



2024

CENTRAL PLAINS WATER TRUST.  
**Sustainability Report**

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# THE TRUST'S ROLE IN MONITORING PERFORMANCE

Central Plains Water Trust (the Trust) is actively developing a plan to align with the strategic initiatives of Central Plains Water Limited (CPWL).

## THIS PLAN WILL FOCUS ON:

- Defining desired ecosystem health outcomes tied to measurable indicators (e.g., nutrients, *E. coli*).
- Tracking trends in wildlife survey data (e.g., birds, reptiles, native fish) conducted by or on behalf of CPWL.
- Creating a photographic catalogue of critical species to educate stakeholders.
- Expanding highlights of the Near River Recharge project and presenting measurable data on its performance and global significance.
- Assessing the number of actions required to achieve environmental targets, including evaluating project impacts over time.
- Investigating the cost-effectiveness of current mitigation strategies and identifying what works best and why.
- For the target of a 30% nitrate-N reduction, determining:
  - The number of samples required to detect changes within 5, 10, or 20 years.
  - The distribution of lag times between actions and measurable improvements.
- Evaluating progress toward surface and groundwater quality goals in preparation for the scheme's consent review by Environment Canterbury in 2047.
- Exploring how CWPT can assist in securing consent beyond 2047.



CPWL Scheme area.



# FACILITATING SUSTAINABLE WATER.

## CHAIRS FOREWORD

The Central Plains Water Trust 2024 Sustainability Report has been prepared by the Trust. Established by the Settlor Councils (Christchurch City Council and Selwyn District Council), the Trust holds resource consents on behalf of the community and licenses these to CPWL to operate the Central Plains Water Enhancement Scheme for its shareholders.

The Trust's objective is to promote sustainable development of the region's water resources, supporting agricultural and horticultural diversity in the Central Canterbury Plains while fostering ecological, social, and recreational values across the region.

To achieve this, the Trust regularly reports to the Settlor Councils and keeps their representatives informed about the performance of CPWL. It also reports on the conditions and outcomes outlined in the Statement of Intent set by the Settlor's representatives.

Among the Trust's key goals is promoting the long-term sustainability of the region's water resources. Through its oversight role, the Trust ensures that CPWL builds and maintains resilient, intergenerational infrastructure while striving for efficiency and leveraging data for continuous improvement.

One of the main requirements of the Trust's oversight is the production of a Sustainability Report, which consolidates data to assess progress against environmental targets. This report provides an independent analysis of the scheme's effects and performance across various metrics derived from resource consent conditions and CPWL's strategic documents.

This year, the Trust evaluated CPWL's strategic goals and developed action plans to align and assess the performance of the two key initiatives with the Trust's objectives (*Strategic Initiatives*). A work plan is currently being developed around these actions.

# STRATEGIC INITIATIVES

The Trust has assessed alignment with CPWL's 100-Year Strategy (see Table below) and is actively exploring how elements within this strategy can inform the development of a comprehensive action plan. This will guide the Trust in advancing its commitment to promoting sustainable development of the region's water resources.

INTERGENERATIONAL INFRASTRUCTURE	We build and sustain resilient intergenerational infrastructure striving for efficiencies and leveraging data for continuous improvement.	TRUST'S ROLE AND ACTIONS
CLIMATE RESILIENCE	Engage with regional leaders (industry and regulator) to co-develop a climate resilience strategy (water/energy/food/transport).	<ol style="list-style-type: none"> <li>1. To participate, engage and reflect the sector's view on climate resilience over the next 100 years.</li> </ol>
<b>SUSTAINABILITY</b>		
CULTURE	<b>Quantify the environmental benefits of CPWL Scheme as:</b> <ul style="list-style-type: none"> <li>• Groundwater vs Surface water usage data</li> <li>• Reduction in N lost below the root zone</li> <li>• Area of land managed under CPWL Farm Environment Plans</li> <li>• Utilisation of soil moisture monitoring.</li> </ul>	<ol style="list-style-type: none"> <li>2. Check the quality of data gathering and reporting aligns with community needs.</li> <li>3. Champion the collection, stewardship, and use of environmental data in an accessible datahub.</li> </ol>
BENEFITS	<ul style="list-style-type: none"> <li>• Identify community and shareholder benefits.</li> <li>• UNSDG reporting.</li> </ul>	<ol style="list-style-type: none"> <li>4. Identify community and stakeholder needs.</li> <li>5. Help identify appropriate metrics for UNSDG reporting.</li> </ol>
PERFORMANCE	<ul style="list-style-type: none"> <li>• Percentage of A grade audit results.</li> <li>• Bird Surveys.</li> <li>• Water quality and water quantity data and trends.</li> <li>• Develop and implement performance software to improve water take oversight.</li> <li>• CPWL report on scheme performance against Selwyn Waihora Zone Implementation Plan.</li> </ul>	<ol style="list-style-type: none"> <li>6. Check the quantity and quality of environmental performance meets community and stakeholder needs and recommend changes if needed.</li> <li>7. Monitoring of collected Biodiversity information.</li> <li>8. Align performance to actions taken via Farm Environment Plans to give shareholder confidence that actions are leading to water quality improvement.</li> </ol>

