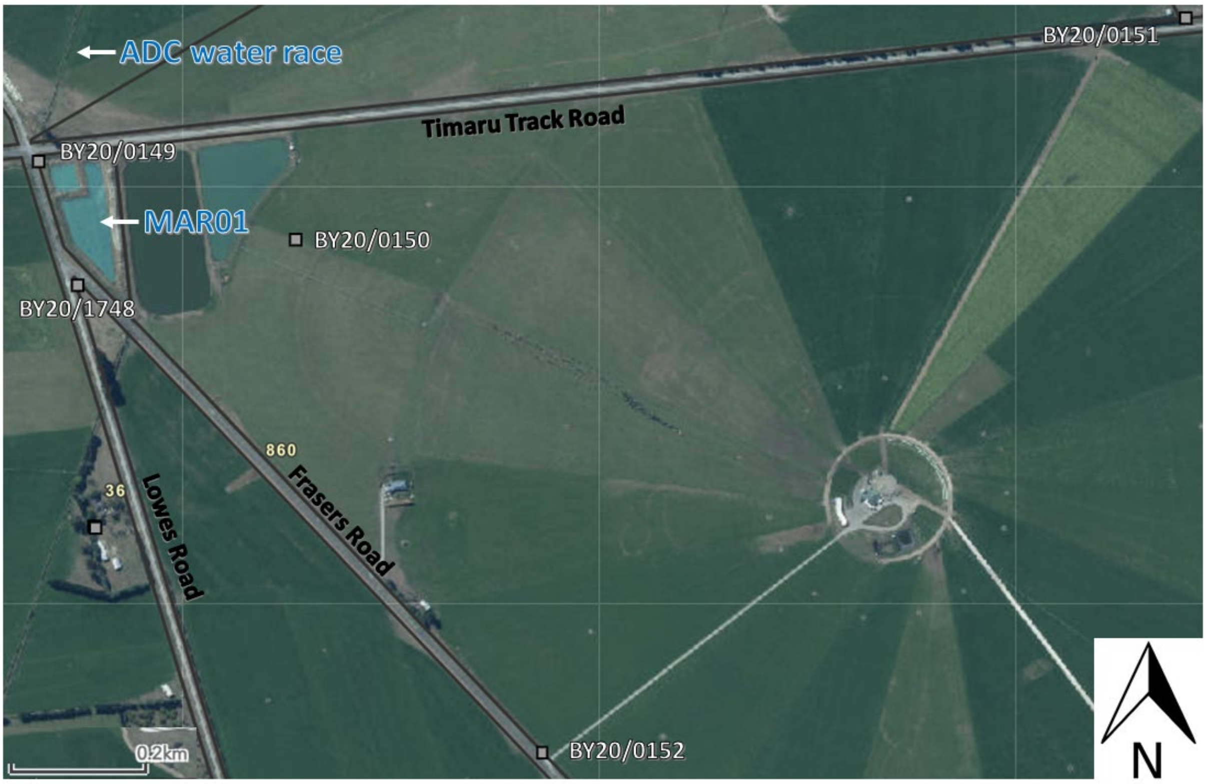

Figure 3-6: MAR01 (MAR Pilot Site) locality and nearby monitoring (Source: Canterbury Maps)

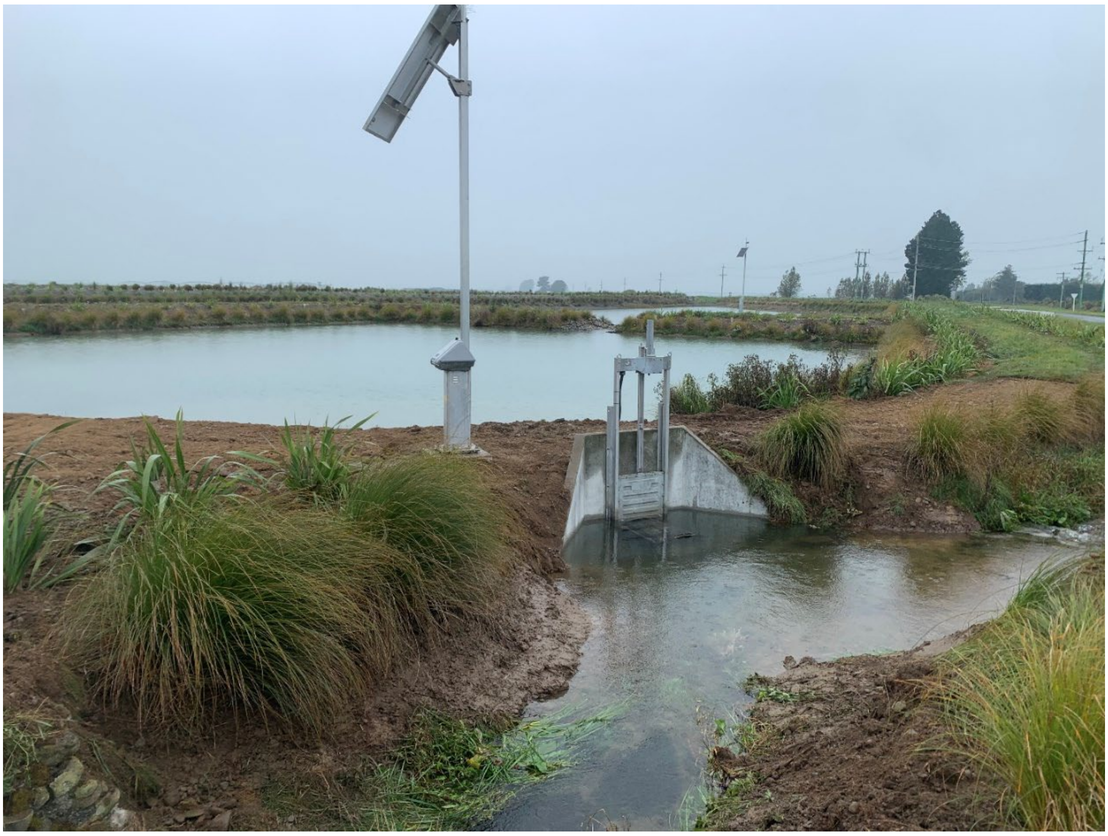

Figure 3-7: New MAR01 intake from ADC water race (Source: HHWET)

