Waimate District
Climate Resilience Strategy

Briefing notes for Water Management Action Plan Workshop

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Waimate District Council

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Below is a summary of the relevant Government Policies with associated links to help you make an informed decision when contributing to our online survey or workshop for our Water Management Action Plan as part of our community engagement for our District's Climate Resilience Strategy.

Key policy documents pertaining to this Action Plan

Emissions Reduction Plan (ERP)

https://environment.govt.nz/publications/aotearoa-new-zealands-first-emissions-reduction-plan/

National Adaption Plan (NAP)

https://environment.govt.nz/publications/aotearoa-new-zealands-first-national-adaptation-plan/

Canterbury Climate Change Risk Assessment (CCCRA)

https://www.canterburymayors.org.nz/wp-content/uploads/Canterbury-CCRA-Report_FINAL_V5.0.pdf

Water Management Action Plan: Outcomes

- Reduce Water management related carbon emissions and environmental impacts.
- Improve the resilience of Water infrastructure.

ERP / NAP: Goals

1. Reduce the vulnerability of assets exposed to climate change.
2. Ensure all new infrastructure is fit for a changing climate.
3. Use renewal programmes to improve adaptive capacity.

These briefing notes are grouped under our two strategy goals

1. Net zero emissions for the district.
2. Build climate resilience through a just and equitable intergenerational approach to planning and preparing for the impacts of CC.

Background

Water and climate change are inextricably linked. Extreme weather events are making water more scarce, more unpredictable and more polluted. These impacts throughout the water cycle threaten sustainable development, biodiversity, and people's access to water and sanitation.

Flood events can contaminate land and water resources and cause damage to water and sanitation infrastructure. Destruction of vegetation and tree cover exacerbates soil erosion and reduces groundwater recharge, increasing water scarcity and food insecurity.

Growing demand for water increases the need for energy-intensive water pumping, transportation, and treatment. Source: https://www.unwater.org/water-facts/water-and-climate-change

Water is defined in the National Adaptation Plan (p126) as: wastewater, stormwater, drinking water and irrigation networks, including sources of water (eg, dams, rivers, reservoirs and groundwater), and water bodies into which stormwater and wastewater are discharged.

When it comes to water infrastructure,

The Waimate District has one waste water treatment plant

- 914km of freshwater pipelines
- 48km of waste-water pipelines
- 13km of stormwater pipelines (inclusive of open drains)

Text from: Waimate District Council Stormwater Management Plan for Waimate Township

4.4 Climate Change

Possible climate change outcomes that may impact on stormwater in Waimate include:

- Increased frequency and/or volume of system flooding
- Increased surface flooding and stormwater flows

An allowance for climate change is being adopted into design of new infrastructure, however, there remains the question of whether existing infrastructure with long term life expectancy will be adequate

Key summaries from: The National Climate Change Risk Assessment (NCCRA) (p78-82)

5.6 Built environment | Rohe turanga tangata

Most significant risks	Ratings	
	Urgency	Consequence
Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise.	93	Extreme

Risk summary

All towns, cities and sectors of our economy rely on a safe and secure water supply. Many water supplies are at risk from drought, changes in mean annual rainfall, extreme weather events (including heavy rainfall) and sea-level rise. This risk is likely to increase in the future.

Drought severity will increase in most regions. As well as reducing water availability, drought and higher temperatures can lead to higher demand, which can exacerbate supply issues. Population growth is projected to increase, adding pressure on water supplies.

Sea-level rise (leading to salinity stress) and increases in heavy rainfall (leading to flooding and sedimentation of water sources) are already affecting water quality around New Zealand, and this will likely increase.

For Māori, water is seen as the essence of all life; impacts on water are a significant cultural issue. Some Māori communities also rely on non-reticulated water systems, making them vulnerable to drought and water contamination.

Exposure

Potable water supplies are exposed to drought, changes in mean annual rainfall, heavy rainfall, rising sea levels and salinity stress. Exposure can reduce water availability and quality.

Projections show that droughts will be more severe in most regions. Droughts are likely to be more frequent and intense in already drought-prone areas (Ministry for the Environment, 2018).

