11. Aboriginal water values and uses


I'm hoping to bear
the load of others

Part 11. Aboriginal water values and uses

The Murray-Darling Basin Plan requires Basin states to identify objectives and outcomes for water, based on Aboriginal values and uses water, and to have regard to the views of Traditional Owners on matters identified in the Basin Plan.

Victoria engaged with Traditional Owner groups within the Wimmera-Mallee Water Resource Plan area to:

- outline the purpose, scope and opportunity for providing water to meet Traditional Owner water objectives and outcomes through the Murray-Darling Basin Plan
- define the role of the water resource plans in the Basin, including but not limited to the requirements of the Basin Plan (Chapter 10, Part 14)
- provide the timeline for the development and accreditation of the Wimmera-Mallee Water Resource Plan
- determine each Traditional Owner group's preferred means of engagement and involvement in the development of the Wimmera-Mallee Water Resource Plan
- continue to liaise and collaborate with Traditional Owner groups to integrate specific concerns and opportunities regarding the water planning and management framework
- identify Aboriginal water objectives for each Traditional Owner group, and desired outcomes.

The Water Resource Plan for the Wimmera-Mallee (surface water) and Wimmera-Mallee (groundwater) water resource plan areas is formally titled Wimmera-Mallee Water Resource Plan for the purposes of accreditation.

When engaging with Traditional Owners groups that span both the Wimmera-Mallee and northern Victoria, Victoria's North and Murray Water Resource Plan has been referred to as the Northern Victoria Water Resource Plan and is so called in Chapter 11 of the Comprehensive Report.

This part outlines:

- Traditional Owners in the area for the Wimmera-Mallee Water Resource Plan
- Traditional Owner objectives and outcomes for water
- approaches to addressing risks to Traditional Owner water-related values and uses
- how regard was had to Traditional Owner water values and uses in the development and implementation of Victoria's Aboriginal Water Policy
- opportunities to strengthen protection of Traditional Owner values and uses through existing arrangements and agreements.

This part includes contributions by each of the Nations in the area for the Wimmera-Mallee Water Resource Plan. Each contribution identifies the objectives and outcomes of water, and Traditional Owner views for each group. Victoria's approach to meeting Part 14 of Chapter 10 of the Basin Plan has been to incorporate the views of Traditional Owners through their contributions to the Water Resource Plan. This part includes accredited text that responds to Basin Plan requirements under Part 14 of Chapter 10 of the Basin Plan.

11.1 Basin Plan requirements

Section 10.52 of the Basin Plan requires the Wimmera-Mallee Water Resource Plan to identify the following:

- *the objectives of Indigenous people in relation to managing the water resources of the water resource plan area; and*
- *the outcomes for the management of the water resources of the water resource plan area that are desired by Indigenous people.*

The Basin Plan also requires regard to be had to the views of relevant Indigenous organisations on:

- their values and uses of water when developing Water Resource Plans
- a further range of matters listed in section 10.53:
    a. Native Title rights, Native Title claims and Indigenous Land Use Agreements provided for by the Native Title Act 1993 in relation to the water resources of the water resource plan area
    b. registered Aboriginal heritage relating to the water resources of the water resource plan area
    c. inclusion of Indigenous representation in the preparation and implementation of the plan
    d. Indigenous social, cultural, spiritual and customary objectives, and strategies for achieving these objectives
    e. encouragement of active and informed participation of Indigenous peoples
    f. risks to Indigenous values and Indigenous uses arising from the use and management of the water resources of the water resource plan area.

A water resource plan must have regard to the views of Aboriginal communities about cultural flows under section 10.54 and provide at least the same level of protection of Indigenous values and uses as existed before the Basin Plan under section 10.55.

11.2 Traditional Owners in the Wimmera-Mallee water resource plan area

Caring for Country is the essence of Aboriginal social, spiritual, economic and physical wellbeing, and the basis of cultural lore. Cultural connections to Country do not follow the boundaries of the Wimmera-Mallee water resource plan area, or indeed state boundaries, and are not represented in how water is managed in the region.

The Wimmera-Mallee Water Resource Plan includes a surface water area and a groundwater area. The Wimmera- Mallee water resource plan area includes surface water that is sourced through the Wimmera system (see **Part 2**), which is distinct from the River Murray and its floodplains. The identification of surface water areas for the purposes of developing water resource plans do not reflect Aboriginal connection to Country where water is sourced from the River Murray.

The boundaries of the Wimmera-Mallee Water Resource Plan do not align with Country as recognised through 'boundaries' represented in current Traditional Owner agreements at a Commonwealth or Victorian Government level. **Figure 25** provides a representation of where Traditional Owners are located within the Victoria's water resource plan areas.

Some Traditional Owner Groups are being represented in both the Wimmera-Mallee and Northern Victoria Water Resource Plan. These include Barapa Barapa, Dja Dja Wurrung, Latje Latje, Nyeri Nyeri, Ngintait, Tati Tati Wadi Wadi, Wadi Wadi, Wamba Wemba and Weki Weki. Any changes to content in the Wimmera-Mallee Water Resource Plan because of this ongoing consultation will be represented in the Water Resource Plan for northern Victoria. It is therefore important to refer to both plans to understand the Traditional Owners' aspirations for water.

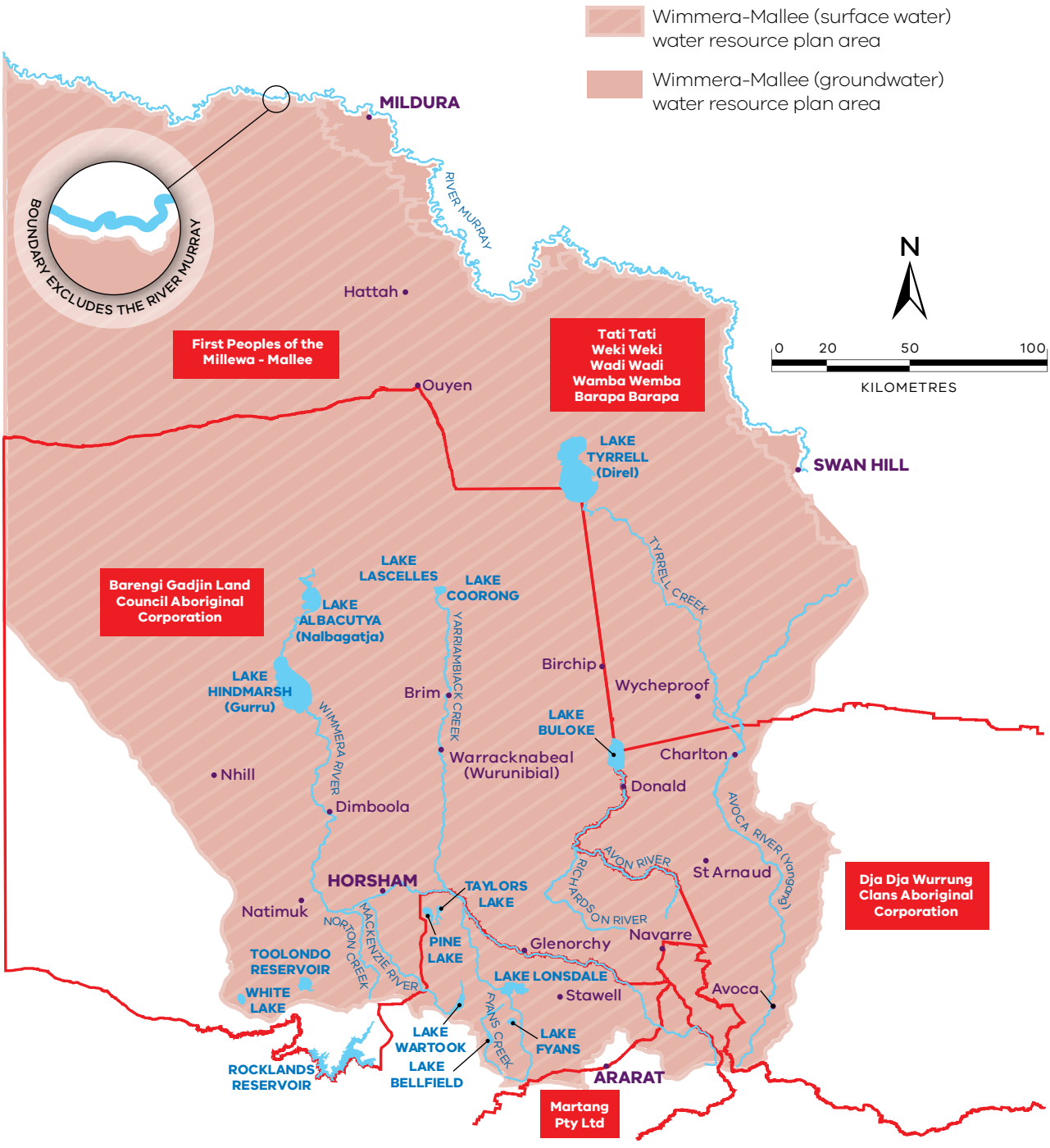

Figure 25: Representation of Traditional Owner groups in Victoria's Wimmera Mallee Water Resource Plan areas

11.2.1 Working with Traditional Owners

Local Traditional Owner knowledge and expertise is needed to progress the realisation of Aboriginal water objectives and outcomes in Victoria's water policy development and management framework.

> "It is our human right – the rights of the indigenous people of Australia. To be involved in water, have the right of access to water, and be participating players in the decisions made regarding water. "

Brendan Kennedy, Tati Tati Nation, July 19, 2017

It is expected that incorporating Traditional Owner objectives into Victorian water planning and management will benefit the community through an improved understanding and management of local waterways.

Victoria is required by Basin Plan to engage with Traditional Owners in the development of water resource plans to ensure that the objectives and outcomes of Traditional Owners for water resource management of Basin resources are formally identified. DELWP engaged with Traditional Owners who are formally recognised under the *Native Title Act 1993* (Cth), the *Traditional Owner Settlement Act 2010* (Vic) and the *Aboriginal Heritage Act 2006* (Vic), as well as with Traditional Owner Nations as identified in a guide to Traditional Owners in water resource plans areas, approved by the Murray Lower Darling Rivers Indigenous Nations (MLDRIN), the Northern Basin Aboriginal Nations (NBAN) and the Murray-Darling Basin Authority (first published in September 2015 and updated in October 2018).

DELWP welcomes contributions of Traditional Owner groups who have expressed an interest in the processes, noting it is unable to recognise Nations' statements of boundaries where these are not supported by formal agreements with the Victorian or Commonwealth Government.

Traditional Owners engaged through the Wimmera-Mallee Water Resource Plan include (in alphabetical order):

- Barapa Barapa (see **Part 11.3.1**)
- Dja Dja Wurrung (see **Part 11.3.2**)
- First Peoples of the Millewa-Mallee (Nations of Nyeri Nyeri, Ngintait and Latje Latje) (see **Part 11.3.3**)
- Martang Pty Ltd (see **Part 11.3.4**)
- Tati Tati Wadi Wadi (see **Part 11.3.5**)
- Wadi Wadi (see **Part 11.3.6**)
- Wamba Wemba (see **Part 11.3.7**)
- Weki Weki (see **Part 11.3.8**)
- Wotjobaluk peoples (represented by Barengi Gadjin Land Council) (see **Part 11.3.9**)

Some Nations identified within the Wimmera-Mallee Water Resource Plan have Country or areas of significant cultural interest within other Victorian water resource plan areas:

- The First Peoples of the Millewa-Mallee Registered Aboriginal Party (representing Latje Latje, Nyeri Nyeri and Ngintait) boundary falls in both the Northern Victoria Water Resource Plan and the Wimmera-Mallee Water Resource Plan

- Dja Dja Wurrung Country as recognised under its Traditional Owner Settlement Agreement straddles both the Northern Victoria Water Resource Plan and the Wimmera-Mallee Water Resource Plan
- Barapa Barapa, Tati Tati, Wadi Wadi, Wamba Wemba and Weki Weki Nations have identified objectives and outcomes and expressed interest in water on Country in both the Northern Victoria Water Resource Plan, and the Wimmera-Mallee Water Resource Plan

A staged engagement and consultation approach has been used to identify objectives and outcomes with Traditional Owners in the Victorian share of the Murray-Darling Basin. This approach considers and respects the preparedness, prioritisation and resourcing of each individual Traditional Owner group to best participate in the preparation of Victoria's water resource plans.