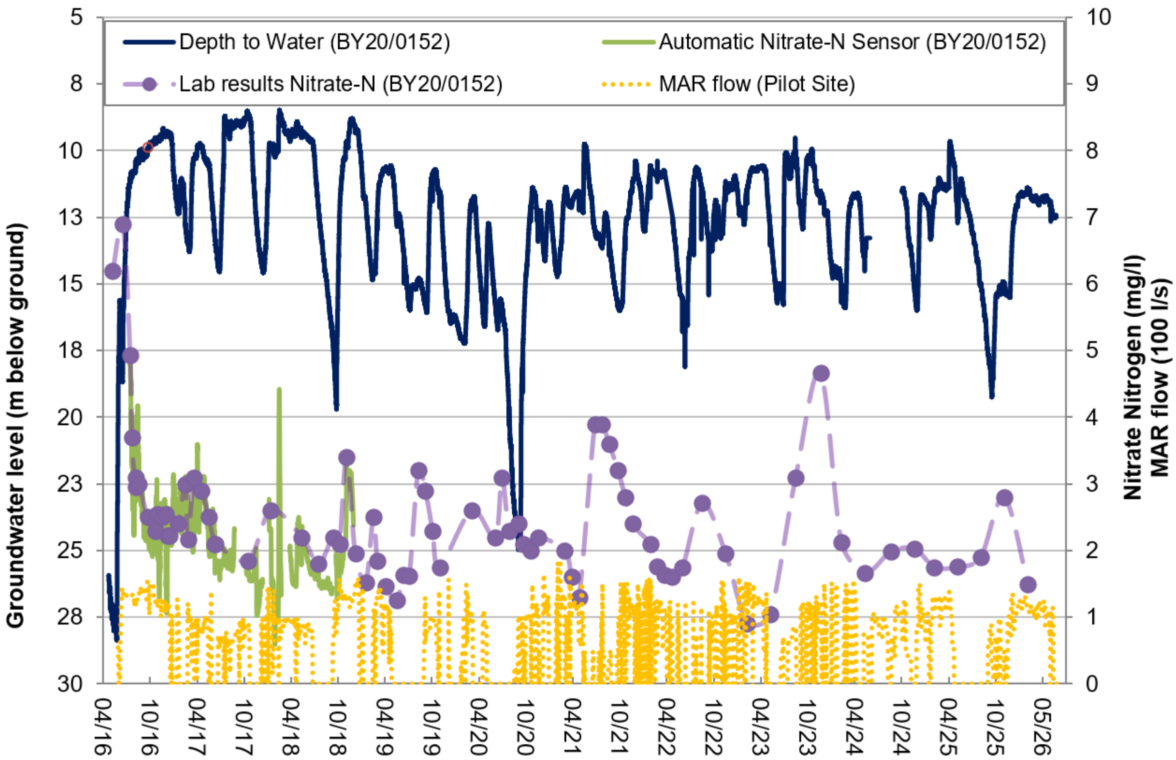

Figure 3-8: MAR01 discharge flow plus groundwater nitrate and levels 1 km down-gradient (Source: HHWET)

3.3 Case study – Groundwater nitrate near Winslow

Catchment-wide monitoring and assessments are utilised to report on progress towards PC2 water quantity and quality targets as well as identifying localised challenges and opportunities. Identified local challenges and opportunities are addressed via case studies. In recent years, with only one MAR site operating, the case study focus has been on groundwater nitrate down-gradient from MAR01 near the settlement of Winslow. Section 3.1 of HHWET, 2025 summarises the assessments to date of groundwater down-gradient from MAR01, the 'Tinwald nitrate hotspot' and the evidence for westward seasonal movement of the nitrate hotspot (north of Maronan Road between Tinwald and Winslow) due to groundwater abstraction. For 2025/26, case study assessments moved south west to domestic wells at the locations shown in Figure 3-9. The continuous nitrate sensor monitoring from K37/0751 utilised in Section 3.1 of HHWET, 2025 has been retained in this analysis for comparative purposes.

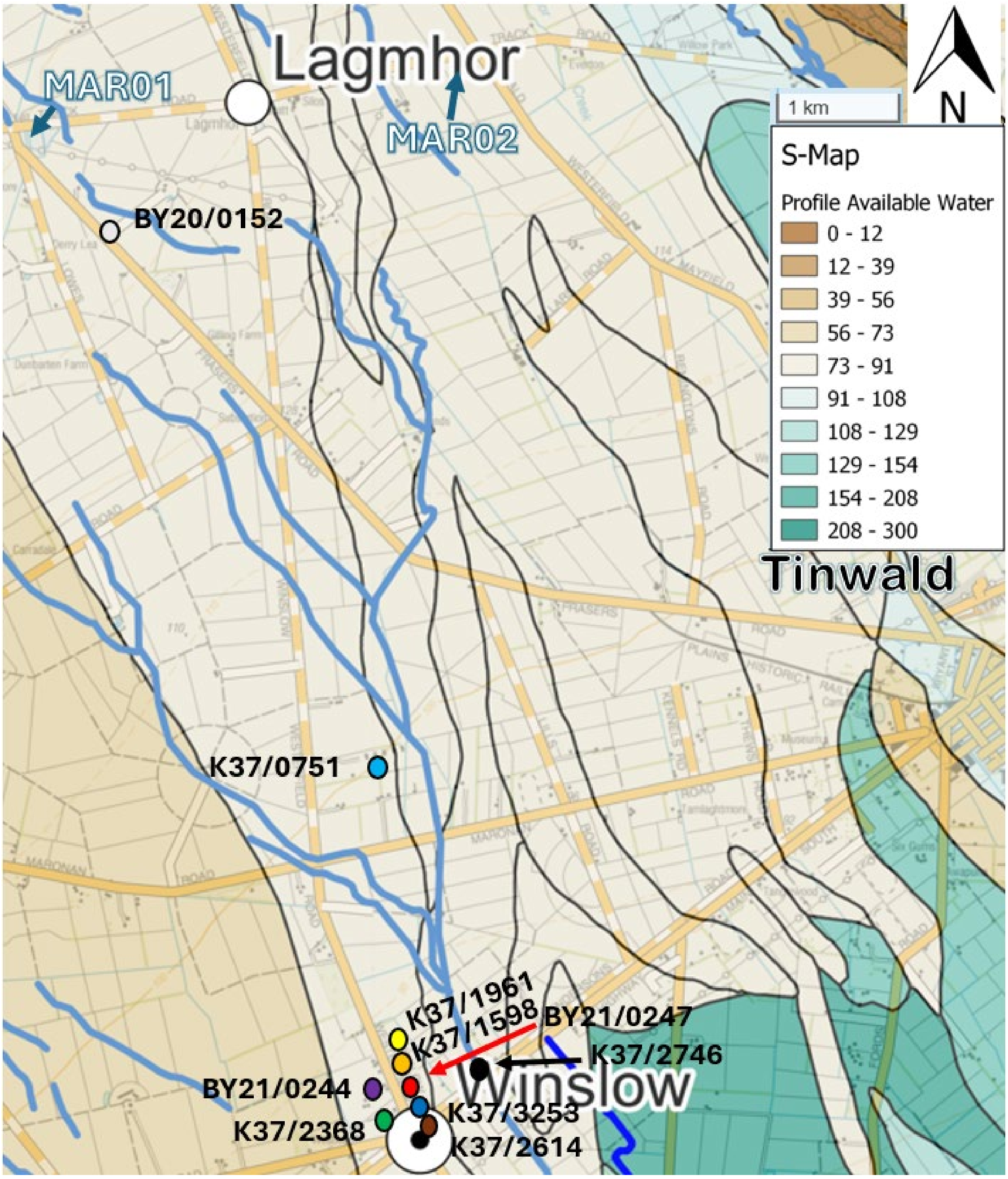

Figure 3-9: Case study area near Winslow with S-Map polygons (black), surface paleo-channels (blue) and case study wells

Figure 3-10 presents nitrate concentrations at 2025/26 case study wells near Winslow. This monitoring continues to suggest that the previously proposed westward movement of high nitrate water near Tinwald due to groundwater pumping does extend to wells near Winslow (with a decreasing influence in the westward direction). The groundwater irrigation abstraction is from both the 40-60 m depth range and from depths >100 m.

K37/2746 shows the greatest seasonal nitrate-N concentration variation of all monitored bores (9.3-17.8 mg/l). It is the furthest east of the monitored bores. Its bore log shows only sandy gravels below 16 metres below ground level, whereas the bores to the west contain clay deeper than 16 metres below ground level. Figure 3-9 shows a surface paleochannel in the vicinity of K37/2746.

Like K37/2746, the two bores with nitrate sensors (K37/0751 and BY21/0247) reached peak nitrate in December/January. Their overall seasonal variation is less than K37/2746, but they show measurable sub-weekly variation at times, with this variation correlating with local pumping variation (see Section 3.1 of HHWET, 2025).