While some areas will have less water available annually, others may experience a lack of water during times of need, or seasonally. Since 2014, the number of councils that have set water restrictions has ranged from 44 to 66 per cent annually (WaterNZ, 2015, 2016, 2017, 2018). This is a significant number and, without intervention, will likely increase. Recent droughts have caused significant, recorded decreases in water supplies around New Zealand. In 2010, Northland had the worst drought in 60 years, with record low rainfall causing significant water shortages for rural and urban populations (Northland Regional Council, 2011). Wellington also had a drought in 2013, when the region came close to running out of drinking water (Harrington et al, 2016). During the 2019–2020 summer, Northland had the driest summer on record, causing water shortages throughout the region, as well as in Waikato and Auckland (RNZ, 2020).

Heavy rainfall can lead to the contamination of water supplies that rely on freshwater rivers and lakes. In March 2017, Auckland had three short, intense rainstorms (the 'Tasman Tempest'). These caused sedimentation of water reservoirs, which led to the contamination of a number of dams supplying Auckland's water (Urich, Li and Burton, 2017).

New Zealand has nearly 150 mapped aquifers that provide roughly one-third of its daily supply. Many of these are located along the coast (Pattle Delamore Partners Ltd, 2011). As sea levels rise, coastal aquifers will become increasingly vulnerable to saltwater contamination. Salinisation of coastal aquifers is already occurring in Northland, Auckland, Waikato, Bay of Plenty, Taranaki, Wellington, Tasman, Marlborough, Canterbury and Dunedin (Pattle Delamore Partners Ltd, 2011). Salinity stress and wider groundwater changes will increase the pressure on water security, affecting both water availability and quality (Thorburn et al, 2013).

Sensitivity

Water supplies are sensitive to climate change impacts due to the design, condition and location of infrastructure as well as changes in water availability and demand.

Rising temperatures and drought can increase water demand, both average and peak, as people use more water outdoors. This exacerbates shortages from lower rainfall and higher evapotranspiration (LGNZ, 2019; Paulik et al, 2019a; Paulik et al, 2019b; Hendy et al, 2018; Thorburn et al, 2013). A number of towns in New Zealand do not have water meters or are only partially metered. Managing demand in these towns is therefore more difficult (WaterNZ, 2018). Higher temperatures and drought can also lead to algal blooms, which can contaminate drinking water sources (Ministry for the Environment, Stats NZ, 2020).

Water supplies are generally more sensitive where there is a single source of water, rather than several sources as in Auckland, which has access to dams in the Hunua and Waitākere Ranges, the Onehunga Aquifer and the Waikato River (Watercare, nd).

Rural water supplies are also sensitive to climate change hazards, particularly where reticulated systems are limited or absent (Woodward, Hales and de Wet, 2001). Rural and Māori communities, as well as communities with inadequate resources to import water or pay for private treatment facilities, will be more sensitive to increasing drought (Woodward, Hales and de Wet, 2001).

The potential for water insecurity to affect communities with social inequities or health issues adversely is not well understood in New Zealand. The inquiry into the Havelock North campylobacteriosis outbreak in 2016 illustrates this point, noting that: "unlike in areas where consumers can make their own assessment of risk, drinking water risks are effectively imposed on all consumers by suppliers. The consumer base will include many people who are vulnerable for various reasons, including old age, youth and those who are immunocompromised or suffering from ill health" (DIA, 2017).

Adaptive capacity

In terms of water availability, the adaptive capacity of systems will largely depend on the ability to maintain or enhance supplies and storage, and to manage and reduce per capita demand. Overseas experience has shown that demand can be reduced through interventions such as water efficiency, metering, pricing and behaviour change (Tortajada and Joshi, 2013).

In New Zealand, water is mostly supplied to cities and towns by local authorities (city or district councils), or in some cases, council-controlled organisations. As management of supply is fragmented, improvements in adaptive capacity may continue to be ad hoc around Zealand.

Adaptive capacity is considered lower in smaller communities where infrastructure is already under pressure due to low investment. Climate change will exacerbate these pressures. The cost to upgrade water and wastewater infrastructure to meet current drinking-water standards is estimated at $8 billion (BECA, 2019; GHD et al, 2019).

Consequence

Given the importance of water supplies for communities and business, consequences from impaired supply can be significant, and could arise from a range of climate hazards.