# THE BENEFITS OF CENTRAL PLAINS WATER LIMITED

Central Plains Water Limited (CPWL) supplies sustainable water to support agriculture, cropping, and seed production across 45,000 hectares of Canterbury farmland, enabling diverse farming, and strengthening food production.

CPWL prioritises environmental stewardship, monitoring water use and adhering to strict resource consents. By collaborating with regulators and observing to high environmental standards, CPWL ensures sustainable water management for future generations.

### IMPACT 1:

**50–70**  
Million m<sup>3</sup>  
Annually

With CPWL's provision of water, farmers have ceased abstracting 50–70 million m<sup>3</sup> of groundwater annually from central Canterbury aquifers.

### IMPACT 2:

**29%**  
Less  
Nitrogen

29% reduction of nitrogen below the plant root zone from CPWL farms.

### IMPACT 3:

**\$364**  
Million

In 2024, CPWL contributed \$364 million to Canterbury's GDP and generated 2045 jobs for the Canterbury region, while supporting many local community projects\*

### IMPACT 4:

**100%**  
FEP'S

100% of CPWL shareholder farms have a FEP. CPWL supply irrigation to 45,000 hectares, but manages the FEP's for 71,000 hectares of shareholders' land.

Source:  
2024 BERL report.

# CPWL'S IMPACT ON ECONOMIC GROWTH

Recent analysis by the AgriBusiness Group Ltd highlights the impact of CPWL irrigation. On 23,564 hectares of former dryland, irrigation has nearly doubled beef production, increased grain yields by a third, and boosted milk output from 34 million to 475 million litres annually, driving regional economic growth.

WITHOUT  
CPWL  
WATER



33.89

Million  
Litres  
Milk

0.86

Million  
Kilograms  
Beef

9.41

Million  
Loaves  
Bread

WITH  
CPWL  
WATER



475.46

Million  
Litres  
Milk

2.08

Million  
Kilograms  
Beef

12.29

Million  
Loaves  
Bread

NET GAIN  
FROM CPWL  
SCHEME



441.57

Million  
Litres  
Milk

1.22

Million  
Kilograms  
Beef

2.88

Million  
Loaves  
Bread

Source:  
The AgriBusiness Group Ltd.



## MONITORING PERFORMANCE

CPWL engages an Avifauna Ecologist to monitor bird populations around the Rakaia and Waimakariri River intakes. Conducted annually from September to February, these surveys identify breeding birds, ensuring the protection of these ecologically significant treasures for future generations.





Photo Credits: Peter Langland, Vaughan Morsley, Rob Lawrence

## BIRD SURVEYS: Safeguarding Avian Treasures

Within the scheme area, particularly around the operational zones near the Rakaia and Waimakariri River intakes, CPWL is committed to safeguarding colonies of key avian species. These include the South Island pied oystercatcher (Tōrea), black stilt (Kakī), pied stilt (Poaka), wrybill (Ngutuparore), banded dotterel (Pohowera), black-billed gull (Tarāpuka), white-fronted tern (Tara), and black-fronted tern (Tarapirohe).