K37/1961 nitrate-N concentrations increased sharply through September/October 2025 (6-13.7 mg/l), but then held relatively constant. K37/1961 is a shallow well that is down-gradient from an ADC water race. Its peak nitrate concentration is similar to K37/0751, which is at a similar depth. Section 3.1 of HHWET, 2025 shows monitored wells in the 20-30 m depth range closer to Tinwald with 19-25 mg/l nitrate-N.

BY21/0244 and K37/2368 show the least seasonal variation. These are the furthest west of the monitored bores. All case study households received sample results and additional information (e.g., water treatment options) during the monitoring period. An additional MAR site is planned nearby; however, the total maximum recharge flow for MAR sites in the vicinity of Winslow is less than half the current total maximum irrigation abstraction (~1,000 l/s) consented in the vicinity of Winslow. This will affect the influence of MAR near and down-gradient from Winslow.

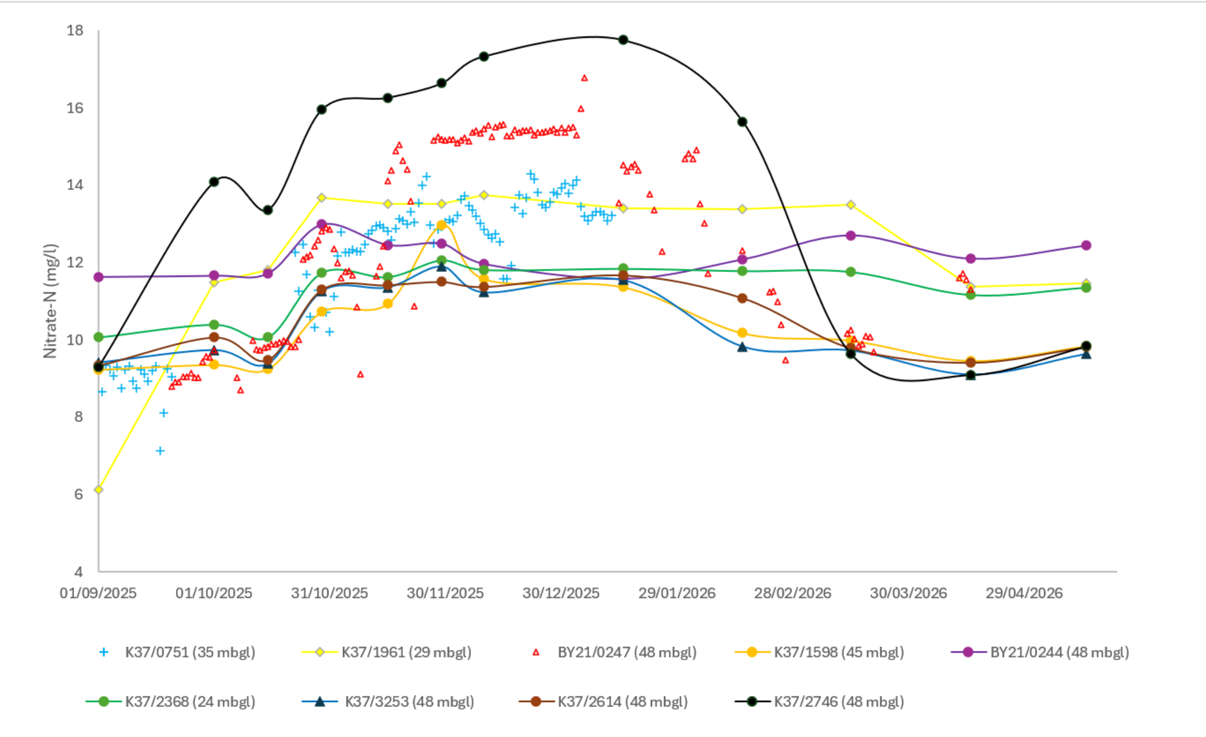

Figure 3-10: Case study monitoring - groundwater nitrate near Winslow

3.4 Case study – The 'Missing N' VMS project

The vadose zone, also known as the unsaturated zone, is the subsurface region located between the land surface and the saturated zone (groundwater table). The measurement of water chemistry in this zone is challenging without disturbing the subsurface material being monitored.

Sensoil's Vadose zone Monitoring System™ (VMS - https://sensoil.com/technology/) is comprised of flexible sleeves installed in uncased, slanted boreholes (Figure 3-11). The flexible sleeves host multiple monitoring and sampling units, distributed along their length. Each monitoring unit includes water content sensors, vadose zone sampling ports and gas sampling ports for frequent sampling of the unsaturated (vadose) zone and its hydrology. Over 150 VMS systems have been installed around the globe, but the technology is yet to be trialled in New Zealand.

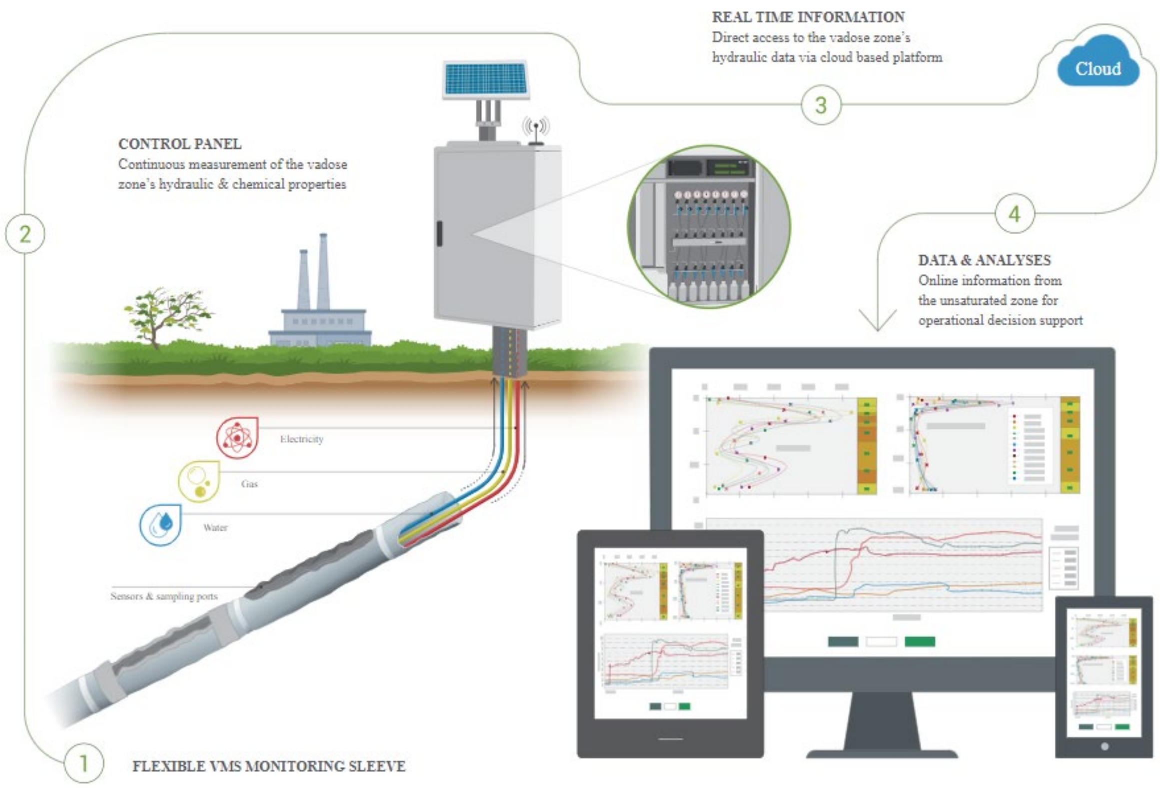

Figure 3-11: The VMS system (Source: Sensoils)

The 'Missing N' VMS project will install the first Sensoil VMS in New Zealand alongside cheaper combinations of subsoil and groundwater monitoring equipment, and compare these technologies as to their applicability in supporting on-farm decisions that aim to measurably reduce nutrient leaching (scale and/or regularity). The term 'Missing N' describes the nitrogen compounds lost from the soil profile via land surface recharge. The project budget is $500,000 (plus in-kind support) over 3.5 years, with the budget equally split between local (HHWET, MHV Water, Align Farms, Dairy NZ, Fonterra and Synlait) funding sources and MPI's new Primary Sector Growth Fund (PSGF). MPI and HHWET (on behalf of the Hekeao/Hinds Science Collaboration Group) signed the project Funding Agreement in September 2025.