The 'Tasman Tempest' (see above) affected water supply in Auckland and thousands of people across the city. It caused very poor, raw water quality, compromised treatment facilities, and reduced throughput. Watercare called for voluntary water savings of 20 litres per day for residential customers, and ran an engagement campaign with all large commercial users to inform them of issues and encourage voluntary reductions and contingency planning. Through these actions, severe commercial losses and impacts on public health were avoided.

Recent droughts have caused water shortages throughout Waikato, Auckland and Northland, resulting in numerous water reduction advisories and waiting lists for water tank refills of up to five weeks (RNZ, 2020). Water reductions are generally staged, with initial restrictions on public outdoor water use (eg, public parks, sports fields), followed by private outdoor use (eg, gardens) and finally more restrictions on residential and commercial use. The increasing restrictions will have corresponding levels of consequence for community health and wellbeing, and for business operations.

Droughts can also lead to more favourable conditions for algal blooms (influenced by high water temperatures, long residence times and high nutrient concentrations) and poorer water quality particularly in non-reticulated systems (van Vliet and Zwolsman, 2008), as well as in reticulated systems where treatment may be inadequate. This can in turn lead to significant health impacts. While not directly climate change related, the Havelock North event illustrates the potentially severe social consequences of water contamination (DIA, 2017).

Interacting risks

Changes in water availability from drought and lower rainfall will have consequences for all domains. They may contribute to a rise in diseases due to water-borne pathogens or a lack of hygiene (H3) (Hendy et al, 2018). More frequent watering bans and higher prices for water (or the imposition of water prices) and wide-scale shortages in drinking water could exacerbate inequities and create new ones (H2).

Increased human use may degrade rivers, lakes and streams (and associated ecosystems) (N3, N6). However, mitigating impacts on rivers, lakes and streams could also help to reduce the risks to potable water in some areas (N3, N6). The management of water resources could be further challenged by uncoordinated and inconsistent governance between and within levels and agencies of government and private property owners, and the possibility of maladaptive actions (G1, G2). Lower capacity of amenity spaces will compromise human health and wellbeing.

Confidence: High agreement, medium evidence

Overall, there is high agreement that climate change will impact urban and rural water security. There is strong evidence on hazard exposure to water systems. In general, there is strong evidence on the vulnerabilities to water security from climate change, but further research is required to understand community vulnerability to changes in water quality.

Adaptation

Adaptation is variable among the various councils and water supply authorities. Watercare has a climate change strategy, which includes a focus on climate resilience for its network. All authorities actively monitor water availability, demand and quality, and most have prepared demand management plans and drought management plans.

Key summaries from: Canterbury Climate Change Risk Assessment (p38-68)

Canterbury has an extensive groundwater system, with aquifer depths ranging from shallow surface level to over 300 metres (Figure 10.1). These aquifers are recharged from rainfall infiltration with contributions from the alpine and foothill rivers and from other surface water. They eventually discharge into surface water such as lowland springs, wetlands, streams, lakes or directly into the sea.

Canterbury has the country's largest amount of water-related infrastructure assets by asset value. This represents 30% of New Zealand's total water related asset value, which is double that of the next highest Region. Assets include flood control structures, pump stations, erosion protection structures, river structures and dams. New Zealand's flood protection was in the most part built between the 1930's and 1980's, and includes stopbanks, pump stations and river control works. The land that benefits from these systems has been fully utilised across much of New Zealand. Canterbury is no different, using areas of benefit for primary production or urban development (Giberson, 2019).

Table 10.1: Summary of highest risks to wai (water)

Using RCPB.5 (P / M / L)	Higher mean temperatures	Change in mean annual rainfall	Drought	River and surface flooding	Coastal flooding	Increased coastal erosion	Sea-level rise and salinity stresses	Storms and wind	Increased fire-weather	Increasing landslides and soil erosion	Extreme weather events	Reduced snow & ice	Ocean chemistry changes	Marine heatwaves	Climate change
Coastal barriers and sea walls					Low / High / High	Low / High / High	Low / High / High	Low / High / High							
Stopbanks and flood management schemes				Moderate / High / Extreme			Low / Moderate / Moderate								
Groundwater - availability and quality		High / Extreme / Extreme	High / Extreme / Extreme				High / Extreme / Extreme								
Water quality (lakes and rivers)	Low / High / Extreme	Insignificant / Low / High		Low / Low / High			Insignificant / Low / High			Moderate / High / High		Insignificant / Low / High			
Stormwater assets				Moderate / High / High											
Wastewater treatment plants						Moderate / High / High	Moderate / High / High								
Surface water availability and supply		Moderate / High / High	High / Extreme / Extreme									Low / Moderate / High			
Water supply infrastructure				Low / Moderate / High				Low / Moderate / High							