Engagement through the Wimmera-Mallee Water Resource Plan was undertaken with individual Traditional Owner groups to outline the Basin Plan requirements for Victoria's water resource plans. Engagement included joint discussion of timelines, consideration and response to how best to develop objectives and desired outcomes of each group.

Different means of engagement included workshops, meetings, Nation meetings, community gatherings and information sharing on Country in response to the preferences of each Traditional Owner group.

11.3 Traditional Owner contributions to the Wimmera-Mallee Water Resource Plan: identifying objectives and outcomes and recognising values and uses

Contributions to the Wimmera-Mallee Water Resource Plan were prepared for or by each of the Groups within the plan area, to meet requirements of the Basin Plan. The contributions included in this part have been approved by representatives of the Traditional Owner group for inclusion in the Comprehensive Report.

The contributions meet the requirements of Part 14 of Chapter 10 of the Basin Plan as they detail the objectives and outcomes for water for the respective Traditional Owners. The contributions also outline their views about the values and uses of water. Part 14 of Chapter 10 of the Basin Plan requires regard to be had to several matters and the contributions provide views on those matters.

It is intended that the information contained in the contributions can assist in achieving objectives and outcomes beyond the scope of water resource plans.

The following part presents the contributions as approved by each Nation group. The content of each contribution represents the views of the contributors. They do not necessarily represent the views of the Victorian Government. This document is not an instrument to add to the discussion of Country or to give validity to potential claims for recognition or disputes with other Nations.

11.3.1 Barapa Barapa

The Barapa Barapa objectives and outcomes were workshopped in January 2018. The contribution was discussed at a Nation meeting, and signed off in January 2019.

11.3.1.1 Description

"To the Barapa people, the land is our oxygen. We feel the presence of our old people being there. We have a spiritual connection to everything; the animals, the land and the water. We are the custodians of the land for future generations. When you visit our Country, you share this responsibility with us. Barapa Barapa are the river custodians, one of many Nations who are the Traditional Owners of Murray River Country"

'Barapa Barapa Cultural Watering Framework', pub. North Central CMA, 2017

Barapa Barapa has a strong association with the Murray River, and its tributaries, including around the area of Gunbower Forest in Victoria, with areas of significance including Reedy Lagoon, Guttrum and Black Swamp. Interests in water extend both geographically and through connection to water sources, to both the Northern Victoria and the Wimmera-Mallee water resource plans.

Barapa Barapa Country continues across the border to NSW, to Deniliquin, with several rivers feeding into the Murray being places of interest.

11.3.1.2 Current or pending agreements

The Barapa Barapa peoples are in the preliminary stages of their Native Title negotiation, along with the Wamba Wemba Nation. Negotiation may include progressing to a settlement agreement under the *Traditional Owner Settlement Act 2010* (Vic).

11.3.1.3 Registered Aboriginal Party (Cultural Heritage)

Barapa Barapa does not currently have Registered Aboriginal Party (RAP) status, however, the group is undertaking the required preliminary work to apply to be recognised as a RAP for their Country as part of Native Title negotiations.

Barapa Barapa has spoken about the need for Native Title to include water rights. It is also concerned regarding the requirements for Registered Aboriginal Party status – for instance proof of occupancy, and the access barriers that preclude that.

11.3.1.4 Existing reference /scoping materials[9]

Through the Barapa Barapa Water for Country Steering Committee there are several existing reference documents relating to water. The Barapa Barapa Cultural Watering Framework is the result of a four year project on the Lower Gunbower Forest, that helped determine cultural values and associated watering objectives at a series of sites. Victoria's Water Resource Plans helped fund the project for several months, as there was a strong alignment with the requirements of the Murray-Darling Basin Plan.

9 Traditional Owner groups may not wish to share these: this can also denote that they exist and Government should be aware of it and respect existing materials.

In 2017, Victoria's Water Resource Plans funded an Aboriginal Waterway Assessment with Barapa Barapa.

Barapa Barapa Water for Country Steering Committee with North Central CMA have produced a series of publications and videos on YouTube: **www.nccma.vic.gov.au/media-events/videos/barapa-water-country**

11.3.1.5 Barapa Wamba Water for Country Project

The current project builds on the Barapa Barapa Water for Country project, which commenced in 2014 to identify and map traditional values and sites of cultural significance in the Gunbower Forest. The second phase of the project focused on flow objectives and how these will deliver cultural outcomes in the Gunbower Forest. In 2018-19 the project has extended to gain understanding of the cultural values and aspirations of wetlands on Barapa Barapa and Wamba Wemba Country.

11.3.1.6 Preferred means of engagement

Barapa Barapa has stressed that any engagement regarding Country needs to have Barapa Barapa people involved from the outset.

The Barapa Wamba Water for Country Steering Committee is the "water arm" of the working group. The committee receives support from a water officer based in the North Central CMA: **www.nccma.vic.gov.au**.

Barapa Barapa MLDRIN delegates can be found at **www.mldrin.org.au/membership/nations**, and can be an initial form of contact.

While Native Title discussions are underway, the Barapa Barapa and Wamba Wemba working group is a key stakeholder and needs to be engaged, as instructed by the full group, to act in the best interests of Barapa Barapa and Wamba Wemba. The working group receives executive support from the First Nations Legal and Research Services.

Figure 26: Uncle Ron Galway doing a Welcome to Country, Barapa Barapa Water for Country project, Treetops Scout Camp, Gunbower.

11.3.1.7 Barapa Barapa and Water Resource Plans

Introduction

For several months, Victoria's Water Resource Plans has been talking with Barapa Barapa through MLDRIN delegates, the Water for Country project steering committee, and the Barapa Wamba working group about water – including their objectives, desired outcomes, values and uses, thoughts on water entitlements, and how Barapa Barapa representatives want to work with Government.

Victoria's Water Resource Plans provided funding support for delivering the Water for Country framework (2017) and associated meetings on Country and held both a community gathering (June 2018) and a Nation meeting (November 2018) to discuss Barapa Barapa's contribution to Victoria's Water Resource Plans. Barapa Barapa is also represented on the Northern Victoria Water Resource Plan Technical Advisory Group and has hosted an Advisory Group meeting on Country at Gunbower to help other members better understand their aspirations for water and what success may look like.

Barapa Barapa has also met DELWP on Country several times to further understanding of water on Country, how current practices can impact on cultural outcomes, and how these changes to the natural landscape in turn have a negative effect on native flora and fauna, and ultimately, erode the ability of Barapa Barapa to connect with the environment in a way that is respectful of both their cultural past, and of current day objectives.

Barapa Barapa people are strong advocates for water returning to Country, and for Country returning to healthy Country. Members of Barapa Barapa have also raised concern in regards to

compliance from water users, and that permitted water extraction is still too high. In addition the heavily regulated waterways on Barapa Barapa Country have stopped water from overbank flooding reaching sites of cultural significance - including important story-telling sites many of which now have no water. Barapa Barapa believes water would be better managed if what it supported agriculturally was more sensitive to the landscape, and less thirsty. Lack of flows are impacting badly on protected native animals – and the way that flows are managed. For instance, regulated flows have destroyed fish populations that have not adapted to the changes in either timing, volume or temperature.

There is an ongoing challenge with salinity and soil health along the Murray and its tributaries, particularly in the past 50 years – Barapa Barapa reports that many lakes and billabongs that were fresh, now have salty water. Other water quality concerns have been raised – and a potential indicator in that deformed fish are being found in the Murray River. The management of public land that adjoins waterways is also a concern, including when land is leased to farms for grazing cattle, which causes degradation of the river bank, and impacts on water quality. Barapa Barapa also believes Traditional Owners should be involved in, and remunerated for, measuring water quality by using cultural indicators.

Barapa Barapa have been supported by the North Central CMA through a water officer employed, including to provide secretariat support. There is a clear preference for Barapa Barapa to also have a water officer for its Nation to help with work on the ground to get water back on Country, including re-establishing wetlands. For the position to make real inroads, Barapa Barapa suggest funding be for a significant time period, and appropriate funding and resources for the continuation of the steering committee, and for cadetships for people starting out, and to facilitate them commencing then moving into a long-term role to support youth. It is also important for there to be women and men, for cultural reasons. Barapa Barapa stressed it wants its people to be employed to work, monitor and manage water on Country – that it is seeking occupational opportunities.

Rights to information, images and culture shared by Barapa Barapa remain the property of Barapa Barapa people.

Objectives

The following are the objectives and associated outcomes for Barapa Barapa as determined through their work on the Water for Country Framework, meetings with Victoria's Water Resource Plan team over a 12-month period, an open community gathering, and a Nation meeting. Barapa Barapa reserves the right to reflect on and change these as required.

Table 30: Barapa Barapa objectives and outcomes

Objectives	Outcomes
Achieving cultural outcomes	
Barapa Barapa wants to be able to care for waterways and wetlands and participate in the decision-making processes that influence the sustainable use of water.	Water management is undertaken in a way that is integral to Barapa Barapa cultural identity.
That water management and water delivery supports the cultural practices for Barapa Barapa women, as advised by women on the steering committee, at gatherings, and through government consultation.	Barapa Barapa women are able to practice their cultural birthing practices throughout the Nation where women having birthing in special areas. That women have a say in watering regimes to meet their needs.

continued

Objectives	Outcomes
Barapa Barapa and government work together to improve water quality so billabongs, lakes and wetlands that have become saline are restored to their freshwater status.	Culturally significant water bodies are returned to their freshwater status. Native flora and fauna return or thrive at important sites
Barapa Barapa to participate in culturally informed watering through supported, active participation in the management of environmental water to ensure the consideration of Traditional knowledge and delivery of shared benefits.	Shared benefits of environmental water are accommodated, activated and achieved.
Barapa Barapa has an equal say at the table in how to manage rivers and waterways.	Decisions on water management, planning and policy are informed and influenced by Barapa Barapa as an equal partner.
Water is returned to culturally significant sites, as advised by Barapa Barapa.	Habitat on culturally significant sites is restored. Native animals and plants return or thrive.
Water management enables the restoration of traditional harvest activities to enable sharing of cultural knowledge and stories	Water management supports native flora and fauna.
Rights to water	
Recognition and integration of Barapa Barapa custodians' rights, needs, priorities and values in water management. Including increased engagement and participation of Barapa Barapa custodians in natural resource management through internal and external relationship building.	Barapa Barapa are recognised as the custodians on Country.
Working with water	
Resourcing us to participate in water policy, strategy and plans on Barapa Barapa Country.	Barapa Barapa achieves improvements in: • Economic participation (skills development / jobs) • Governance and leadership • Health, cultural and social wellbeing
Barapa Barapa is able to access employment opportunities in natural resource management, and is remunerated for its participation in government	Barapa Barapa people are employed at water authorities, CMAs, Parks Victoria, Fisheries and there is a Barapa Barapa Water Officer for the Nation.
Government supports training programs for the Barapa Barapa community to explore and implement business opportunities with each other and other communities.	Barapa Barapa is supported by government, coorporations and philanthropical societies to run its own water-based businesses.
Government supports a teaching program for the Barapa Barapa community to share knowledge with each other and other communities.	Barapa Barapa knowledge is shared and recognised, to provide better outcomes for waterways, native flora and native fauna.