The currently funded project (phase 1) runs from September 2025 to December 2028.

- September 2025 – July 2026: Development, installation, validation, monitoring, engagement, review.
- August 2026 – June 2027: Monitoring, engagement, review.

- July 2027 – December 2028: Monitoring, engagement, review, cumulative analysis and final synthesis.

The project plan proposes a phased and adaptive research approach to assess the viability and utility of vadose zone monitoring technologies for supporting nutrient management decisions in light alluvial vadose zone geologies. The focus is on the proof of concept of the VMS on the Canterbury Plains (with their light soils and highly heterogeneous gravel-based sediments) and the comparison of VMS with alternative cheaper monitoring systems for assessment of nutrient leaching. The VMS will be installed at a farm near Ealing on the Hekeao/Hinds Plains.

By the end of phase 1, we will consider this project as successful if we have:

- Established the viability of the VMS technology at a farm with soil and aquifer characteristics that are common across the Canterbury Plains (proof of concept).
- Compared the performance of a VMS and alternative monitoring systems in terms of providing data to help inform land use decisions.
- Prepared for phase 2 (measuring the effects of farm system changes on nutrient leaching) at the Ealing VMS site.
- Identified implications for installing VMS-based monitoring to other locations across New Zealand, including considerations of system type, density, and deployment strategy.
- Highlighted new research opportunities in New Zealand enabled by VMS monitoring.

Progress during 2025/26 included monitoring design and purchase, installation of an on-site water level monitoring bore, and installation planning. Installation is anticipated in July 2026.

4 Hekeao/Hinds Drains, TSA and Constructed Wetlands

4.1 Hekeao/Hinds Drains surface water quality

PC2 sets nitrate-NN targets (annual median and annual 95th percentile) to be achieved by 2035 for Hekeao/Hinds drains. Environment Canterbury monitor five of these drains monthly when flow is present. MHV Water (supported by HHWET) monitor all Hekeao/Hinds drains, sometimes in their mid as well as lower reaches. Groundwater irrigation abstraction between MAR sites and the drains reduce the potential water quantity benefits from MAR on drain flows. For example, during 2025/26, MAR01, 02 and 08 were operating with a combined total recharge of 2.03 million cubic metres (equivalent to 64 l/s continuous recharge). As discussed in Section 3.1 of HHWET, 2025, this is not sufficient to influence the flow (and therefore water quality) of downgradient drains, given the relative volumes of MAR, land surface recharge and groundwater irrigation abstraction in the surrounding catchment.

Stockwater races historically provided baseflow to these drains, and HHWET are continuing to work with community partners on retaining and managing key water races for multiple purposes, including targeted aquatic ecosystem health. Targeted Stream Augmentation (TSA) has also been successfully operating in the northern drains area (in Windermere Drain) and could be expanded to other drains where PC2 rules allow (see Section 4.2). Figure ES 1-1 shows proposed MAR sites are also situated upgradient from key southern drains, with MAR28-30 upgradient from Stormy Drain and MAR26 beside Moffats Drain (a tributary of Boundary Drain).

Figure 4-1 presents the relevant monitoring sites for the Hekeao/Hinds southern drains, while Figure 4-2 presents the relevant monitoring sites for the Hekeao/Hinds northern drains. Figure 4-3 presents their annual median nitrate-NN concentrations, while Figure 4-4 presents their annual 95th percentile. Most of these drains cease flowing at their monitoring site during periods of low groundwater. Annual statistics for low groundwater years are therefore based on less than 12 months of data.

The annual median nitrate-NN concentrations for Hekeao/Hinds drains in Figure 4-3 can be summarised as follows:

- All annual nitrate-NN concentrations for Hekeao/Hinds drains have remained above the 2035 PC2 target since 2018; however, some drains are showing improvements.

- Stormy and Boundary Drains show little response to annual rainfall variation, though Boundary Drain shows a significant concentration decrease during 2022/23, settling at a similar concentration to Stormy Drain after consistently tracking 2-3 mg/l higher. Potential changes to a key Boundary Drain tributary (Moffats Drain) are being investigated to see if they may have contributed to this Boundary Drain concentration decrease. Recent annual median concentrations are similar to the catchment-wide median shallow groundwater concentration (see Figure 3-1).

- Parakanoi and Blees Drains generally increase 1-2 years after above average rainfall and decrease 1-2 years after below average rainfall. These drains have consistently had higher annual median nitrate-NN concentrations than the other drains since 2023 and are downgradient from the 'Tinwald nitrate hotspot' (see Section 3.3).

- For Windermere Drain, higher rainfall years correlate with higher annual nitrate-NN concentrations in the same year (i.e., a shorter lag time than nearby northern drains), except for the year ending June 2025. Eiffelton Community Group Irrigation Scheme (ECGIS) pump deep groundwater (with relatively low nitrate) into Windermere Drain for subsequent irrigation abstraction and for supplying environmental flows (known as Targeted Stream Augmentation, or TSA). Higher augmentation flows generally correlate with lower rainfall totals, and vice versa. However; Windermere Drain nitrate concentrations in the last 3 years have also been influenced by an expansion of TSA activities (see Section 4.2). Annual median nitrate concentrations have trended down during this period, and the 2025/26 result was only 11% above the 2035 PC2 target.

The annual 95th percentile nitrate-NN concentrations for Hekeao/Hinds drains in Figure 4-4 can be summarised as follows:

- Most annual 95th percentile nitrate-NN concentrations for Hekeao/Hinds drains have remained above the 2035 PC2 target since 2018; however, three of the drains have shown measurable improvements in the last four years.

- Stormy and Boundary Drains show some correlation with annual rainfall variation, with a slightly lagged effect for 2023 rainfall (i.e., potentially contributing to 2024 nitrate concentrations). This suggests that some contributing groundwater has a relatively short lag time. Stormy Drain results are very close to the PC2 2035 target during drier years.

- As with the annual median, the Parakanoi and Blees Drains' annual 95th percentile generally move up and down with rainfall after a 1-2 year lag; however, the relationship is less clear than the annual median due to the influences of different sample sizes (due to differing periods of no flow) and peak values. From 2018-2026, both drains flowed between 5 and 12 months of the year during sampling. Ecosystem health challenges for these drains therefore include flow absence as well as elevated nitrate concentrations. This flow absence contributed to Environment Canterbury ceasing monitoring for QMCI (Quantitative Macroinvertebrate Community Index) in 2025 at the Parakanoi Drain, with lower Hekeao/Hinds Plains QMCI monitoring only occurring now in the Hekeao/Hinds River and Boundary Drain.

- Windermere Drain annual 95th percentiles also vary in similar fashion to annual median concentrations, with 2025 and 2026 results notably meeting the PC2 2035 target (the first lowland Hekeao/Hinds waterway to achieve this result). Further detail is provided in Section 4.2.