All surveyed bird species are classified as either nationally threatened or at risk, highlighting their ecological significance and the need for monitoring.

### IMPACT 1:

Through meticulous bird surveys, CPWL track and record breeding bird numbers and nesting colonies. Each CPWL finding is carefully mapped to inform strategies.

### IMPACT 2:

CPWL takes active steps to minimise disturbances and enhance breeding conditions, supporting population stability for these species.

All these birds are considered taonga species holding deep cultural, spiritual, historical, and traditional significance.





Photo Credits: Peter Langland, Vaughan Morrissey, Rob Lawrence

## SIGNIFICANT IMPACT

### Lake Ellesmere/Te Waihora

Established as part of consenting requirements, the CPWL EMF, Lake Ellesmere Te Waihora Environmental Management Fund, and Lake Ellesmere Te Waihora Sea Openings Fund have played a pivotal role in creating intergenerational gains from the mountains to the sea ki uta ki tai.

Lake Ellesmere/Te Waihora is a coastal treasure, fed by the Selwyn River, lowland streams, and the regional groundwater system. Recognised as a wetland of international significance, it holds immense cultural and ecological value as a taonga.

#### IMPACT 1:

Through the CPWL EMF, Lake Ellesmere Te Waihora Environmental Management Fund, and Lake Ellesmere Te Waihora Sea Openings Fund CPWL has contributed **\$350,000** to restoration initiatives, with an additional **\$160,000** allocated for facilitating lake openings—a vital practice in maintaining the lake's ecosystem.

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#### SEA OPENINGS:

Lake openings are carefully timed to support seasonal fish migrations. Tuna (eels) migrate between April and June, while species like flounder, whitebait, and sea-run trout enter the lake from September to October. Salmon runs occur from late November through March.

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#### COMMUNITY IMPACT:

These efforts support traditional food-gathering practices, such as collecting swan's eggs, and help maintain the lake's ecological balance. Managing water levels prevents wetland margins from drying in summer and mitigates flooding risks that can impact land, drain networks, and infrastructure.



# FARM ENVIRONMENT PLANS

Farm Environment Plans (FEP'S) are a requirement under discharge consent CRC165686. The FEP is audited, these audits assess whether farms are achieving Good Management Practice (GMP). Farms that receive an A or B grade benefit from an extended audit interval.

Each CPWL farm must maintain an up-to-date FEP, the template that the FEP is on (not the completed farm FEP itself) must be approved by the Canterbury Regional Council's Chief Executive.

All CPWL farms are audited by an independent auditor, separate from the farm's advisors or preparers of the FEP. The auditor must assess the farm's compliance with GMP and assign a grade based on their confidence in the farm's performance. If any aspect of the FEP receives a low or medium rating, the auditor outlines the necessary actions and deadlines for improvement. Failure to meet these actions by the next audit results in an automatic C grade.

## IMPACT 1:

All CPWL shareholders maintain an FEP.

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## IMPACT 2:

99.3% of these plans have received an A or B grade from independent auditors, demonstrating GMP is being implemented in a timely manner (as defined by Environment Canterbury).

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# FARM AUDIT GRADES

Farms with an A or B grade must be re-audited within 12 months if the farm manager or the farming system changes, such as conversions between different operations (e.g., dairy to cropping) or the introduction of new livestock types (e.g., deer or wintering dairy cows).

## A GRADE:

The farm is compliant and achieving GMP, with the next audit due in 4 years.

## B GRADE:

The farm is compliant and on track to achieve GMP, with the next audit due in 2 years.

## C GRADE:

The farm is non-compliant and not achieving GMP, with the next audit due in 12 months.

## D GRADE:

The farm is in serious non-compliance, with the next audit due in 6 months.

# CPWL NUTRIENT TARGETS AND BUDGETS.

Nitrogen loss below the root zone across our FEP management area has reduced by 29% since 2015, demonstrating the positive impact of land management at scale.

As part of the Canterbury Land and Water Regional Plan (Plan Change 1), the Selwyn Waihora Water Zone Committee, with input from the community, developed a package of actions including restricting the agricultural nitrogen load losses from the catchment. For farms in the Selwyn Waihora catchment, further reductions were required from 1 January 2022.