continued

Objectives	Outcomes
Government adheres to Barapa Barapa's requirements in regards to participation, including engagement timelines	Barapa Barapa cultural perspectives are sought at the beginning of projects and responded to in water management on Country. Government acknowledges and accommodates Barapa Barapa requirements, including: • plain English and no acronyms • achievable timeframes • self determination • cultural awareness • equal participation
Cultural monitoring	
Barapa Barapa wants to work with Government to support its own cultural values monitoring program.	A cultural values monitoring program on water is developed, funded and implemented to measure cultural outcomes on waterways.
Barapa Barapa seeks resourcing to undertake ecological surveys for water life - for example crays, freshwater mussels, fish, bugs, turtles, rakali and other important species – for water quality, and monitor cultural hot spots annually.	Species are monitored annually by Barapa Barapa.
Barapa Barapa is resourced to undertake surveys for cultural heritage, to indicate areas of high productivity in the past, as priority watering sites.	Determining priority watering sites for the environment is influenced by areas of cultural importance
Economic benefits	
Barapa Barapa has access to water entitlements to enable it to make watering decisions autonomously.	Cultural watering entitlement is held by Barapa Barapa
Yabby and fish farming is introduced by Barapa Barapa at sites and government works with Barapa Barapa to maintain appropriate water standards to support yabbies and fish at an economic scale.	Water quality and protection is brought to, and maintained at, a standard to support yabby and fish cultivation. Barapa Barapa is able to harvest yabbies and fish for cultural and economic outcomes.

Values and uses

Barapa Barapa has mapped the requirements of culturally important flora and fauna, and their water dependencies (see below), and included this in its 'Water for Country' framework.

In discussions with Barapa Barapa, the Nation has repeatedly outlined the interdependencies between Country, culture and water:

"Cultural Heritage cannot survive without water"

Uncle Neville Whyman, November 2018.

Having water reach important sites, water of a quality that supports life, and to be available at times that support cultural values is imperative for flora and fauna, and in turn, vital for activities such as hunting, harvesting native plants for medicine and food, and fishing and yabbying.

Different people specialised in making tools for Barapa Barapa, and there was a big trading route. For Barapa Barapa to make their specialised tools, cultural implements and canoes, there needs to be water in certain places, at certain times, to enable plant and species to thrive in a way that supported the Nation.

Figure 27: History in the making: Scar tree created at Reedy Lagoon, Gunbower Island, at the 2018 Bark Canoe Event

Table 31: Barapa Barapa flow dependent cultural assets

Asset category	Include	Water dependence	Aim
Plants	Old Man weed	Needs Seasonal flooding/drying regime - damp soils	Abundant healthy Old Man weed populations through wetting/drying
	River Red gums (piyal)	Periodic flooding that reaches out onto floodplain in winter-spring	Healthy trees with little dieback and new annual growth
	Cumbungi (Gumbung)	Needs seasonal flooding/drying regime	Some good healthy stands fringing wetlands (leaving open water), burn in winter
	River Flax Lily	Needs functioning floodplains, mimicking natural conditions	Increase numbers and plants reproducing
	Water Ribbons	Clean water, spring flooding	Abundant populations in spring in wetlands and creek.
	Nardoo (talem talem)	Needs seasonal flooding/ drying regime	Abundant healthy populations
	Moonah	TBC	Healthy plants recruiting
	River Mint (kapel-kup)	Needs seasonal flooding / drying regime - damp soils	Abundant healthy populations
	Water pepper	Seasonal flooding and a drying regime	Some healthy populations
	Native Lettuce	Needs seasonal flooding / drying regime	Abundant healthy populations at the end of spring

continued

Asset category	Include	Water dependence	Aim
Animals	Fish (yawir) Large bodied native	Connectivity and stable flow during breeding (November) - irrigation causing unseasonal variability	
	Turtles (toonimum)	Traditional ecological knowledge used to inform flow requirements to support species.	Abundant Murray Cod and Yellow Belly in Creek. Tout Cod present. Catfish (buk)in permanent wetlands. Carp numbers reduced
	Goanna (tyuling)	Permanent refuges and protection during nesting seasons	
	Grey Kangaroo (kurre)	Traditional ecological knowledge used to inform flow requirements to support species.	increase breeding and survival
	Bardi and Wittchetty grubs	Water quality/saline/ water levels and bird breeding supported for food source	Maintain
	Freshwater mussels	Water quality/saline/ water levels	Maintain
	Crayfish	Well watered, healthy forest, and a spring rain	Maintain and protect
	Water birds - Ducks, Swans (Kunawar), Magpie, Geese	Permanent refuges. Shallow areas. Periodic flooding in wetlands, right flow rate.	Mussels present and breeding
	Emu (Kawir)	Permanent refuges	
	Water Rats	Traditional ecological knowledge used to inform flow requirements to support species.	Increase breeding and survival

continued

Asset category	Include	Water dependence	Aim
Water	Reedy Lagoon Black Swamp	Permanent refuges with some drying phases	Areas of permanent clean open water
	Gunbower Creek	Right seasonality - lowest in summer, highest in spring	Natural seasonal flows of clean water, some deep holes
	Reedbed Swamp - Guttrum/ Benwell Forests	Periodic flooding (winter - spring)	Restore periodic flooding
People - Tangible cultural heritage	Scarred trees (coolamons, shields, shelter, canoes and women's areas)	Periodic flooding	Sites surveyed and recorded. Maintain tree health - no loss of trees
	Culturally significant trees (ring trees, burial trees, boundary trees)	Periodic flooding	Sites surveyed and recorded. Maintain tree health - no loss of trees
	Earth mounds (villages and cooking sites)	Rarely inundated	Sites surveyed and recorded. Record and preserve
	Middens	Rarely inundated	Sites surveyed and recorded - avoid bank erosion
Intangible cultural heritage	Women's sites	TBD	Sites surveyed and recorded. Sites visited and cared for by Barapa Barapa Traditional custodians. No damage by visitors
	Men's sites	TBD	Sites surveyed and recorded. Sites visited and cared for by Barapa Barapa Traditional custodians. No damage by visitors
	Cultural knowledge	TBD	Participatory water management with cultural knowledge included

Table 32: Barapa Barapa flow objectives with indicators

Name	Objective	Indicator	Measure
Kulayatang (wet)	Maintain permanent water refuges	Open water in black swamp and reedy lagoon in summer	presence of remnant pools of sufficient quality water in summer. No further invasion of Ruby Red gums or Giant Rush
		Healthy water	water test kit - salinity and dissolved oxygen levels suitable for plants and animals. Groundwater bore levels appropriate – TBD
		Water enters fish ponds associated with mounds	Presence of water in fish ponds (cultural sites) during flood

continued

Name	Objective	Indicator	Measure
Cultural Plants	Promote and maintain healthy cultural plants at culturally significant sites (Reedy Lagoon, Black Swamp. Reed Bed Swamp - Guttrum Forest)	Old Man Weed - lots of green in summer	Cultural harvest, plant surveys, seed collection and photo points at designated sites
		River Red gums - Tree health scores and photo points to observe canopy for new growth annually and water gets to flood mark on trees periodically (inside Reedy Lagoon)	
		Cumbungi (Gumbung) - weaves without breaking, looks fresh and tastes good	
		River Flax Lily - new plants flowering	
		Water Ribbons - Abundant in spring	
		Nardoo - Plants are present and healthy after flood and look right (not tall and leggy)	
		Moonah - Plants flowering and recruiting	
		River Mint - Plants look healthy and are producing seed	
		Water Pepper - Plants present and producing seed	
		Native Lettuce - Enough plants to harvest	

continued

Name	Objective	Indicator	Measure
Yumurriki (Dreaming)	Barapa people sharing culture and caring for Country	Cultural and monitoring activities on Country	Number of people and hours on Country. People feel good on Country (video/ questionnaire)
	Protect and preserve culturally significant sites through appropriate flow regimes	No new erosion or exposure of cultural sites Dead Scarred trees remain standing Live scar trees are healthy	Photo points at inflow and outfall points Circumference measure/ photo points of dead scarred trees Tree health scores of live scarred trees
Yawir (fish)	Promote healthy and abundant native fish communities	Murray Cod and Yellow Belly are breeding.	Fish survey show range of ages including young of year (less than 1 year)
		Trout Cod and Catfish	Fish surveys show presence
Tya (soil/land)	Prime wetlands by prewetting soils in autumn	Aquatic plants respond to watering events	Plant surveys and photo prints
Kunawar (Black Swan)	Promote healthy water bird populations	Water birds breeding	Spring-summer surveys for eggs

11.3.1.8 Cultural flows

Barapa Barapa seeks water entitlement so it can make its own decisions about water on Country, and to provide economic outcomes for Barapa Barapa people. Barapa Barapa also seeks cultural outcomes through shared benefits from water held by others, such as through working with government on how water held as entitlement by the environment is used.

11.3.2 Dja Dja Wurrung

The Dja Dja Wurrung contribution was developed and signed off by the Dja Dja Wurrung Kapa Gatjin water advisory group, with support from the Dja Dja Wurrung Water Officer, in accordance with the agreement between Dja Dja Wurrung Aboriginal Clans Corporation Chief Executive Officer and MLDRIN delegate, Rodney Carter, and DELWP.

"Dja Dja Wurrung Country is a cultural landscape that is more than just tangible objects; imprinted in it are the dreaming stories, Law, totemic relationships, songs, ceremonies and ancestral spirits, which give it life and significant value to Dja Dja Wurrung People."

Dja Dja Wurrung Recognition Statement

11.3.2.1 Description

The following is the work prepared, agreed and submitted by Dja Dja Wurrung, in a process agreed between the corporation and Victorian Government, to enable Dja Dja Wurrung to prepare its response to Victoria's water resource plans, supported by Government when requested. The format is determined by the requirements of the Basin Plan, approached in a manner that meets the needs of the Dja Dja Wurrung Aboriginal Clans Corporation, and the people it represents.

Dja Dja Wurrung people, Country and agreements (TOSA)

On the 28 March 2013, after 18 months of negotiations between the State and Dja Dja Wurrung People, the Government of Victoria and the Dja Dja Wurrung Clans Aboriginal Corporation (DDWCAC) entered into a Native Title 'Recognition and Settlement Agreement'. The Agreement formally recognising Dja Dja Wurrung people as the Traditional Owners of their Country and acknowledges the history of disbursement and dispossession that has affected the Dja Dja Wurrung People since settlement. Victoria's Northern Water Resource Plan area covers a large part of central Victoria and consists of approximately two thirds of Dja Dja Wurrung Country. Dja Dja Wurrung Country, legally recognised by the 'Dja Dja Wurrung Recognition and Settlement Agreement', extends from the upper catchments of the Bulutjang (Loddon River) and Koliban (Coliban River) to Mount Franklin and the towns of Creswick and Daylesford in the southeast to the Yerrin (Campaspe river) Kyneton, Redesdale and Rochester in the east, Lake Boort in the north, Lake Buloke, Donald in the northwest, to the Avon Richardson River, Navarre Hill and Mount Avoca marking the south west boundary.