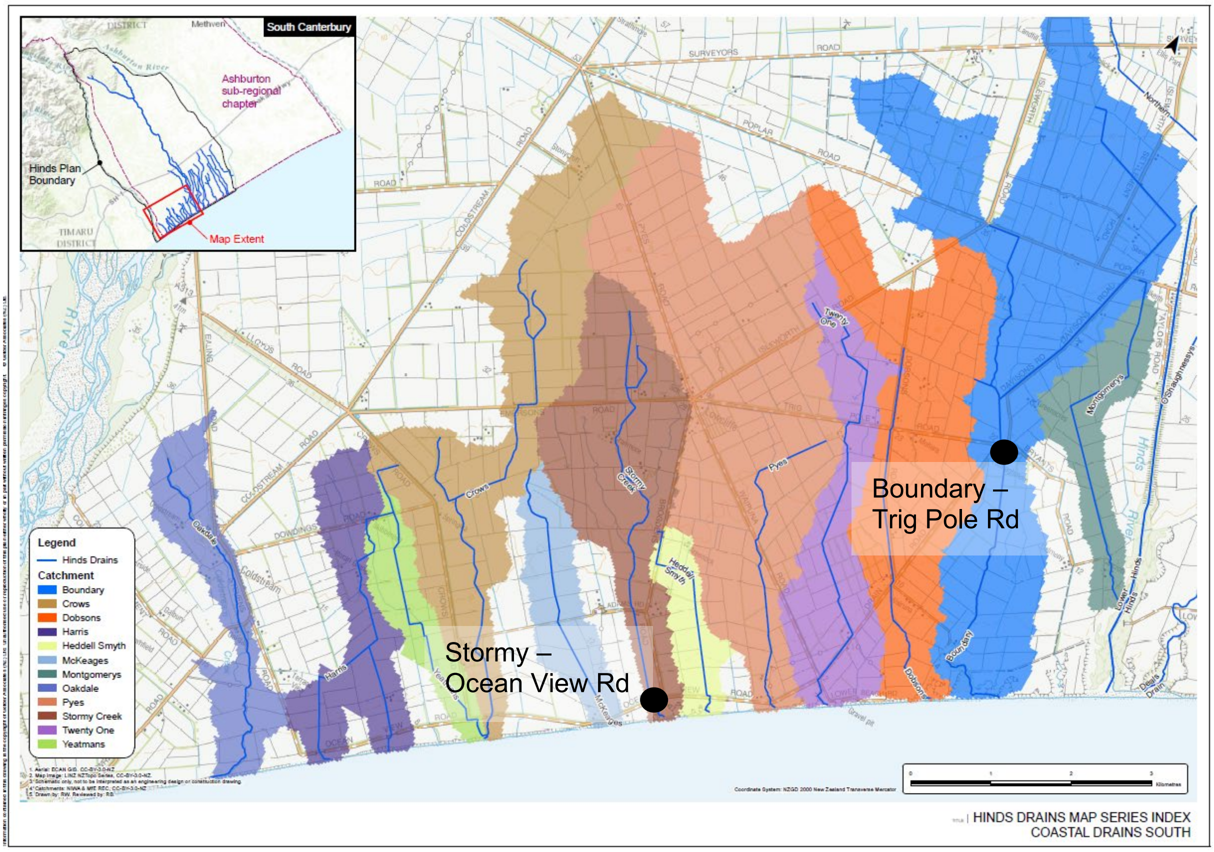

Figure 4-1: Hekeao/Hinds southern drains monitoring sites (Source: Hinds Drains Working Party, CRC)

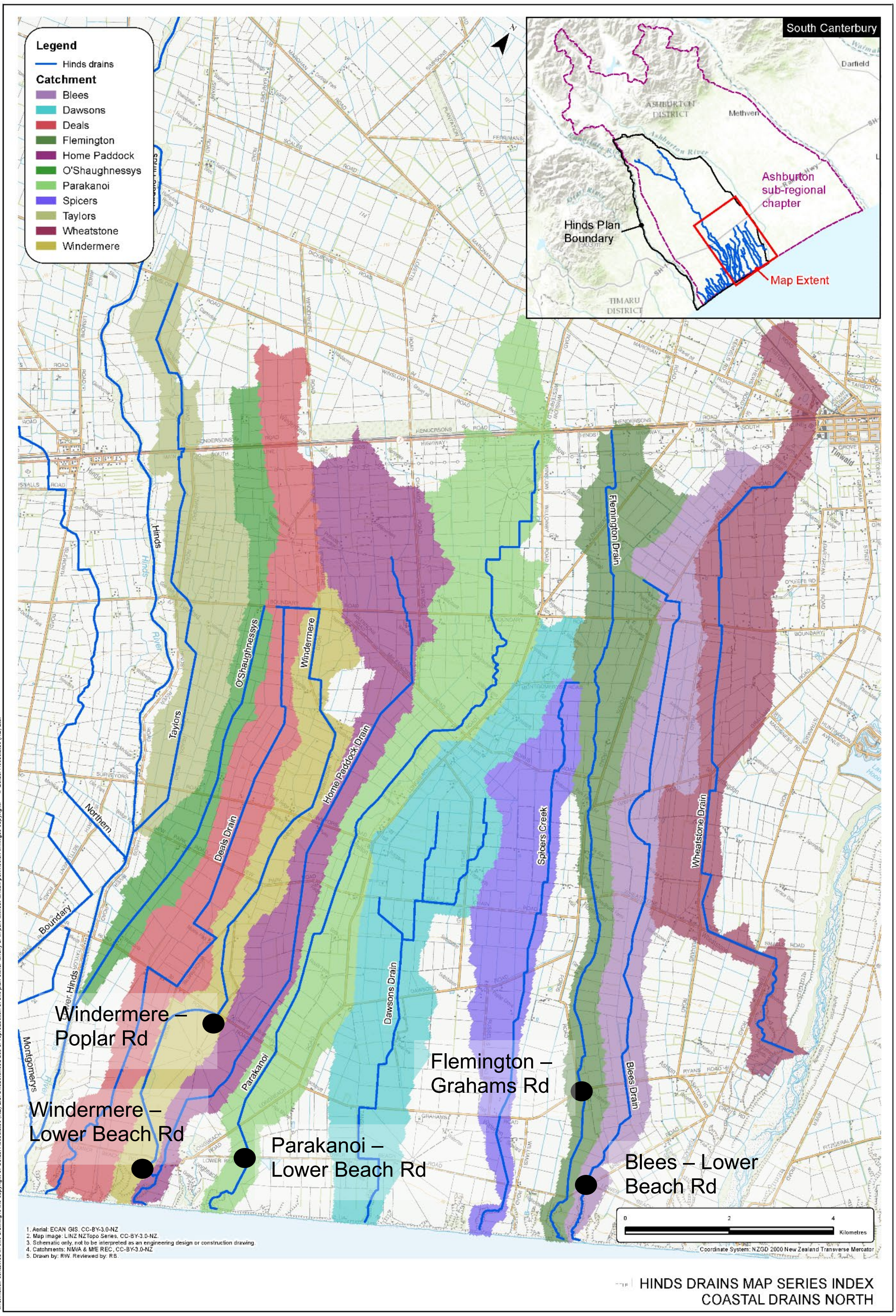

Figure 4-2: Hekeao/Hinds northern drains monitoring sites (Source: Hinds Drains Working Party, CRC, MHV Water)