A nutrient budget is a modelled calculation of a farm's nitrogen losses. Nutrient budgets are updated each year to show a trend and to understand how each farm's nitrogen loss has changed compared with nitrogen losses for the period 2009–2013 (or when the farm commenced irrigating, if later).

The amount a farm must reduce their nitrogen loss by is based on their land use. In total, CPWL shareholder farms have reduced nitrogen loss below the root zone by 29% compared to pre-scheme nitrogen loss. A wide range of farming practices have been implemented to enable this reduction.

**The most significant impact comes from good management practices such as:**

- Reducing fertiliser use.
- Improving effluent management.
- Improving irrigation practices.

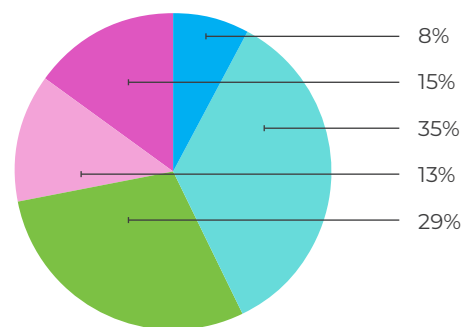
## IMPACT 1:

29% Less nitrogen lost below the root zone compared to pre-CPWL

## IMPACT 2:

Through the Environmental Management Fund, CPWL has accessed grants enabling farmers to access Ballance MitAgator farm maps. These maps improve on Overseer modelling by identifying critical areas of nitrogen, phosphorus, sediment, and E. coli loss, allowing targeted, cost-effective mitigation actions. Data shows that targeted actions are seven times more cost-effective than untargeted approaches (Figure 1)<sup>1</sup>.

## EXAMPLE MITAGATOR NITROGEN RISK MAP



**Total Loss = 15,230 kg N/yr**  
**Total Loss Rate = 39 kg N/ha/yr**

**Figure 1 Map of the risk of nitrogen loss rates.**

(Green = Very Low. Light Blue = Low. Blue = Medium. Light Pink = High and Pink = Very High. Corresponding to rates of 0-8, 8.1-16, 16.1-24, 24.1-32, and >32, respectively).

# SURFACE AND GROUND WATER

Monitoring surface and groundwater quality is essential to understanding the environmental impact of the CPWL. By collecting extensive data and analysing trends, the scheme provides insights into key water quality indicators, identifies areas requiring action, and supports sustainable water management across the region.

## IMPACT 1:

CPWL has conducted nearly 3,500 water samples across 60 ground and surface water sites since 2014. This extensive monitoring is designed to assess the scheme's impact on water quality and trigger necessary actions.

## IMPACT 2:

Nitrate-N concentrations exceeding trigger concentrations for further investigation were observed in four bores within stage one of the scheme. These concentrations are within the range seen prior to the scheme's operation, but statistical evaluation is limited due to insufficient data. Additional data collection is underway to establish (at least) five-year medians for the remaining scheme areas.

## IMPACT 3:

Groundwater nitrate-nitrogen trends over the past decade show most concentrations are increasing at a rate comparable to those monitored by Environment Canterbury. Detailed trend likelihoods are presented in Table 1.

**Table 1:**

Likelihood of Increasing or Decreasing Trends in Groundwater Nitrate-Nitrogen Concentrations (2014–2024)<sup>2</sup>.

CONCENTRATION (mg L <sup>-1</sup> Nitrate-Nitrogen)	ENVIRONMENT CANTERBURY WELLS (%)	CPWL WELLS (%)
VERY LIKELY INCREASING	42%	45%
LIKELY INCREASING	16%	20%
INDETERMINATE	20%	5%
LIKELY DECREASING	11%	10%
VERY LIKELY DECREASING	21%	20%
NUMBER OF WELLS	19	20

## IMPACT 4:

Anecdotal evidence suggests improved groundwater quality in the last five years in bores beneath the oldest parts of the scheme. A breakdown of short-term trends is provided in Table 2. Trends are not to be considered certain owing to the brief time span of analysis (5 years), the strong likelihood of climatic variability and the influence of lag times.