The basins within Dja Dja Wurrung Country represented by Victoria's Northern Water Resource Plan include the Bulutjang (Loddon River) basin and part of the Yerrin (Campaspe River) basin. The waters of Yerrin (the Campaspe River) and its main tributary Koliban River(Coliban) are highly significant areas to the Dja Dja Wurrung people as well as the main storages within the Loddon System, such as Cairn Curran and Laanecoorie reservoir. Dja Dja Wurrung Country also encompasses the Bendigo and Clunes goldfields as well as the Loddon and Avoca River watersheds. The Northern Victoria Water Resource Plan area scope includes an abundance of wetlands and rivers that are currently of interest to Dja Dja Wurrung, such as Boort Lake, Bullock Creek, Tang Tang Swamp and the Bendigo Creek, and their confluences.

Dja Dja Wurrung ENTERPRISES

Dja Dja Wurrung Enterprises Pty Ltd, trading as 'Djandak', is the commercial arm of the Dja Dja Wurrung Clans Aboriginal Corporation. It is owned wholly by the Dja Dja Wurrung Clans Aboriginal Corporation and is a Supply Nation Certified Business operating since 2012.

Djandak primarily acts as a representative of the Dja Dja Wurrung Group regarding Natural Resource Management works. It is also the home of the Dja Dja Wurrung Water Unit and Kapa Gatjin (To Know Water) Advisory Group.

Djandak has a team of cultural and natural heritage experts and project staff who work on a wide range of natural and cultural resource management projects from practical on-ground works through to traditional ecological knowledge gathering and cultural education activities. Their services include natural resource management and conservation works, landscaping projects, environmental policy, strategy development and cultural services.

Djandak's purpose is motivated and guided by the aspirations detailed in Dhelkunya Dja, the Dja Dja Wurrung Country Plan.

"Hundreds of years ago, our Country was mostly covered in open forests and woodlands, providing us with the plants and animals that we used for food, medicine, shelter and customary practices. Today, though our Country is vastly changed, it still holds many important values. We feel a moral responsibility to care for our Country as it binds us to the past, present and future"

Dhelkunya Dja Country Plan

The Kapa Gatjin Advisory (To Know Water) Group is the water-focused subdivision of the 'Dhelkunya Dja Land Management Board'. Its purpose within Djandak is to support and advise the Kapa Gatjin Water Unit on the execution of the 'Rivers and Waterways' chapter of the Dja Dja Wurrung 'Dhelkunya Dja Country Plan'. The Kapa Gatjin Advisory Group is representative of the wider Dja Dja Wurrung community in water-related matters and is to be involved in all decision making and consultation within Victoria's Water Resource Plan.

The function of the Kapa Gatjin Advisory Group is to:

- build on our creation storylines and connection to Djandak (Country) with our mob
- to support and advise the Kapa Gatjin Water Unit in developing and delivering the Country Plan aspirations for Rivers and Waterways
- work with the RAP to identify and care for cultural sites near Dja Dja Wurrung waterways
- promote cultural education between Dja Dja Wurrung Traditional Owners and Land and Gatjin (water) users and the broader community
- compile our cultural knowledge in order to produce resources to share knowledge with our community
- promote and build on partnerships with relevant stakeholders to collaborate on joint projects
- revive and conduct our cultural ceremonies associated with water
- assist with developing and progressing projects from Aboriginal Waterways Assessment (AWA) reports
- promote Dja Dja Wurrung self-determination through capacity and rapport building to ensure a legitimate and distinguished role in decision making and management of our waterways.

11.3.2.2 Agreements that influence water policy, partnerships, rights

Through their membership with the Murray and Lower Darling Rivers Indigenous Nations (MLDRIN) and the Federation of Victoria Traditional Owners Corporation (FVTOC), Dja Dja Wurrung actively participate in representing the rights of Traditional Owner groups in water policy and governance in Victoria and the Murray Darling Basin. Dja Dja Wurrung has also conducted an Aboriginal Waterways Assessment in May 2017 along the Coliban River and Upper Coliban Catchment Area alongside MLDRIN and North Central Catchment Management Authority, both of whom provided invaluable support to the project.

"The North Central Catchment Management Authority will ensure that the corporation is provided with the opportunity to be actively engaged in regional natural resource management strategic planning processes for which it is accountable in the Agreement area.

NCCMA will partner with Dja Dja Wurrung to develop joint project funding proposals to undertake natural resource management-related projects in partnership where suitable fund sources can be identified."

Dja Dja Wurrung and North Central Catchment Management Authority Partnership Statement

The Dja Dja Wurrung Recognition Settlement Agreement (RSA) includes 'Natural Resource Management Participation Strategies', under which the State of Victoria has committed to provide the Dja Dja Wurrung people (through DDWCAC) with the opportunity to 'actively participate in the development and review of natural resource management policies and strategic plans, and regional management and action plans' within the Agreement area, in order to further Dja Dja Wurrung people's rights and interests in water.

Schedule 16 – Natural Resources Management Participation Strategies of the Dja Dja Wurrung Settlement Agreement includes partnership arrangements between Dja Dja Wurrung and North Central CMA, which commits both parties to further developing a mutually beneficial relationship that will allow the organisations to work proactively together to build capacity, capability and sustainability. The MoU (memorandum of understanding) aims to define and further the relationship between the two organisations to deliver on North Central CMA commitments regarding the Dja Dja Wurrung RSA and to deliver outcomes that go beyond compliance with the RSA.

The RSA also includes a draft authorisation order, which authorises the take and use of water from a waterway or bore to meet any personal, domestic or non-commercial communal needs of Dja Dja Wurrung people. This order authorises the taking and use of water from a waterway or bore only where the Dja Dja Wurrung member has access to a waterway or bore in the circumstances set out in section 8(1) of the Victorian Water Act.

A 'Traditional Owner Land Management Agreement' is held between the state and Dja Dja Wurrung people and sets out principles to guide joint management of six parks that make up the Dja Dja Wurrung appointed land held under Aboriginal title by the Dja Dja Wurrung Clans Aboriginal Corporation. Parks include: Hepburn Regional Park, Paddys Ranges State Park, Kooyoora State Park, Wehla Conservation Reserve, Greater Bendigo National Park and Kara Kara National Park.

Dja Dja Wurrung have also secured freehold titles to three significant sites – Mt Barker (Yapenya), Carisbrook and Franklinford (Lalgambrook) in addition to the six parks jointly managed with the State.

The Dhelkunya Dja Land Management Board works in partnership with the Government to develop and implement joint management plans for these sites that consider all nine assets of the Dhelkunya Dja Country Plan; the Jaara people, cultural practices and customs, cultural heritage, flora and fauna/bushtucker and medicine, rivers and waterways, land and climate, self-determination of Dja Dja Wurrung people, Traditional Owner economy under Dja Dja Wurrung Enterprises, and joint management.

11.3.2.3 Preferred means of engagement

Dja Dja Wurrung has managed their own consultation processes to engage Dja Dja Wurrung people in the development of the Northern Victoria Resource Plan, with support and involvement where required from the Water Resource Plan team at DELWP.

Dja Dja Wurrung Enterprises were funded through the inaugural Aboriginal Water Grants Program to employ a Water Policy Officer and the Kapa Gatjin (To Know Water) Advisory Group. As a result, Dja Dja Wurrung are in a position where we are able to coordinate consultation independently with Dja Dja Wurrung people, provided appropriate resourcing is made available for consultation activities. Dja Dja Wurrung therefore requests that the Kapa Gatjin Water Policy Officer is to remain first point of contact for all matters relating to the Water Resource Plan, which will then be communicated to the Kapa Gatjin 'To Know Water' Advisory Group for further consideration and endorsement.

This is the preference of Dja Dja Wurrung as it reflects the group's rights to be engaged as an equal partner with the State and its agencies in land and water planning and management.

11.3.2.4 Water Resource Plan response

During consultation it has become clear that there is an ongoing process of peel back of values and uses of water occurring which will continue to inform the Victoria's Water Resource Plan in the coming years. To ensure that this process and the learnings of this process can be captured by Victoria's Water Resource Plans it is proposed that Dja Dja Wurrung be supported by DELWP in the annual review and updating of a Country Plan specific to Water in the water resource plan area. This Country Plan will build on the rivers and waterways Goal of Dhelkunya Dja and provide guidance as to Dja Dja Wurrung water policy, values and uses of water and objectives and desired outcomes for management which will greatly enhance the process and support Dja Dja Wurrung in providing ongoing engagement and input into the Water Resource Plan implementation.

Due to the constant evolution of water management over time, we feel it would be practical for Dja Dja Wurrung to produce a dynamic and flexible document that will, as previously mentioned, refine and review the rivers and waterways chapter of the Dhelkunya Dja Country Plan to provide more detailed and meaningful input that can better sustain Victoria's water resource plans over their 10 year term. The document will create a firm basis for further planning and development regarding Dja Dja Wurrung values, uses, objectives and outcomes in water, and will allow us to take a progressive and all-inclusive approach in describing and implementing our cultural values into the Water Resource Plan.

We propose that the Dhelkunya Dja Country Plan is referenced within Victoria's water resource plan to allow it to remain a 'live' scheduled document that will remain under Dja Dja Wurrung's control and discretion, allowing for continuous capture and review of Dja Dja Wurrung water policy over time. This will permit us to be ongoing, flexible and proactive with our objectives/outcomes & values/uses without restricting our ideals or compromising how we wish to communicate our priorities and objectives for managing water on Country within Victoria's water resource plans.

We also ask it is acknowledged that it is not possible to include all of Dja Dja Wurrung's cultural water aspirations, uses, values, and places of cultural importance into one perspective, as our values are diverse and complex and can widely differ between family and clan groups. Dja Dja Wurrung request that the naming or identification of specific wetlands in the Water Resource Plan does not compromise the importance of those not listed, and that any cultural values provided in this response do not fully define the interests and beliefs of Dja Dja Wurrung people, which are multifaceted and cannot be defined through a single standpoint or response.

It is also requested that the Dja Dja Wurrung Intellectual Property and Research Policy (IP) protocols are respected and followed. The IP protocols outline measures intended to ensure that the cultural and intellectual property of Dja Dja Wurrung Traditional Owners is protected and respected. This reflects the rights and protections of Aboriginal Cultural Heritage as presented in the 'Aboriginal Heritage Act 2006', and the 'United Nations Declaration on the Rights of Indigenous Peoples'.

The IP policy necessitates that Cultural Heritage and Cultural Knowledge are morally and legally the responsibility of their respective Traditional Owners, and that any Cultural Knowledge provided by Dja Dja Wurrung in this response is therefore the intellectual property of the Dja Dja Wurrung community. The collection and further use of cultural knowledge provided requires Free, Prior and Informed Consent of the Dja Dja Wurrung people, whom hold the right to keep confidential any information concerning their cultural practises, traditions and beliefs.

We feel confident that through this proposed process, we can make a significant ongoing contribution to Victoria's water management and entitlement planning, policy and implementation by working in partnership with DELWP to progress our shared objectives of greater Traditional Owner involvement in water management, while simultaneously supporting self-determination and independence for Dja Dja Wurrung people in regard to water governance.