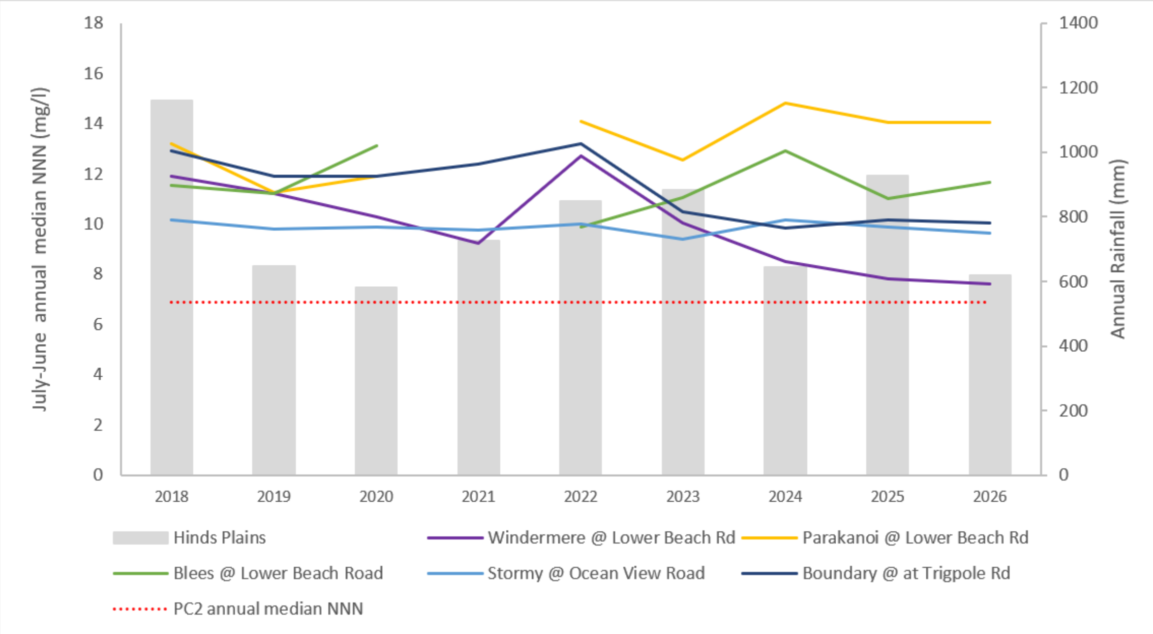

Figure 4-3: Hekeao/Hinds drains annual median NNN (Source: CRC, MHV Water)

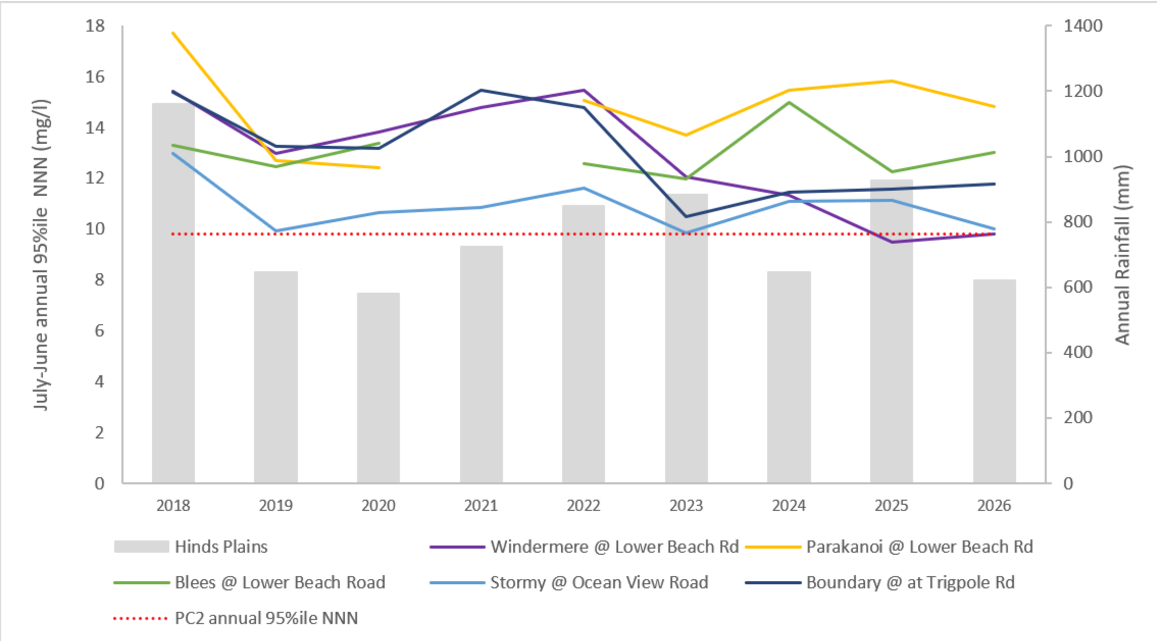

Figure 4-4: Hekeao/Hinds drains annual 95%ile NNN (Source: CRC, MHV Water)

4.2 Targeted Stream Augmentation (TSA)

The Windermere Drain below Boundary Road distributes pumped groundwater supply for the Eiffelton Community Group Irrigation Scheme (ECGIS). As the deep groundwater pumped by ECGIS is lower in nitrate-NN than the spring-fed supply to the Windermere Drain, the nitrate-NN concentrations of the influenced drain decrease, and the flow increases during the irrigation season. The flow augmentation enhances aquatic habitat during what is usually the most challenging time of the year for ecosystem health (due to lower flows and higher temperatures). The Hinds Drains Working Party recognised the potential of this waterway for ecological and biodiversity values, and proposed removal of fish barriers, creation of riffles/pools and riparian planting initiatives. These enhancements have since been implemented by the Hinds Drains Working Party, Lowlands Catchment Group, local landowners and CSI Fish and Game. ECGIS have also voluntarily pumped groundwater into the Windermere Drain over and above any irrigation demand (including out of the irrigation season) to maintain drain flows for ecosystem health. This is known as Targeted Stream Augmentation (TSA), with ECGIS TSA activities described in Calder-Steele (2019).

TSA activities were further supported by an ECGIS/MPI/HHWET project in 2021 to power one of the ECGIS pumps by a new 44 kW solar panel array. This project also developed a business case for powering other combined irrigation/environmental projects with electricity requirements. More recently, ECGIS and HHWET began exploring ways to enhance flows as required year-round (including a voluntary minimum flow target of 80 l/s when irrigation supply is not occurring), with the Windermere Drain enhanced TSA (eTSA) project beginning in May 2024. In late 2024, ECGIS and HHWET agreed in principle to form a joint venture to install a second 120 kW solar array (powering a key ECGIS pump for irrigation and TSA). This array was constructed in autumn 2026.

Figure 4-5 presents the Windermere Drain monthly nitrate and daily flow records. It shows that the PC2 2035 annual 95th percentile nitrate-NN target has been met every month since November 2023 and the minimum flow target has been met since May 2021 (except for five individual days when available pumping capacity was slightly less than demand). Figure 4-5 shows extended periods prior to these dates where the PC2 2035 annual 95th percentile nitrate-NN target and/or minimum flow targets were not met. Wet winters that combine elevated flow and nitrate are the biggest challenge to meeting this PC2 target (e.g., winter 2018). Winter 2025 included the longest duration of elevated flow since 2018; however, targeted TSA still resulted in all monthly nitrate-NN concentrations achieving the PC2 2035 annual 95th percentile nitrate-NN target.

Updates on electric fishing surveys, environmental DNA (eDNA) monitoring and biodiversity enhancements to complement Windermere TSA are presented in Section 4.2 of HHWET, 2025. The most significant challenge to TSA for other drains is consenting the water take (even as a non-consumptive use), due to the over-allocated status of the relevant groundwater allocation zones. Supplementary take consents to existing irrigation consents have been considered but their potential is limited by consented annual totals and high demand periods for both uses occurring at similar times.