**Table 2:**

Short-Term Trends in Groundwater Nitrate-Nitrogen Concentrations (5-Year Analysis)<sup>2</sup>.

CONCENTRATION (mg L <sup>-1</sup> Nitrate-Nitrogen)	2014–2024 (%)	2014 –2019 (%)	2019–2024 (%)
VERY LIKELY INCREASING	45%	55%	10%
LIKELY INCREASING	20%	15%	5%
INDETERMINATE	5%	15%	25%
LIKELY DECREASING	10%	10%	15%
VERY LIKELY DECREASING	20%	5%	45%
NUMBER OF WELLS	20	20	

## IMPACT 5:

Median nitrate-nitrogen concentrations at ten riverine sites exceeded concentrations designed to trigger further investigation and action.

## IMPACT 6:

In Lake Ellesmere/Te Waihora, mid-lake chlorophyll-a concentrations and the Trophic Lake Index score exceed trigger levels, indicating the need for further investigation into potential causes.

# NEAR RIVER RECHARGE: Delivering climate resilience in Selwyn/Waihora

The Selwyn Waihora water zone extends from the alpine rivers and high country of the Waimakariri Basin and Lake Coleridge to the wetlands of Te Waihora/Lake Ellesmere. The vision for the zone is to protect its alpine rivers and high-country values, restore the mauri of Te Waihora, and support a prosperous land-based economy.

The Near River Recharge (NRR) project is a globally unique innovation designed to replenish declining groundwater resources in the Selwyn Waihora area. The project supports climate resilience and ensures sustainable water management in one of Canterbury's most critical regions.

Most Canterbury Plains rivers and streams sit on a large bed of leaky gravel, naturally recharging connected aquifers when flowing. The NRR project enhances this process by channelling clean water through constructed leaky basins during periods of low river flow.

CPWL's run-of-river water supply has significantly reduced reliance on groundwater abstraction, with shareholders switching to run-of-river water and in doing so achieving reductions of 50–70%. This shift has allowed streams across the region to flow more consistently, reducing pressure on groundwater resources.

Supported by government environmental agencies, local schools, and CPWL, the NRR project has not yet been utilised, it stands as a tool for future climate resilience. Strategic native plantings further enhance biodiversity, creating a healthier ecosystem.

Through the CPWL Educational Grant, students from Greendale School have been using the NRR as an extension of their classroom. Initiatives like hands-on monitoring of freshwater invertebrates, supported by EnviroSchools.



Students from Greendale school gathering data on invertebrate numbers in the Selwyn River NRR.

# LAG TIMES

## UNDERSTANDING LAG TIMES AND TRENDS

Lag times—the delay between implementing farm practices and detecting changes in water quality—play a crucial role in monitoring and managing the environmental performance of CPWL.

Trends in nutrient concentrations, such as nitrate-N, provide valuable insights into where action is needed. Increasing trends signal areas for intervention, while improving trends reinforce the value of good practices.

However, using trends to detect CPWL's impact can be challenging due to variations caused by dry or wet years and lag times in groundwater and surface water responses. Tools are now available to assess lag times and whether the number of samples collected is sufficient to determine changes despite natural variability 3.

## UNDERSTANDING THE EFFECTS OF TIME LAGS

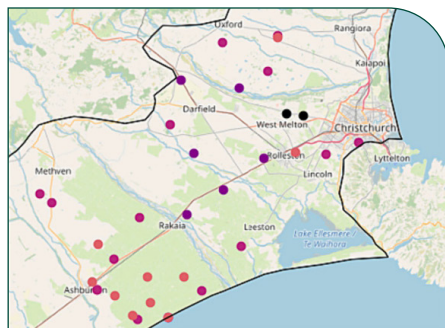
For instance, reducing nitrate-N concentrations by 30% may take over 30 years to become evident in deeper bores, where lag times are long. In contrast, many of the scheme's shallower bores have shorter lag times, meaning changes could be detected sooner. An example is shown in Figure 2, illustrating the likelihood (80%) of detecting a 30% reduction target over 10 years with seasonal sampling in groundwater.

Efforts should focus on:

1. Determining the age of water in shallow bores to better estimate lag times.
2. Ensuring sufficient samples are collected to meet stakeholder expectations regarding nutrient reductions within acceptable timeframes.