Objectives and Outcomes

Table 33: Dja Dja Wurrung - Objectives

Objectives:
Dja Dja Wurrung people see their land and its waterways as central to their cultural identity and aspirations for community and economic development. As stated in the Dhelkunya Dja Country Plan, the Dja Dja Wurrung people wish to:
• Ensure all of our waterways are healthy, with the right water in the right place at the right time to meet the needs of the environment, Jaara people and the broader community
• Have a recognised and legitimate role in water governance, with genuine consultation in policy development and a recognised role in decision-making about our waterways
• Secure adequate and equitable water rights that meet our social, cultural, spiritual, economic and environmental needs
• Share our creation stories to teach people of how water works in the landscape
• Ensure that Dja Dja Wurrung cultural and spiritual values for gatjin are respected, acknowledged and celebrated.
• Government to work support Dja Dja Wurrung to continue to develop and unpack the rivers and waterways goal of the Dhelkunya Dja Country Plan to inform Dja Dja Wurrung values and uses for water
• Dja Dja Wurrung to be provided resourcing to develop more Seasonal Watering Plans for Country and to gain resourcing to develop more Environmental Watering Plans for Country

continued

Objectives:
• Dja Dja Wurrung seeks the opportunity to access water and achieve visions without government involvement
• Make water accessible for all Dja Dja Wurrung people
• Acquire (tradeable) water entitlements (purchase, seek donations from private donors, access surplus water entitlements created through efficiency mechanisms under the Murray Darling Basin Plan) or purchase property with water entitlements attached
• Work with water corporations to influence their delivery of urban or irrigation water. Use to enhance environmental flows to deliver on cultural objectives
• Use Section 8A rights under TOSA to access water
• Dja Dja Wurrung to become manager of Environmental water
• Participation with CMAs and water corporations to collaborate to develop and implement plans for the protection and rehabilitation of our waterways
• Work with CMA, VEWH and CEWH and other relevant government bodies so the release of environmental water, when available, can be timed with cultural outcomes and community events
• Know how much water is going in/out of Country. Take stance on water consumers and research how much major consumers use. Develop relationships with other water users
• Investigate water used on Country for financial/commercial gain. Investigate profits and GST to be shared with Dja Dja Wurrung. Add Dja Dja Wurrung logo to products sold for commercial gain (ie bottled water)
• Identify framework to decide which sites need cultural water, and how to identify them, i.e. perform case studies on possible sites, environmental watering plans, aboriginal waterway assessments.
• Government to ensure Dja Dja Wurrung is invited to elect representatives onto advisory and working groups of stakeholders and partners.
• Expand our knowledge of water markets and trading to develop guidelines and policies for buying/selling water.
• Be enabled to follow up on identified sites and their water rights: Mt Franklin, Mt Barker, Carisbrook.
• Advocate for Indigenous Land Corporation (ILC) to participate in water as well as land.
• Develop new partnerships and review existing ones. Place measures (ie. Partnership evaluation tools) to make partnerships realistic/accountable
• Build cultural competency with partners, ie through cultural awareness workshops
• Dja Dja Wurrung to have more involvement in agriculture, farming, green/recycled water and be involved in Government decision making and planning.
• Consult other mobs to compare positions, share insights. Follow precedents that may have worked for them, learn from mistakes that may not have worked. Possibilities to trade water between mobs, creation of new Aboriginal water market.
• Make cultural activities more accessible on wetland sites.

continued

Objectives:
• Create opportunities to involve the Dja Dja Wurrung community in the development and care of sites by training Jaara in water related matters i.e. monitoring
• Develop our economic independence through education and training to build our capacity.
• Manage sites to support cultural activity and healing of Country.
• Negotiate to develop a framework for access and management of all natural resources i.e. cultural burning.
• Government to facilitate for land and water to be managed simultaneously to secure a cultural and holistic approach in water management.
• Secure both land and water rights to sites and wetlands.
• Increase community involvement at sites; interpretative and educational signage/audio, spiritual/healing places, vegetation (cultural, medicinal), wildlife, tourism opportunities (cultural walks, school programs, tourist attractions).
• Government to resource better weed removal and weed control of sites and for the introduction of native and/or endangered fauna back onto Country. ie) quolls, dingoes, emus, native fish and the removal of aggressive and invasive species that negatively affect the ability of indigenous species to survive.
• Revegetate wetlands to allow for food and fibre resources, and native, ecologically and culturally important plants.
• Build capacity through employing, procuring and training Dja Dja Wurrung peoples in water management and planning. Increase employment, training and economic development for Dja Dja Wurrung people through water-related projects.
• Conduct ongoing monitoring and maintenance of sites and waterways, preferably by Dja Dja Wurrung people.
• Employment and training of Dja Dja Wurrung people to undertake cultural monitoring and interpretation.
• Restore Cultural Flows and recreate Jaara Traditional ecological knowledge to inform management practises that heal Country.
• Management of impacts that degrade the natural character/health of sites or alter the natural flow of a waterway. i.e. bridges, fenced areas, rubbish, farming activity (grazing, cropping, runoff), land use upstream

Table 34: Dja Dja Wurrung - Outcomes

Outcomes
To empower, improve and promote the physical, social, emotional, cultural, spiritual and ecological wellbeing of Country including gatjin, waterways, individuals, the Dja Dja Wurrung community and wider society. To achieve this, we expect the State to directly engage with the Djandak (through their water policy officer) in relation to water management, delivery and resourcing that supports the maturation of a Dja Dja Wurrung Water Unit through the initial following processes:
• resourcing, including funding for Dja Dja Wurrung

continued

Outcomes
• to continue to develop and unpack the rivers and waterways goal of the Dhelkunya Dja Country Plan ensuring we continue to communicate the importance of Dja Dja Wurrung values and uses for water for the successful implementation of Victoria's North and Murray Water Resource Plan
• for Kapa Gatjin Advisory Group to provide review and feedback on the Water Resource Plan and associated processes on an ongoing basis.
• to develop and implement a transition plan within 12 months of accreditation of Victoria's North and Murray Water Resource Plan to empower Dja Dja Wurrung to achieve self-determination of gatjin on Country, including delivery of Seasonal Water Proposals and Environmental Water Plans.
• to develop Seasonal Watering Proposals for Country
• to develop Environmental Water Plans, integrating cultural knowledge and western science, initially for all waterways and wetlands with recognised Dja Dja Wurrung names.
• to maintain an Aboriginal Water Policy Officer position, to implement, develop and inform policy positions, processes and procedures with the support of the State.
• to deliver Aboriginal Water Assessments (on a seasonal basis) to inform all the above (at least 6 per year)
• As per schedule 16.4 of the Dja Dja Wurrung Recognition and Settlement Agreement
• Meet with relevant State government investors covered by this plan to develop funding proposals to support the above as well as relevant Dja Dja Wurrung values and uses for water in delivery of this Water Resource Plan (ie VIF, VEWH, etc)

11.3.2.5 Values and uses

The following table shows the association between objectives, outcomes, and values and uses:

Table 35: Dja Dja Wurrung - The association between objectives, outcomes, and values and uses

Objective	Outcome	Values and Uses
Continue to develop and unpack the *rivers and waterways* goal of the *Dhelkunya Dja Country Plan* to inform Dja Dja Wurrung values and uses for water	• Self-determination • Build on Dja Dja Wurrung water policy • Can be used to inform Dja Dja Wurrung values and uses for water • Better equipped to care for Country	• Social • Economic • Cultural • Environmental • Educational
Gain resourcing to develop more Seasonal Watering Plans for Country Gain resourcing to develop more Environmental Watering Plans for Country	• Better equipped to care for Country • Can be used to inform management practises • Will assist in directly achieving Country Plan aspirations • Capacity building	• Social • Economic • Aboriginal-environmental • Environmental

continued

Objective	Outcome	Values and Uses
Opportunity to access water and achieve visions without government involvement	• Self-determination, self-sufficiency • Capacity building	• Social • Economic
Make water accessible for all Dja Dja Wurrung people	• Water access for all Dja Dja Wurrung people • 'Closing the gap'	• Social • Economic
Acquire (tradeable) water entitlements (purchase, seek donations from private donors, access surplus water entitlements created through efficiency mechanisms under MDBP) or purchase property with water entitlements attached	• Use to deliver cultural flows • Investment; sell allocations in dry years • Donate or sell at low cost to DDW community members working land • Deliver environmental water to wetlands on private lands • Use for agricultural production • Deliver Aboriginal environmental water to on site wetlands	• Aboriginal environmental • Cultural • Economic • Social
Work with water corporations to influence their delivery of urban or irrigation water. Use to enhance environmental flows to deliver on cultural objectives	• Use to enhance environmental flows to deliver on cultural objectives • Partnership	• Aboriginal environmental • Cultural
Use Section 8A rights under TOSA to access water	• Cultural flows • Water for cultural purposes	• Aboriginal environmental • Cultural • Economic • Social
Become manager of environmental water Participation with CMAs and water corporations to collaborate to develop and implement plans for the protection and rehabilitation of our waterways	• Take on management responsibilities that CMAs perform in delivering environmental water • Self determination • Establish a recognised and legitimate role in water management/planning • Development partnerships	• Aboriginal environmental • Social • Economic • Cultural • Environmental
Work with CMA, VEWH and CEWH and other relevant government bodies so the release of environmental water, when available, can be timed with cultural outcomes and community events	• Influence delivery of environmental water to best suit our cultural needs • Self-determination • Healing of Country and culture • Development of partnerships	• Aboriginal environmental • Social • Environmental • Cultural

continued

Objective	Outcome	Values and Uses
Know how much water is going in/ out of Country. Take stance on water consumers and research how much major consumers use. Develop relationships with other water users.	• Better able to monitor water on Country • Capacity building • Know how much water is going in and out of Country • Better equipped to take a stance on water consumers and their use of water	• Economic • Aboriginal environmental • Educational
Investigate water used on Country for financial/commercial gain. Suggestions that their profits and GST should be shared with Dja Dja Wurrung. Potentially add Dja Dja Wurrung logo to products sold for commercial gain (ie bottled water)	• Economic and business benefit • Closing the gap • Capacity building	• Economic • Social • Educational
Identify framework to decide which sites need cultural water, and how to identify them. ie) perform case studies on possible sites, EWPs, AWAs	• Framework will allow us to have a consistent approach to watering • Able to manage cultural water more effectively + efficiently • Information gathered can be used to inform future management practises and decisions • Capacity building	• Social • Aboriginal Environmental • Cultural • Educational
Elect representatives onto technical advisory groups of stakeholders and partners	• Recognised and legitimate role in water management • Capacity building • Building partnerships	• Social • Educational
Contact a water broker to expand our knowledge of water markets and trading to develop guidelines and policies for buying/selling water. Contact MILDRN for suggestions on how to use it to our advantage.	• Capacity building • Will allow us to develop guidelines and policies for buying and selling water • Make it easier to purchase water entitlements	• Social • Economic • Educational
Follow up on identified sites and their water rights: Mt Franklin, Mt Barker, Carisbrook. Argue ILC for water as well as land	• Learn how we can access water rights as well as land rights • Potentially gain access to water • Opportunity to manage water and land rights simultaneously (in these areas)	• Cultural • Environmental • Social

continued

Objective	Outcome	Values and Uses
Develop new partnerships and review existing ones. Place measures (i.e. Partnership evaluation tools) to make partnerships realistic/ accountable.	• Realistic and legitimate partnerships • Governance • Make partnerships transparent and accountable • Be seen as an equal partner rather than a stakeholder or contributor	• Social
Build cultural competency with partners ie) through cultural awareness workshops.	• Secure and respectful partnerships • Equity and respect • Reconciliation • Raising awareness	• Social • Cultural • Educational
More involvement in agriculture, farming, green/recycled water.	• Environmentally friendly ways to access and use water • Potential economic opportunities	• Environmental • Economic
It would be valuable to eventually consult other mobs to compare positions, share insights. Follow precedents that may have worked for them, learn from mistakes that may not have worked. Possibilities to trade water between mobs, creation of new Aboriginal water market.	• Keeping cultural water cultural • Sharing insights will reduce mistakes and misinformation. Learning from others mistakes • Creation of Aboriginal water forum • Self-determination • The creation of an Aboriginal water market may further improve relationships between mobs, allowing us to mutually work together towards a single united goal – to heal Country	• Social • Cultural • Educational • Economic
Possibility to plan and make cultural activities more accessible on wetland sites.	• Increased accessibility to sites • Able to use wetlands freely for cultural activities	• Cultural • Social
Create opportunities to involve the Dja Dja Wurrung community in the development and care of sites by training Dja Dja Wurrung people in water related matters i.e. monitoring Develop our economic independence through education and training to build our capacity.	• Capacity building and training • Involving mob in caring for their Country • The more people trained in water, the larger the voice we have. • Better able to care for our Country • Develop self-determination through economic ventures with water (ie tourism)	• Social • Cultural • Economic • Aboriginal environmental • Environmental • Educational