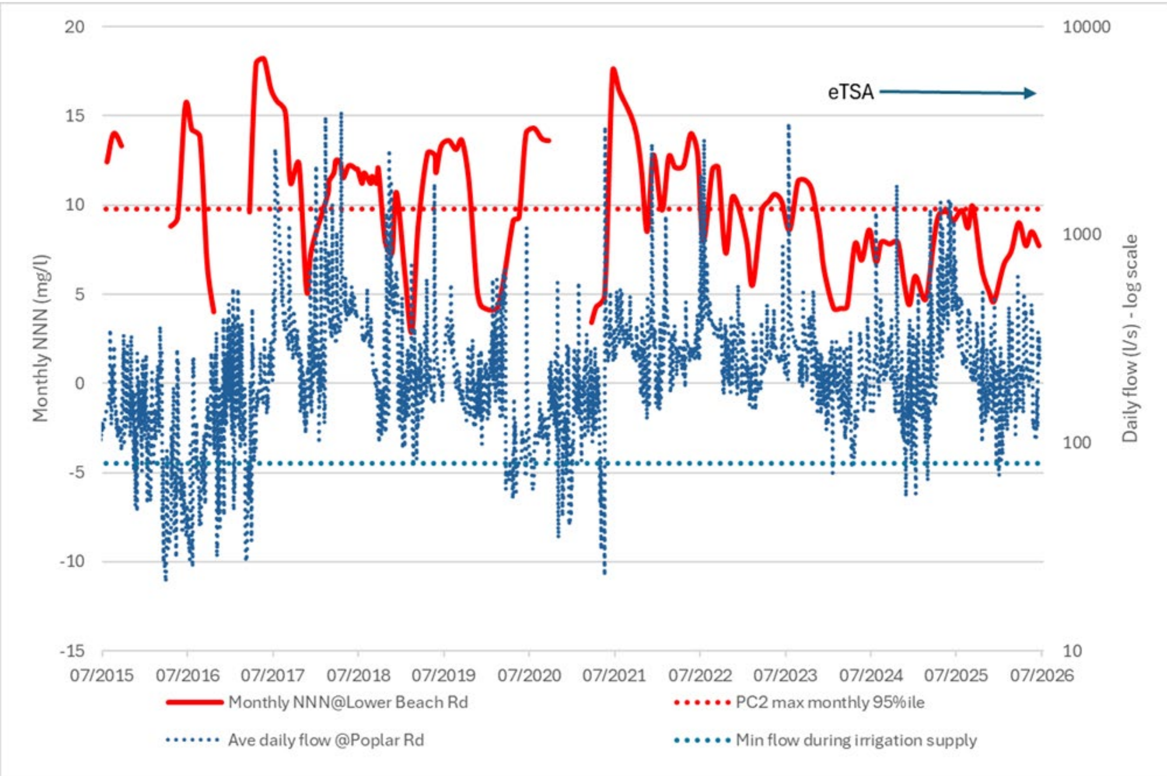

Figure 4-5: Windermere Drain monthly NNN and daily flow monitoring, with the enhanced TSA (eTSA) project beginning in May 2024 (Source: CRC, MHV Water)

4.3 Constructed wetlands

Wetlands and bioreactors convert nitrate to nitrogen gas via biological processes. This conversion releases the nitrogen gas into the atmosphere, decreasing nitrate concentrations in the water without requiring an external source of low nitrate water. Natural wetlands historically covered parts of the lower Hekeao/Hinds Plains as well as areas around the Hekeao/Hinds River. Constructed wetlands provide improved nitrate conversion rates over natural wetlands due to their tailored design. Bioreactors also provide high nitrate conversion rates using an even smaller land footprint.

During 2025/26, HHWET supported the conclusion of a three year project to trial the eClean bioreactor in a rural waterway. Nitrate removal efficiency by the bioreactor ranged from 30-60%, with removal rates positively correlated to water temperature (i.e., increased removal rates with increased water temperature). Operations were significantly constrained by design challenges (e.g., intake resilience and power supply continuity) and the bioreactor was removed in autumn 2026 at the conclusion of the project.

During 2025/26, HHWET also continued to support the pilot scale lower Hekeao/Hinds constructed wetland (on Wairuna Farm beside Montgomery’s Drain) by designing and beginning assessments for a larger stage 2 wetland. HHWET also supported the design of a constructed wetland fed by springs that supply a tributary to Northern Drain and led the development of a constructed wetland on Wairepo Farm beside O'Shaughnessy's Drain at New Park Road (see Figure 4-6). The Wairepo wetland was chosen by Environment Canterbury as one of three Canterbury constructed wetlands to go through a new streamlined approvals process. It is expected to be constructed in late spring 2026.

PRELIMINARY WETLAND DESIGN PARAMETERS	
DESIGN FLOW	4 - 7 L/s
MINIMUM SURFACE AREA	3,500 m²
MINIMUM OPERATING VOLUME	950 m³
RETENTION TIME	2 DAYS
MAXIMUM FLOW	10 L/s
OPERATING DEPTH	0.3 m
FOREBAY VOLUME	280 m³
PROPOSED PLANTING DENSITY	1-2 PLANTS/m²

Figure 4-6: Concept design for Wairepo constructed wetland (Source: HHWET)

5 HHWET Purposes and Objectives

5.1 Review of HHWET Purposes

HHWET Purposes were reviewed in May 2025, with the aim of clarifying some of the original terminology. 2026 HHWET purposes, with amended wording in **bold** are:

1. To improve the quality and quantity of water in the **Hekeao/Hinds Plains**.

2. To reduce or maintain groundwater nutrient levels in the **Hekeao/Hinds Plains** in accordance with regulatory requirements and community determined targets.

3. To investigate and action methods for improvement of the environment within the **Hekeao/Hinds Plains** by implementing strategies that can improve and enhance water quality.

4. To investigate and promote the availability of water in a manner which will reduce the detrimental impacts within the **Hekeao/Hinds Plains**.

5. To encourage the better management of water resources in the **Ashburton** District. To educate the public, farmers, and the community on the appropriate methods to be used to reduce pollution of water, to improve the quality of water, and to protect the environment against the degradation from the improper use of water.

6. To **enhance** groundwater levels in the **Hekeao/Hinds Plains**.

7. To enhance lowland stream flows and biodiversity **in the Hekeao/Hinds Plains**.

8. To ensure that the **Hekeao/Hinds Environmental Enhancement Scheme** is affordable and cost effective to the **Hekeao/Hinds Plains** community.

5.2 Review of HHWET 2025/26 achievements

HHWET objectives are set annually in five subject areas. HHWET 2025/26 objectives were met except for those influenced by consenting delays. Year 10 (2025/26) achievements are summarised as follows:

1. Governance
    a. Monthly HHWET meetings took place (except January), attended by HHWET Trustees, Mid Canterbury Catchment Collective representatives, a CSI Fish and Game observer, the HHWET Executive Director and contracted minutes secretary.
    b. An annual public meeting and multiple Hekeao/Hinds Science Collaboration Group meetings (for the 'Missing N' VMS project) took place.
    c. HHWET Purposes and Objectives were reviewed and amended for the 2026/27 Business Plan.
    d. A Licence to Use MHV's Valetta Pond 3 was confirmed and a Joint Venture Agreement was signed with ECGIS for the Windermere TSA solar array. The HHWET-RDRML Access Agreement and HHWET-MHV Operations Agreement were reviewed and amended.
    e. HHWET's targeted rate funding approach was reviewed.