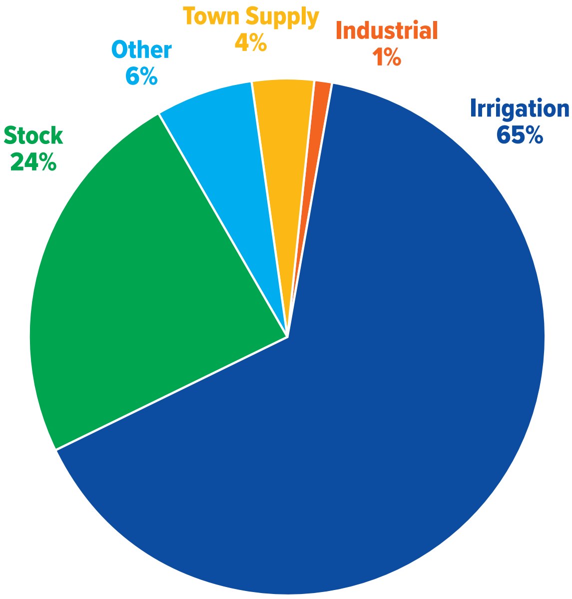
Key

Insignificant · Low · Moderate · High · Extreme · P Present day · M Mid (2050) · L Long (2100)

Table 10.4: Summary of risks to water supply and associated infrastructure

Risk statement	Risk				High level description
	Present	2050 (RCP8.5)	2100 (RCP4.5)	2100 (RCP8.5)	
Risk to water supply infrastructure due to river and surface flooding	Low	Moderate	Moderate	High	The frequency and intensity of storms are projected to increase over time, which may cause increased flooding. High flows, sediment and debris may cause damage and disruption to water supply facilities, particularly above ground infrastructure such as intakes. Poor condition or ageing components may be upgraded to improve resilience. However, the potential to adapt water supply infrastructure may be limited by the need to draw water from exposed locations, and service existing communities.
Risk to water supply infrastructure due to storms and wind	Low	Moderate	Moderate	High	The frequency and intensity of storms are projected to increase over time. High flows, sediment and debris may cause damage and disruption to water supply facilities, particularly above ground infrastructure such as intakes. Poor condition or ageing components may be upgraded to improve resilience. However, the potential to adapt water supply infrastructure may be limited by the need to draw water from exposed locations, and service existing communities.

Figure 10.3: Consented water demand by type of use in Canterbury (Land Air Water Aotearoa, 2021).



10.5.1 Irrigation and stock water supply

Climate change will place pressure on surface water and groundwater sources. This is due to a range of projected changes, particularly, changing rainfall patterns, decreases in summertime low flows, decreases in mean annual flows in inland areas, and increasing drought potential. These are likely to reduce irrigation water supply reliability, with potential for a reduced ability to support the current level of supply. Reduced availability is likely to coincide with increased demand for irrigation, as high temperatures or increased drought potential may impact optimum pasture growth. Further increased water demand is likely to be required to cope with heat impacts on stock (Environment Canterbury, 2009).

Sensitivity of the Region to drought is currently rated as extreme. The 2016 droughts in Canterbury were the worst since those of the 1980s, with 86% of water bores across the Region affected. This caused unreliable water supply to farmers, with a range of impacts for agriculture.

10.5.2 Town supply

Town supply water demand generally increases during periods of warmer temperatures when water availability is at its lowest. Summer peaks in demand often occur due to increased shower use, outdoor watering, and increased demand in fire fighter services (Stakeholder Engagement, 2021).

At a regional scale, current sensitivity of town supply is low. Most districts report that their residential water demand is well within current allocations.

10.6 Risks to water supply infrastructure

The highest risks to water supply and infrastructure from climate change includes those from changes to storms and flooding.