continued

Objective	Outcome	Values and Uses
Manage sites to support cultural activity and healing of Country. Negotiate to develop a framework for access and management of all natural resources i.e. cultural burning. Find a way to allow for land and water to be managed simultaneously to secure a cultural and holistic approach in water management. Secure both land and water rights to sites and wetlands.	• Consistent management framework for natural resources that respects cultural knowledge and standards • More control over all our natural resources and the benefits of managing them • Combining land, water, fire, cultural, societal and economical values to manage and care for Country in a Traditional way. • Managing land and water rights as one entity will allow for a holistic approach in healing Country.	• Social • Cultural • Aboriginal environmental
Community involvement at sites; interpretative and educational signage/audio, spiritual/healing places, vegetation (cultural, medicinal), wildlife, tourism opportunities (cultural walks, school programs, tourist attractions).	• Community involvement • Educates general public • Share stories and culture • Tourism opportunities • Revegetation will allow for resources such as medicinal plants, grasses for weaving etc	• Educational • Social • Cultural • Economic
Weed removal and weed control of sites. Introducing native and/or endangered fauna back onto Country. i.e. quolls, dingoes, emus, native fish Animal and pest (including fish) control of sites. Removal of aggressive and invasive species that negatively affect the ability of indigenous species to survive. Revegetating wetlands to allow for food and fibre resources, and native, ecologically and culturally important plants.	• Revegetation will allow for resources such as medicinal plants, grasses for weaving etc • Using traditional ecological knowledge to restore Country and native flora/fauna. • Animal, pest and weed control will manage any nuisance plants or pests that may have adverse effects on the environment and other fauna • Promotes traditional practises by allowing Country to provide us with cultural materials our ancestors used	• Social • Cultural • Environmental • Aboriginal-environmental
Build capacity through employing, procuring and training Dja Dja Wurrung peoples in water management and planning. Increase employment, training and economic development for Dja Dja Wurrung people through water-related projects.	• Capacity building and training • Self-determination • Increase in employment and economic development • Involve Dja Dja Wurrung people in the management of their Country and waterways	• Educational • Cultural • Economic • Aboriginal-environmental • Social

continued

Objective	Outcome	Values and Uses
Ongoing monitoring and maintenance of sites and waterways, preferably by Dja Dja Wurrung people. Employment and training of Dja Dja Wurrung people to undertake cultural monitoring and interpretation.	• Consistent maintenance of sites and waterways will improve their health while providing employment and capacity-building opportunities for Dja Dja Wurrung people.	
Restore Cultural Flows and recreate Djaara Traditional ecological knowledge to inform management practises that heal country	• Restoration of cultural flows • Better able to care for Country • Sharing of stories and knowledge • Healing of Country through traditional methods	• Cultural • Environmental • Aboriginal-environmental • Social
Management of impacts that degrade the natural character/ health of sites or alter the natural flow of a waterway. ie) bridges, fenced areas, rubbish, farming activity (grazing, cropping, runoff), land use upstream	• Minimising impacts such as upstream land use will allow for the natural flows of waterways to be preserved. • Assist in returning Country to its natural state, while reducing man-made disruption of natural flows that undermine both cultural and ecological values • Management of litter, farmer runoff, rubbish, vandalism etc will allow for improved site health and water quality	• Environmental • Cultural • Aboriginal-environmental

Values and uses case study no. 1

The Aboriginal Waterways Assessment (AWA) is a tool for Aboriginal communities to consistently measure and prioritise river/wetland health so that they are better placed to negotiate for their Country's water needs. The tool is used to capture and record information about the cultural values, uses, and health of waterways and wetlands to assist Aboriginal people to be more meaningfully involved in water planning processes on their Country.

Out on country, the assessment teams share information, hold in-depth discussions, observe and closely inspect sites and build on collective data to complete each site survey form with a focus on various aspects of the waterway and its condition. The team hear presentations from key speakers about the site's condition, history and significance, and record scores and relevant information about cultural values and waterway health.

While conducting their AWA's, Dja Dja Wurrung participants documented feeling a strong sense of connection, healing and spiritual sustenance from their Country and ancestral spirits. The number of the Cultural Heritage sites visited during the AWA's are supportive of this, and evidence a legacy of occupation that shows the important connection between Jaara (Dja Dja Wurrung people) and gatjin(water). Cultural heritage indicators and sites show how and where Jaara have used the waterways in the past, while the AWA tool helps us to record traditional ecological knowledge to continue to inform the management of our waterways today.

Culturally important information	Environmentally important information
Food and fibre knowledge	History of the site
Water flows and regimes that support cultural practices and customs	Water quality and quantity
Traditionally ecological and botanical knowledge used to care for Country	Revegetation needs
Presence of plants and animals used traditionally for food, medicine, shelter and tools	Ecologically important plants and vegetation communities
Oral cultural knowledge about the area	Presence and diversity of fish species
Presence and diversity of native flora and fauna	Presence and diversity of native flora and fauna
Cultural tradition activities such as hunting, fishing and ceremony	Geological and archaeological values
Dreaming stories and storylines	Soil and water health
Intangible heritage (sites and stories) associated with water and water places	Identification of risks and threats to be managed
Tangible cultural heritage sites	Landscape types

"We feel a moral responsibility to care for our Country as it binds us to the past, present and future."

Dhelkunya Dja Country Plan

The cultural and environmental data gathered from the AWA's assists Dja Dja Wurrung in identifying key cultural and environmental values specific to each area. This provides a clear basis for informed management objectives to be developed that will support these values and ensure their progress, to help further advance Dja Dja Wurrung priorities for managing our rivers and waterways. It also provides opportunities for Dja Dja Wurrung to identify how a Traditional Owner group can guide effective use of water allocation, and to assist in the decision making and planning over a range of projects and water policy.

"Water is number 1. Without it trees, birdlife species and vegetation suffer greatly."

Dja Dja Wurrung participant during an Aboriginal Waterway Assessment at Tang Tang Swamp

Values and uses case study no. 2

The lakes and wetlands of the Boort wetlands are of extremely high cultural significance to Dja Dja Wurrung people. The greater Lake Boort contains the highest concentration of scarred trees in Victoria. Lake Lyndger was an important meeting ground, with groups of cooking mounds along the southern shoreline indicating that people met there in large groups. Kinypanial Creek is an intermittent creek along which numerous scarred trees and other significant cultural sites such as mounds, camp sites and artefact scatters have been recorded.

The Boort AWA results have been used to contribute to a management plan for the Boort wetland complex, which is currently a focus of management activity for Dja Dja Wurrung. It has also been used to inform water planning and delivery of environmental water to the site alongside the North Central CMA.

Tang Tang Swamp was identified by Dja Dja Wurrung AWA team as a highly important place within a wider catchment that is culturally significant to the Dja Dja Wurrung people. It features River Red Gums, significant marker 'ring trees', scar trees, basket weaving grasses and many other interesting cultural features. The Swamp is managed as a Wildlife Reserve is registered on the National Directory of Important Wetlands due to brolga nesting and many other visiting migratory waterbirds. It also contains ecologically important plants and vegetation communities such as Southern Cane Grass, aquatic plants and patches of rare native grassland.

Community perspectives and insights captured in the Tang Tang Swamp Aboriginal Waterways Assessment report will be used to further assist Dja Dja Wurrung people to make decisions about how they would like the Swamp to be managed, and help land and water managers to have greater insight into the cultural values of Tang Tang Swamp.

Today, Dja Dja Wurrung Traditional Owners are actively engaged in recording and preserving these sites. This work includes conducting cultural heritage surveys and salvaging artefacts effected by land use activities.

The Coliban River is an important part of the broader Dja Dja Wurrung cultural landscape. Scar trees, burial sites, artefacts, stone quarries and other cultural heritage sites have been recorded along the waterway.

Large stone tool scatters and significant Tachylite quarry sites can be found along the main channel and adjacent to storages in the Upper Coliban, demonstrating continuous use of the land and resources along the waterway for many thousands of years.

The Upper Coliban AWA has continued to inform a variety of projects, such as the South West Loddon Pipeline project delivered by GWM Water and the Integrated Catchment Management Plan that is being developed for the waterway.

As the AWA provides a consistent method to identify cultural values, assess cultural health of waterways and prioritise water management and regulation it can assist the decision making and planning processes of a range of projects. This is being demonstrated where the AWA's provide the research to inform policy development and infrastructure investment to provide water management in support of cultural values and assets.

11.3.2.6 Cultural flows

Despite parts of the Country being recognised and returned to their Traditional Owners, there is still a strong disadvantage in the liberties of Indigenous people in Australia, as they do not have the same access to water rights as they do land rights. This is due to the introduction of the National Water Initiative (NWI), which saw the creation of property rights to water and tradeable water entitlements as necessary to address environmental damage and poor water management practises at the time. This was exacerbated through land and water rights being separated, this was put into effect in 2005 when the Victorian Water Act was amended to "unbundle" water for land title. Prior to this legislation, water and land rights were one entity and were allocated to people as they need it, at minimal or no cost to users. The uncoupling of water and land rights caused unintended consequences for Aboriginal groups, who, without access points or funds required to buy into water, cannot benefit from market-driven legislation.

There are instances, such as in Dja Dja Wurrung's case, of gaining access to land, but being excluded in enjoying rights to water on that same land. Dja Dja Wurrung people's relationship with water is holistic; combining land, water, culture, society and economy - relying equally on rivers, groundwater, wetlands and their Country to access cultural values, regardless of tangibility. Consequently, water and land rights are considered to be interwoven with each other, and it is of Dja Dja Wurrung peoples belief that they should be managed as so.

Therefore, it is in Dja Dja Wurrung's best interests and long-term objectives to gain access and ownership to both water and land rights on our Country, and to enjoy and manage these rights simultaneously to support our ongoing cultural and spiritual connection to our Country and waterways.

11.3.3 First Peoples of the Millewa-Mallee: Nations of Nyeri Nyeri, Ngintait and Latje Latje

Objectives, outcomes and values and uses for water were workshopped, and signed off at separate nation meetings for Latje Latje, Ngintait and Nyeri Nyeri. The final contribution was signed off by the First Peoples of the Millewa-Mallee board, the membership of which includes a Latje Latje MLDRIN delegate, Ngintait MLDRIN delegate and a Nyeri Nyeri MLDRIN delegate.

11.3.3.1 Description

"We, the First Peoples of the Millewa-Mallee are people of the river and the scrub and desert area to the south and west of it. We are descendent from families whose ancestors are part of this Country; ancestors who cared for it, sang to it, danced on it and kept it strong and fat. The ancestors taught their descendants through each generation about their responsibility to care for their Country, despite the decimation caused by colonisation. Even when we were taken away, we still belonged. Country is family."

The First Peoples of the Millewa-Mallee have lodged a native title claim under the *Native Title Act 1993* (Cth) over an area in the north west of Victoria, that runs south of the Murray River to the Mallee Highway and west from the Calder Highway to the South Australian border, including the Murray-Sunset National Park. First Peoples of the Millewa-Mallee are also working through the process towards settlement with the State of Victoria under the *Traditional Owner Settlement Act 2010* (Vic) (the Settlement Act) in relation to the same area.