2. Communications
    a. The HHWET website (www.hhwet.org.nz) was overhauled, while the Facebook page (@HekeaoHindsWET) and LinkedIn page (www.linkedin.com/company/hekeao-hinds-water-enhancement-trust) were kept low key through the Environment Court process.

b. The HHWET Communications Plan key messaging was reviewed and updated.

c. Wider communications were achieved through 7 presentations/articles relevant to the wider community, plus 6 presentations/articles relevant to the farming community, and leadership of and/or contribution to 14 wider public communications (including a feature article in Irrigation Leader magazine).

3. Enabling Regulatory Environment

a. The following consents were granted in April 2025, appealed in May 2025 and heard in the Environment Court in June 2026:

i. CRC233041, for use of up to 3200 l/s surface water for MAR purposes, supplementary to RDRML consent CRC182542.

ii. CRC233046, to discharge up to 3255 l/s at up to 34 Managed Aquifer Recharge (MAR) sites (including 14 of the current MAR test sites).

iii. CRC233851, to discharge up to 410 l/s at Near River Recharge Site #1 (NRR1).

iv. CRC233852, to undertake works in the bed of the Hekeao/Hinds River (for NRR site construction).

v. CRC233853, to discharge up to 200 l/s in total at NRR2 and NRR3.

b. Environment Canterbury confirmed non-enforcement following expiry of CRC210702, which enabled continued operations of the 14 current MAR test sites during the relevant Environment Court process.

c. ADC approval was received for the MAR01 planting plan under Section 10.1.15.3 of the ADC Water Races Bylaw 2019.

d. A consent application for a constructed wetland beside O'Shaughnessy's Drain at New Park Road progressed through Environment Canterbury's new streamlined approvals process.

4. Access to water

a. The HHWET-RDRML Water Supply Agreement extension to cover generation shutdown was in place, subject to conclusion of current consenting processes.

5. Proof of concept

a. Approval process were updated for priority new MAR/NRR sites.

b. Updated Health and Safety documentation was added to all construction documentation.

c. Targeted *E. coli* analysis and discussions took place with catchment groups and landowners.

d. HHWET are a project partner in the trialling of the eClean bioreactor in Hekeao/Hinds. During 2025/26, the project concluded and the bioreactor was removed.

e. The Windermere Drain enhanced TSA project with ECGIS resulted in the achievement of the monthly 2035 PC2 nitrate-NN target for the second year in a row. 2025/26 was also the best year to date for Windermere Drain annual median nitrate-NN (7.7 mg/l), which is only 11% above the 2035 PC2 target.

f. In three out of the last four years, MAR01-influenced average groundwater nitrate-N has been less than 2 mg/l (as measured in the 29 m deep monitoring well BY20/0152).

g. Annual median shallow groundwater nitrate-N was 6% lower than 2024/25, as calculated from approximately 80 bores monitored quarterly.

h. HHWET actively participated in the development and progression of a co-operative approach to future management of Hekeao/Hinds Plains water races for stockwater, environmental and amenity purposes.

i. Justin Legg's PhD supervision continued.

j. Three potential lower catchment constructed wetland concepts were progressed.

6. <u>Collaboration</u>

a. Oversight of the Hekeao/Hinds Science Collaboration Group continued, focussed on progression of the Radiometric Surveys and 'Missing N' Vadose zone Monitoring System (VMS) projects.

b. HHWET were a project partner with Kanuka Trust, EOS Ecology, Mayfield School and Hinds School for "Hekeao Hinds River Catchment Project: Discovering your local waterway from mountains to sea".

c. HHWET's successful application to Air NZ's Every Corner Project provided $15,000 funding for new native plantings at NRR1 with Mayfield School. Total NRR1 plantings exceed 25,000, with significant self-seeding of native plants further increasing forested area. A flock of South Island Pied Oystercatcher spent winter 2026 at NRR1, joining other significant recent bird sightings near NRR1 (Australasian Bittern, Marsh Crake, Bellbird, Kingfisher, and White Heron).

5.3 HHWET 2026/27 Objectives

HHWET's next steps were determined in May 2026 by confirming the following objectives through to 30 June 2027, along with a commitment to continue the ICM approach presented in Figure ES 1-1 (Executive Summary) for the achievement of the Hekeao/Hinds Environmental Enhancement Scheme presented in Figure ES 1-2:

1. <u>Governance</u>

a. Long term agreements in place with Hekeao/Hinds Environmental Enhancement Scheme operators (monitoring and distribution), partners and landowners.

b. HHWET Purposes and Functions reviewed on an annual basis.

c. HHWET documentation that aligns with current regulations and requirements.

d. Annual report and annual accounts externally reviewed on an annual basis.

e. HHWET Trust Deed reviewed every even numbered year.

f. HHWET targeted rates reviewed the year prior to every Long Term Plan funding cycle.

g. HHWET Executive Director performance review completed annually by May HHWET meeting.

h. HHWET AGM held before September HHWET meeting.

i. HHWET Trustee's term of office reviewed annually by AGM.

j. HHWET sites' benefit:cost ratio reviewed annually.

2. <u>Communications</u>

a. Communications Plan (including at least one public meeting annually) reviewed and updated on an annual basis.

   b. Communication opportunities identified and actioned (including local organisations, educational institutions, tangata whenua, media, and conferences).

   c. Engage with and inform district, regional and national freshwater processes where relevant.

3. Enabling Regulatory Environment

   a. Long term HHWET Ltd take, use and discharge consents confirmed for a combined maximum MAR/NRR flowrate contribution to the Hekeao/Hinds Environmental Enhancement Scheme of at least 3700 l/s (equivalent to a maximum of 117 million m^3/year).

   b. Consents confirmed for Targeted Stream Augmentation, Constructed Wetland and Bioreactor concepts as required to support Hekeao/Hinds Environmental Enhancement Scheme implementation.

   c. Additional consents and approvals (e.g., construction consents and Flood Protection Bylaw Authorities) secured as required.

   d. Additional permissions (e.g., DOC) secured as required.

4. Access to water

   a. Long term agreements in place with parent consent holders for MAR/NRR supply flowrate of at least 3700 l/s (including a Water Supply Agreement with RDRML for unconstrained water).

5. Proof of concept

   a. Operational MAR/NRR sites in target areas with demonstrated potential to recharge a combined flowrate of at least 2500 l/s (equivalent to a maximum of 79 million m^3/year).

   b. Monitoring Plan reviewed and updated on an annual basis.

   c. Methods of managing bacterial contamination and suspended sediment to reduce MAR/NRR supply shutdowns reviewed and updated on an annual basis.

   d. Hekeao/Hinds Environmental Enhancement Scheme infrastructure in place that provides compliant, safe, efficient, and reliable operation.

   e. Groundwater Irrigation Nutrient Recycling concept actively supported through development and implementation.

   f. Targeted Stream Augmentation concept actively supported through further development and implementation (including implementing the Windermere Solar Array Joint Venture with Eiffelton Community Group Irrigation Scheme).

   g. Constructed wetland and bioreactor concepts actively supported through further development and implementation.

   h. Additional research and development concepts relevant to HHWET Purposes actively considered.

6. Collaboration

   a. Collaborative opportunities actively sought with potentially complementary groups.

   b. Actively engage with stakeholders to ensure strong relationships which foster a high level of trust and collaboration.

   c. Site co-benefits identified and actively implemented on a site-by-site basis, seeking external funding support where possible.

d. Support (including supervision) provided for tertiary and post-graduate students where their subject matter is relevant to Trust Purposes and Objectives.

e. Collaborate with local catchment groups in areas of mutual interest and provide technical support as agreed.

f. Collaborate with ADC, local water infrastructure entities and community interests on future management options for Hekeao/Hinds Plains water races.

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