Table 10.5: Urban water and rural water supply and distribution infrastructure

District	Number of on-demand water scheme	Connections	Water supply pipe (mains) (km)
Ashburton	12	9685	371
Ōtautahi/Christchurch	7 urban and 6 rural	160000	>3000
Hurunui	7 urban and 12 rural	7000	2,145
Kaikōura	5	less than 4000	210
Mackenzie	6	2580	242
Selwyn	30	17,394	1,300
Timaru	12 (6 urban, 4 rural drinking and stockwater, 2 stockwater)	17570	1853
Waimakariri	7 on demand, 3 semi restricted and 5 fully restricted	19,215	935
Waimate	7	6000	914
Waitaki	15	1,689	11,103

Source: WaterNZ, 2020; Ashburton District Council, 2018; Christchurch City Council, 2021; Hurunui District Council, 2021; Kaikōura District Council, 2021; Mackenzie District Council, 2018; Selwyn District Council, 2018; Waimakariri District Council, 2021; Waimate District Council, 2018; Waitaki District Council, 2021.

10.7 Stormwater and wastewater infrastructure

The highest rated risks to stormwater and wastewater infrastructure include those due to sea level rise, coastal erosion, and river and surface water flooding. Stormwater and wastewater systems are discussed together, as assets within these systems face many similar impacts from climate change.

The risk to both stormwater and wastewater assets due to coastal, river, and surface water flooding, sea level rise and salinity stress is rated as extreme by late century. This is due to the high and increasing exposure of stormwater and wastewater assets to coastal and river flooding, a high sensitivity to a range of impacts from flooding, and a low adaptive capacity.

Key summaries from: Emissions Reduction Plan (p83)

4.1 Prioritise nature-based solutions.

- Where possible, nature-based solutions are prioritised in policy, planning design and decision-making over solutions that do not enhance nature. This will be for both carbon sequestration and climate change adaptation.

Nature-based solutions offer a practical approach for integrating climate and biodiversity policy for all sectors. They can remove carbon from the atmosphere, store it and build resilience to the impacts of climate change at the same time as supporting biodiversity and wider environmental outcomes. They can also create employment opportunities that support an equitable transition, especially in rural areas. Examples of nature-based solutions that remove carbon and support biodiversity include:

- restoring wetlands and coastal ecosystems (eg, peatlands, saltmarshes and mangrove swamps) to sequester carbon and provide natural defences against flooding, drought and sea-level rise, while supporting abundant biodiversity

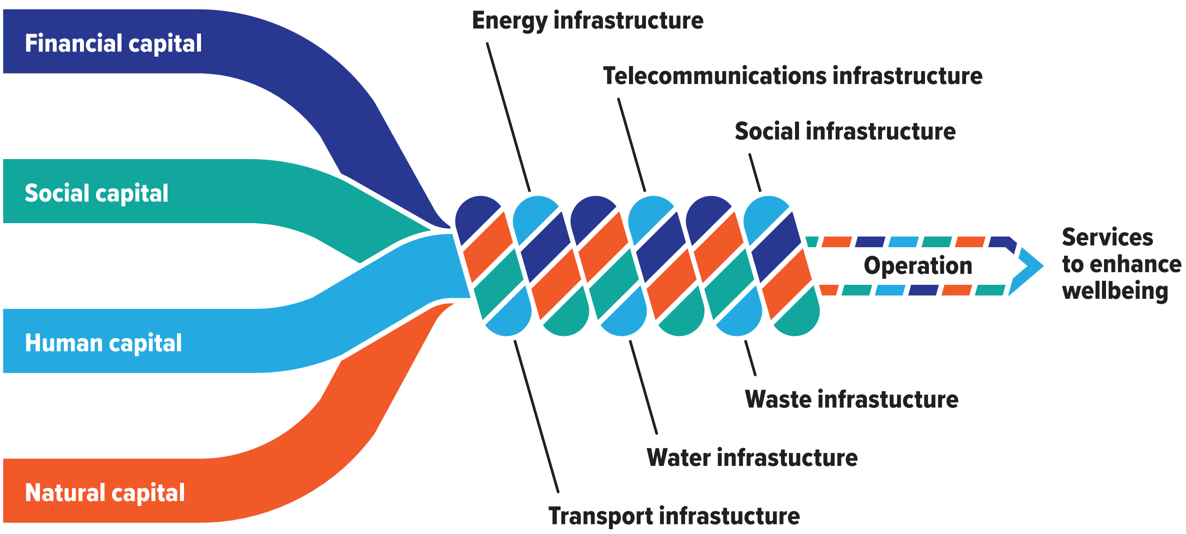
- restoring and planting native forests in upper catchments to sequester carbon, reduce flooding and sediment flow into downstream rivers and estuaries and improve habitats.