First Peoples of the Millewa-Mallee Aboriginal Corporation (FPMMAC) is the representative corporation formed by First Peoples of the Millewa-Mallee for the purposes of their Settlement Act processes. FPMMAC has recently been appointed as a registered Aboriginal party under the *Aboriginal Heritage Act 2006* (Vic) for the northern part of the First Peoples of the Millewa-Mallee claim area. In addition, FPMMAC currently has an application for registered Aboriginal party status before the Victorian Aboriginal Heritage Council in relation to the southern part of the First Peoples of the Millewa-Mallee claim area.

Eligibility to be part of First Peoples of the Millewa-Mallee is not based on language groups or Nations. First Peoples of the Millewa-Mallee is comprised of family groups, descended from apical ancestors connected to the area of the First Peoples of the Millewa-Mallee claim.

Individuals within First Peoples of the Millewa-Mallee identify as Latji Latji, Nyeri Nyeri and Ngintait, but these identifications are not the basis on which these individuals group together as First Peoples of the Millewa-Mallee.

The First Peoples of the Millewa-Mallee are connected to all surface and groundwater within their claim area, and in addition have significant interest and have indicated traditional cultural history in areas beyond their claim area, which for Victoria includes Hattah-Kulkyne National Park, Robinvale and the Lake Tyrrell area.

First Peoples of the Millewa-Mallee Country embraces many sites of cultural significance, including ceremonial grounds, cultural heritage such as earth oven remains, scar trees, birthing trees, shell middens, song lines, ancestral resting places, story places, and sorry places of grievous historical trauma. Cultural sites and places in traditional First Peoples of the Millewa-

Mallee Country are a direct link between contemporary First Peoples of the Millewa-Mallee people and their ancestors who created and cared for those places.

11.3.3.2 Current or pending agreements

In October 2015, the First Peoples of the Millewa-Mallee filed a native title determination application under the Commonwealth Native Title Act 1993 in the Federal Court of Australia. The application was accepted for registration in May 2016 and is currently being case managed by the Federal Court of Australia.

The First Peoples of the Millewa-Mallee first lodged a Part A Threshold Statement under the Settlement Act with the Department of Justice and Regulation of the State of Victoria in May 2016. This was revised in November 2016 and further supplementary material was provided in May 2017. The First Peoples of the Millewa-Mallee lodged a Part B Threshold Statement with the Department of Justice and Regulation in January 2018.

FPMMAC has recently been appointed as a Registered Aboriginal Party (RAP) under the Aboriginal Heritage Act 2006 (Vic) for the northern part of the First Peoples of the Millewa-Mallee claim area. In addition, FPMMAC currently has an application for RAP status before the Victorian Aboriginal Heritage Council in relation to the southern part of the First Peoples of the Millewa- Mallee claim area.

The First Peoples of the Millewa-Mallee's proposed settlement area, native title claim area, and RAP area is geographically included in both the Northern Victoria and the Wimmera-Mallee water resource plans.

11.3.3.3 Existing reference /scoping materials

The First Peoples of the Millewa-Mallee are currently preparing their Country and Water Plan.

The Victorian Government funded through water resource plans an Aboriginal Waterway Assessment for the Ngintait Nation, conducted in 2018. The Ngintait Nation maintains intellectual property rights over the Aboriginal Waterway Assessment but will refer to it as they determine appropriate when working with government regarding water on Country.

Figure 28: Ngintait Nation Aboriginal Waterway Assessment 2018

11.3.3.4 Preferred means of engagement

The First Peoples of the Millewa-Mallee have informed the Victorian Government through the Water Resource Plan consultation that their preferred means of engagement with government agencies and government delivery partners is through the FPMMAC Board (the Board).

The Board is comprised of representatives of each of the identified family groups within First Peoples of the Millewa-Mallee (as required by its Rule Book), meets regularly throughout the year and is committed to ensure that the "right people speak for Country."

The Board considers requests for collaboration, participation or consultation, and determines how best to structure First Peoples of the Millewa-Mallee's involvement.

First Peoples of the Millewa-Mallee and/or Ngintait, Latji Latji, Nyeri Nyeri representatives who are consulting with Government must have the appropriate permission before sharing knowledge. Through ensuring Traditional Owner representatives to speak on behalf of Nations are approved, individuals consulting with government are protected from criticism. The approach also provides a record of information provided to government and when and how that information is able to be cited.

The majority of engagement on the Victorian Government water resource plans has been with First Peoples of the Millewa-Mallee as a whole and the FPMMAC Board. Due to the Victorian Government's consultation requirements and following discussion with MLDRIN delegates for the individual Nations, separate Nation-level meetings were held with those who identify as Latji Latji, Ngintait and Nyeri Nyeri in November 2018.

Choosing the First Peoples of the Millewa-Mallee Board as the first point of consultation adds to the recognition expressed in consultation:

"We work as a collective. We're strong when we stick together."

Approved at consecutive Nation meetings for the First Peoples of the Millewa-Mallee November 2018

Engagement requirements

As at November 2018, as First Peoples of the Millewa-Mallee have a registered native title claim, engagement within the First Peoples of the Millewa-Mallee claim area should be conducted by contacting the First Peoples of the Millewa-Mallee legal representative, First Nations Legal & Research Services on 03 9321 5300. In addition, it is expected any matters concerning Country, including water and works on Country undertaken in regard to water management, policy, planning or proposals, be referred to the First Peoples of the Millewa-Mallee in the first instance, via First Nations Legal & Research Services, with due consideration of the requirements of the Native Title Act 1993 and objectives relating to engagement contained in this water resource plan, most specifically:

- involving First Peoples of the Millewa-Mallee from the outset
- enabling FPMMAC and the right Traditional Owners to be involved as decision makers.

"We want the government to understand how we see the water. We have to be a part of the conversation everyone else is having about the river."

Approved at consecutive Nation meetings for the First Peoples of the Millewa-Mallee November 2018

As part of the First Peoples of the Millewa-Mallee Country and water planning process, the Department of Environment, Land, Water and Planning provided funding towards a film documenting a community gathering to talk about water and Country. Powerfully communicated in the film was the message:

"You government departments that sit behind us, we are all part of this. We can each and every one of us contribute. We don't stand behind anymore. We walk and work together."

Approved at consecutive Nation meetings for the First Peoples of the Millewa-Mallee November 2018

This message was reiterated and strengthened throughout the engagement process between the First Peoples of the Millewa-Mallee and the Victorian Government.

In May 2018 First Peoples of Millewa-Mallee held a community gathering at Lake Cullulleraine. This gathering was part of First Peoples of the Millewa-Mallee's process to develop a Country and Water Plan and talk about their contribution to Victoria's water resource plans and was supported by the Victorian Government water resource in a funding agreement. The gathering saw members from First Peoples of the Millewa-Mallee meet and talk about water, hear how water management had changed with current water regulation, and re-connect over why water was important to them, as Traditional Owners.

Figure 29: Water for the future: Lake Cullulleraine community gathering for the First Peoples of the Millewa-Mallee

Credit: DELWP

"Being together like the Lake Cullulleraine weekend gives us energy being together. We've been disconnected..... but together we understand our place on Country and as family."

Approved at consecutive Nation meetings for the First Peoples of the Millewa-Mallee November 2018

11.3.3.5 Water Resource Plan

Introduction

The Victorian Government has taken a source-based approach to its water resource plans and identified that First Peoples of the Millewa-Mallee had interests in groundwater contained within the Wimmera-Mallee Water Resource Plan. This approach also identified the majority of interests of this Traditional Owner group in relation to surface water – rivers, creeks, wetlands, lakes – related to water being sourced from the Murray River. Engagement with the First Peoples of the Millewa-Mallee therefore increased in 2018.

This approach, while being logical from a State Government perspective, has at times been challenging and counter-intuitive for Traditional Owner groups, whose boundaries do not replicate those of state governments, nor boundaries devised within state governments, such as those of water corporations, catchment management authorities, or public land managers. Water on Country is connected, and state Government boundaries have been expressed by the First Peoples of the Millewa-Mallee as an artificial concept over a landscape and culture that spans thousands upon thousands of years.

It has been agreed with the FPMMAC Board and through consultations, that the contribution from the First Peoples of the Millewa-Mallee for the Northern Victoria and the Wimmera-Malllee water resource plans be consistent.

On January 19th, 2018, the Department of Environment, Land, Water and Planning met with the FPMMAC Board to workshop preliminary objectives for water resource plans, specifically at that time, the Wimmera-Mallee Water Resource Plan, and agree on an engagement approach for the Northern Victoria Water Resource Plan.

At that meeting and at subsequent meetings of the FPMMAC Board, the FPMMAC Board endorsed the Department and the Federation of Victorian Traditional Owner Corporations to provide support to the First Peoples of the Millewa-Mallee to produce outcomes for both a First Peoples of the Millewa-Mallee Country and Water Plan and considered contributions, based on inclusive consultation, to the Victorian Government's water resource plans. The 12-month collaborative program will be further documented in the Northern Victoria Consultation Report.

In discussions with the First Peoples of the Millewa-Malee and at the culmination, through several meetings, the First Peoples of the Millewa-Mallee concluded that as a collective they sought to have a much bigger impact on water decisions, with a priority aim of getting water to Country that either hasn't received water due to changed water management regimes and competing priorities, or has more need than is being catered for to restore or maintain cultural outcomes.

The end goal of the First Peoples of the Millewa-Mallee is a process for input which fosters self-determination. Along the way to this goal, First Peoples of the Millewa-Mallee view having an equal say as a necessity. The First Peoples of the Millewa-Mallee's goal is that there is training for young Aboriginal people in caring for Country, whether in schools, with delivery partners, in negotiation skills and management, through training in plant identification and knowledge of

water catchments or through certificates in cultural heritage with strong emphasis on culture related to water.

Similarly, in relation to representation at a leadership level, the First Peoples of Millewa-Mallee seek more representation on government boards that make decisions in relation to Country and water.

> "There's a lack of communication with us from government. People are walking all over us, and our Country."
>
> **Statement agreed at Nation meetings, November 2018**

The Victorian Government through its water resource plans being developed in response to the Murray-Darling Basin Plan began discussions with the First Peoples of the Millewa-Mallee in 2017, initially in relation to the Wimmera-Mallee Water Resource Plan, and the Murrayville groundwater aquifer.