## TYPICAL REDUCTIONS

No Lag



With Lag

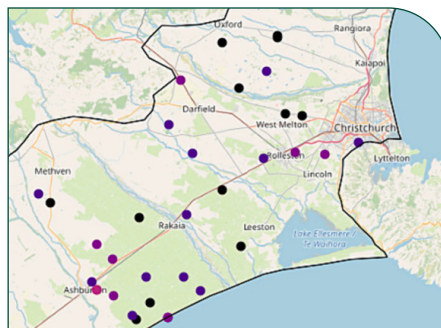


Figure 2.

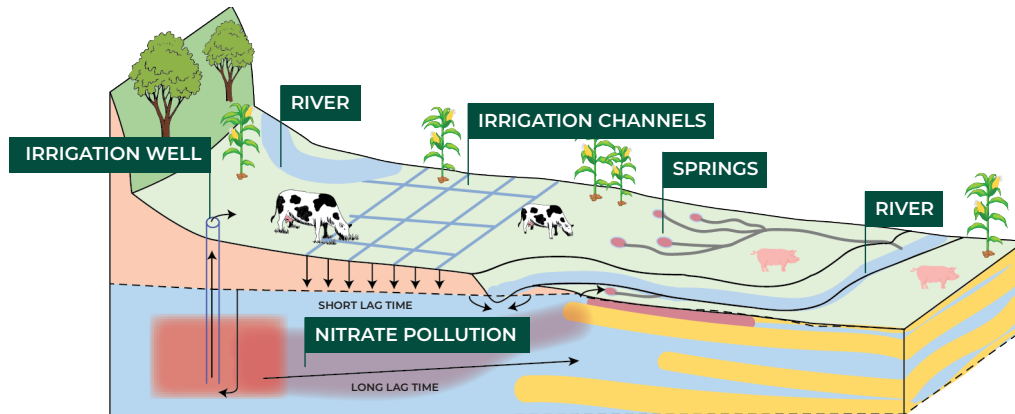
Years to 80% chance of detecting change with 4 samples per year





# LINKING DATA TO FARM ACTIONS

These insights are critical for guiding actions outlined in FEP'S. By monitoring, implementing, and evaluating these plans, farm actions can be linked improvements in catchment water quality. This helps farmers understand when positive changes in water quality can be expected and ensures transparency in performance reporting.



Graphic adapted from Rotiroti et al.<sup>4</sup>.

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## ENVIRONMENTAL MANAGEMENT FUND

The Environmental Management Fund is administered and overseen by an independent committee appointed for this purpose. The committee is made up of representatives of Selwyn District Council, Environment Canterbury and Community interests. The committee is Chaired by ex-Trustee Olive Webb and each year considers a number of applications to make meaningful environmental enhancements to the area. In 2023-24 there were 12 grants made from applications received. In total \$92,852.87 was distributed. These grants were spread geographical across the Selwyn area with community groups such as Ta Ara Kakariki and Canterbury Gliding Club and many individual farmers being successful.



# REFERENCES

1. McDowell, RW (2014) Estimating the mitigation of anthropogenic loss of phosphorus in New Zealand grassland catchments. *Sci. Total Environ.* 468-469, 1178-1186.
2. Rutter, H (2024) CPW: Additional Nitrate Analysis. 19 p. Lincoln Agritech, Lincoln, New Zealand.
3. Dumont, M, Etheridge, Z, McDowell, RW (2024) Determining the likelihood and cost of detecting reductions of nitrate nitrogen concentrations in groundwater across New Zealand. *Sci. Total Environ.* 927, 171759.
4. Rotiroti, M. et al. Groundwater and surface water nitrate pollution in an intensively irrigated system: Sources, dynamics and adaptation to climate change. *Journal of Hydrology* 623, 129868 (2023).

## ADDITIONAL INFORMATION:

Central Plains Water Limited 2024 Annual Report  
<https://cpwl.co.nz/resource-centre/company-resources/>

Annual Ground and Surface Water Monitoring Report 2022/2023  
<https://cpwl.co.nz/resource-centre/company-resources/>

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