Some nature-based solutions can also reduce emissions indirectly, for example:

- using water-sensitive urban design, which mimics natural processes and uses soil and vegetation to manage stormwater and reduce the need for carbon-intensive concrete pipes
- integrating green spaces and natural features into urban areas to help with temperature and flood control, improve air quality and create wildlife corridors. This can also make active transport more appealing, provide recreational opportunities and improve health and wellbeing.

Key summaries from: National Adaption Plan (p127-133; p107-108)

Types of infrastructure (source: NAP, P127).



Infrastructure asset owners are best placed to manage climate risk. Infrastructure asset owners include central and local government and the private sector, onshore and offshore.

All asset owners must begin the process of understanding and actively managing climate risk.

These include actions:

- that have been developed to support action at the system level, across all asset classes and geographies
- to develop adaptation plans by significant (government) infrastructure asset owners
- that support funding resilience activities in particular infrastructure sectors.

Addressing inequity: Understanding and managing risk at the asset level can result in a range of benefits, in addition to resilience – for example, making infrastructure services more reliable, providing better value for money and improving social cohesion.

Action 6.6: Implement the Water Availability and Security programme

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI (MfE support)
Relevant portfolio: Agriculture
Primarily supports: Objective NE1
Status: Current

Climate change increases natural water variability, affecting access to freshwater across the country.

The Water Availability and Security programme will help food and fibre businesses and rural communities adapt to increasingly variable natural water availability through a range of complementary activities to both reduce demand and make best use of available water. It will help restore and maintain the health of waterways, taking its lead from the National Policy Statement on Freshwater Management.

By 2024, the Ministry for Primary Industries (MPI) will form a permanent team to address water availability and security in the food and fibre sectors and rural communities. This work will include partnering with Māori, rural communities and other sectors to find solutions.

Action 6.7: Implement the National Policy Statement on Freshwater Management 2020

Timeframe: Years 1–6 (2022–28)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective NE1
Status: Current

Adaptation action for freshwater bodies will be achieved through local councils devising suitable plan provisions (eg, rules) to achieve a range of outcomes, and must ensure the ability to use resources (eg, land use, discharges, etc) is matched to the assimilative capacity of freshwater.

The National Policy Statement on Freshwater Management 2020 (NPS-FM 2020) applies to all freshwater, including groundwater, and will require management of freshwater in both rural and urban areas. It requires councils to give effect to Te Mana o te Wai, which prioritises the health and wellbeing of water bodies and freshwater ecosystems. Water users will adapt land-use practices in response to these and as the climate impacts become apparent. These actions will ensure the healthy functioning of freshwater ecosystems and mitigate negative impacts from land use.

By 2024, regional councils will notify plans implementing the NPS-FM 2020.

Action 6.8.3: Continue the Freshwater Biosecurity Partnership Programme

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

The Ministry for Primary Industries (MPI) leads the Freshwater Biosecurity Partnership Programme in partnership with the Department of Conservation (DOC), Fish and Game New Zealand, specific Māori entities, regional councils, Land Information New Zealand and various industry groups, including Genesis Energy and Meridian Energy. The programme's vision is to take collaborative action to protect Aotearoa New Zealand's freshwater from the impacts of freshwater pests.

A changing climate could make more waterways vulnerable to freshwater pest establishment. The programme includes the Check Clean Dry campaign, a national social marketing campaign aimed at preventing the spread of freshwater pests.

The programme will include a focus on supporting the development of effective early-detection and control tools. It will also improve access to information about the distribution of freshwater pests, enabling the Check Clean Dry campaign to be targeted to the highest-risk locations, activities and distribution pathways.

By 2024, development and implementation of an updated Freshwater Biosecurity Partnership Programme strategy will be completed, which includes more support for collaboration on developing new or improved detection and control tools.

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