Objectives and outcomes

Table 36: Objectives and outcomes for First Peoples of the Millewa-Mallee

Objectives	Outcomes
Restock native fish species in waterways and bodies nominated by the First Peoples of the Millewa-Mallee, including BUT NOT LIMITED TO the Billabong at Berribee Homestead, where the fish will be able to mature and breed without unacceptable risk from predators or unfavourable water management regimes.	First Peoples of the Millewa-Mallee are empowered to make choices regarding locations and timing of fish releases based on sites that have cultural or historical importance, and areas that mirror fish movements and hunting in the past.
	First Peoples of the Millewa-Mallee can spend time looking after Country, fishing, yarning and sharing traditional ecological knowledge
All Traditional Owners to be able to physically access waterways of cultural significance, and not be impeded by changed land conditions resulting from water and land management, unclear or restrictive access conditions through rules or regulations, or lack of recognition of the needs of Elders and people with more limited access opportunities.	Access to waterways and water bodies of significance are improved for the First Peoples of the Millewa-Mallee through facility upgrades, rights and improved engagement and responsive management to understand and remove limitations.

continued

Objectives	Outcomes
Access to waterways for other water users, including anglers, boaters, swimmers, joggers, four-wheel drivers and trail bike riders be better controlled to keep people from encroaching on culturally significant sites.	Access to water for both cultural and recreational opportunities is more sustainably managed, protecting Country from erosion and degradation.
	Access to water for recreators is achieved in a culturally appropriate way, protecting culturally significant sites from damage caused by foot and vehicle traffic.
	Access to water for cultural purposes, including fishing, swimming and canoeing, is available to physically impaired Traditional Owners.
Traditional Owner involvement in environmental watering decisions be ongoing and include decisions on site selection, quantities and timing.	Cultural outcomes are identified and catered for when managing water for the environment to achieve shared benefits based on traditional ecological knowledge and cultural values.
Restore songlines as discussed while on Country, and restore them so Traditional Owners can spend time on Country in a place of high cultural significance	The song lines are restored with access to fresh water via the naturally formed waterholes and Traditional Owners are enabled to make decisions regarding the Songlines, including in relation to economic opportunities through tourism and cultural activities.
Representatives from First Peoples of the Millewa-Mallee sit on water boards, including the Catchment Management Authorities, and Lower Murray Water, and Government supports First Peoples of the Millewa-Mallee to be confident, know the rules and requirements, and know how best to share knowledge.	First Peoples of the Millewa-Mallee are at the forefront of decision making and evaluation, of socio-cultural-economic factors and informing and influencing decision makers of how to plan, manage and accommodate cultural outcomes.
The First Peoples of the Millewa-Mallee takes a lead role in monitoring and evaluation	The First Peoples of the Millewa-Mallee are respected, listened to, and resourced to monitor, evaluate and participate in research on Country to determine from a cultural perspective how water management and planning decisions are impacting positively or negatively on Country in regards to water quality, flora and fauna protection and regeneration health in particular in relation to culturally significant species, and the protection of culturally significant sites.

Objectives	Outcomes
The Victorian Government resources the First Peoples of the Millewa- Mallee to: employ an Aboriginal Water Officer to act as a liaison between the First Peoples of the Millewa-Mallee and Government and other bodies as agreed by the FPMMAC Board	Ongoing monitoring and evaluation of cultural outcomes is used to inform decisions regarding when and where to water sites of cultural significance, including but not limited to Lake Walla Walla, Kings Billabong, Brickworks Lagoon, Wallpolla Creek and Lyndsay Island. The First Peoples of the Millewa-Mallee are funded to make their own decisions about when and how it is best to evaluate the health of Country.
Fund and support monitoring and evaluation of changes to Country that occur following different watering regimes, decisions and climatic conditions.	The health of waterways and water bodies on the Country of the First Peoples of the Millewa-Mallee is improved, providing habitat for fish, birds and an environment that fosters native plant species important to cultural practices.
Funding for the First Peoples of the Millewa-Mallee to conduct Aboriginal Waterway Assessments at times determined by the Nation groups as the best way to gauge measures from a cultural perspective, including based on a seasonal calendar as determined by the First Peoples of the Millewa-Mallee based on their observations and cultural knowledge.	Self determination to monitor and evaluate river and wetland health from a cultural perspective.

Case study: Involvement in managing groundwater

The Murrayville Aquifer is within the Wimmera-Mallee Water Resource Plan area, and is of significant interest to the First Peoples of the Millewa-Mallee. The Murrayville Groundwater Management Area (GMA) occupies 1,578 km^2 centred on the town of Murrayville, between the Murray Sunset National Park and the Big Desert. It supports some irrigation, including supporting potatoes, cereals and olives, and provides some town water use and domestic and stock water supply.

In 2017, Grampians Wimmera Mallee Water (GWMWater) released a new Groundwater Management Plan for Murrayville, after consultation with the Murrayville Groundwater Advisory Committee. This plan provides a management strategy for the aquifer to ensure it is protected and used sustainably. A representative from the First People of the Millewa-Mallee presented to the Murrayville Groundwater Advisory Committee to provide a better understanding about Traditional Owners' interest in the aquifer, including accessing water for customary practices and commercial interests, and working with the authorities to protect the aquifer. These interests were captured broadly in the plan, through a statement for the future:

"The Local Management Plan (LMP) recognises and acknowledges that the Traditional Owners have a deep connection to their lands and water. The LMP identifies the need to develop a greater understanding of the cultural objectives and values relating to groundwater in the Murrayville area during the implementation of the LMP."

Murrayville Groundwater Local Management Plan
Grampians Wimmera Mallee Water, 2017

As a result of gatherings on Country through funding afforded through the Country and Water Plan, and the Victorian water resource plans, the First Peoples of the Millewa-Mallee are now seeking ongoing active discussion with land and water managers to communicate their understanding of the groundwater resource and its significance to Traditional Owners in the past, and into the future.

Values and uses

Conversations with the First Peoples of the Millewa-Mallee regarding values and uses have been generous and insightful, but there is a shared concern that documenting these discussions overtly in a government plan may have an adverse effect on active and continuing involvement of First Peoples of the Millewa-Mallee in policy and planning.

Therefore, Victoria's water resource plans for the First Peoples of Millewa-Mallee will refer to values and uses at a higher level, with the view that each and every conversation and decision relating to or impacting on cultural values and uses will involve First Peoples of Millewa-Mallee.

Values and uses include:

- It's important that water comes to the places we hunt and gather, not just to places others value, such as farms and irrigation.
- We need to have our gatherings, our corroborees and our ceremonies.
- If you've got no water, you can't regenerate land.
- We need to be able to look after Country, preserve Country, water those trees, manage erosion, restock waterways with native fish – native fish look after the waterways.
- As late as in the 1950s we still travelled by canoes, trapped, fished, traded with the farmers up and down the river, met friends, and met family.

11.3.3.6 Cultural flows

The First Peoples of the Millewa-Mallee are patently aware that water entitlements provide empowerment to make decisions outside the negotiation of managing and responding to multiple water users.

In addition to achieving cultural outcomes for Country, through water entitlement not bound to shared outcomes or benefactors, the First Peoples of Millewa-Mallee seek water entitlement to build their presence in using water for socio, economic, environmental and cultural outcomes. Three case studies to illustrate the relationships and the standard expected by FPMM for engagement on watering decisions include:

- Kings Billabong
- Lake Walla Walla
- Brickworks Lagoon

Figure 30: Cowanna and Brickworks billabongs are nationally significant wetlands at Merbein Common
Credit: DELWP

11.3.4 Martang Pty Ltd

Close to the source of the Wimmera-Mallee Water Resource Plan surface water area, Martang Pty Ltd represents the Djab Wurrung People. In September 2007, Martang was recognised as a Registered Aboriginal Party (RAP) by the Victorian Heritage Council under the *Victorian Aboriginal Heritage Act 2006* (the Act). The Act recognises Aboriginal people "as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage".

The Victorian Heritage Council recognised Martang as an organisation representing Traditional Owners able to demonstrate strong traditional links to the area. Martang's RAP status is for the south-west of its application area. This includes the upper reaches of the Wimmera River and tributaries such as Spring Creek.

Initial contact with Martang indicated interest in conducting an Aboriginal Waterway Assessment on Lake Lonsdale. While there is no approved RAP for Lake Lonsdale, it has been acknowledged in the Lake Lonsdale Management Plan that there are numerous sites of cultural significance (Lake Lonsdale Management Plan, 2012). The area is now part of a joint Native Title claim from Barengi Gadjin Land Council, Eastern Maar and Gunditj Mirring. It is expected an Aboriginal Waterway Assessment would require agreement by all interested Traditional Owner groups.

The Victorian Government will continue to work with Martang to realise its water objectives under water resource plans, as per the stated objectives of *Water for Victoria*.

11.3.5 Tati Tati Wadi Wadi

Tati Tati Wadi Wadi objectives, outcomes and values and uses for water were signed off at a nation meeting at Nyah. The final contribution was signed off by a Tati Tati MLDRIN delegate.

11.3.5.1 Description

Tati Tati Wadi Wadi First Nation are the Traditional Owners of their Country, river, lakes, creeks and lagoons and respectfully share tribal boundaries with the Mutti Mutti, Latji Latji, Wadi Wadi, Kurenji, Barkinji and Wergaia First Nations.

Tati Tati Wadi Wadi First Nation is represented in the Northern Victoria and Wimmera-Mallee water resource plans through interests around the Robinvale-Swan Hill area, with a focus on the Murray River and its tributaries and floodplains, and in Lake Tyrrell, a terminal lake at the edge of the Avoca Basin.

"The Tati Tati Wadi Wadi people have lived on this country since time immemorial, and we are the Sovereign First Nation of our River and Mallee country. We are the Traditional Owners of land, water, culture, language, ancestral heritage, law, customs, secret and sacred objects, songs, stories and artist impressions."

Brendan Kennedy, Tati Tati MLDRIN delegate May 2018

Tati Tati Wadi Wadi Aboriginal Corporation was established in May 2007.

11.3.5.2 Current or pending agreements

Tati Tati Nation is a member of Murray Lower Darling River Indigenous Nations (MLDRIN). It is a strong advocate of MDLRIN as an inclusive and representative organisation for Traditional Owner groups in the Murray-Darling Basin.

Tati Tati Wadi Wadi people have never ceded their sovereignty, nor have they consented nor authorised any others to govern over their people and Country.

Tati Tati Wadi Wadi in working with the Victorian Government to provide their contribution to water resource plans state that their responses to water resource planning are in no way an admission of traditional ownership of water other than that of the Tati Tati Wadi Wadi people. The Nation further emphasised that it does not surrender its waterways nor recognise ownership of their water to any State or Commonwealth governments or their representatives.

The Nation is not currently in any Native Title, Traditional Owner Settlement Act or Registered Aboriginal Party negotiations.

11.3.5.3 Existing reference/scoping materials

Tati Tati Wadi Wadi received funding through Victoria's water resource plans to conduct an Aboriginal Waterway Assessment at several sites of significance to the Nation. Tati Tati Wadi Wadi Traditional Owners group whom actually participated in the Aboriginal Waterway Assessment maintains intellectual copyright over the Aboriginal Waterway Assessment report.

Figure 31: Scar tree near Margooya Lagoon (Tati Tati Wadi Wadi workshop)

Back row from left: Toby Kirby, Chris Kennedy & Kobe, Jade Kennedy, Brendan Kennedy, Cahill Kennedy, Kathleen Terrick. Front row from left: Harold Ian Kirby, Robert (Bob) Kennedy, Rebecca Kennedy, Jessica Kennedy (girl), John F Kennedy, Thomas Kennedy & Jaylan Kennedy, Joshua Paul Pep Kirby, Bonney Kirby (girl), Jason Bootsy Kirby

Credit: DELWP

11.3.5.4 Preferred means of engagement

Tati Tati Wadi Wadi asserts that no one person can speak for Country. It's preferred means of engagement with government is initially through the participating Tati Tati MLDRIN delegate (Brendan Kennedy), who then determines the most effective way to engage more broadly.

Tati Tati Wadi Wadi has expressed strongly that decisions on how water is managed, including flow regimes, volumes, and structures to manage water, should be made in collaboration with Traditional Owners from both the perspective of improving cultural outcomes and applying cultural knowledge. In addition, government needs to understand discussions in regards to structures on Country should not be limited to cultural heritage as understood through the *Aboriginal Heritage Act 2006* (Vic).

During consultation for the Victorian Government water resource plans, Tati Tati Wadi Wadi has told government that it wants to be funded to work alongside the government to improve cultural outcomes on Country:

"We want to be driving this bus and be able to implement our cultural sciences – at the moment we are not even in the bus, we are sitting at the back of the trailer."

Brendan Kennedy, Margooya Lagoon, 2018

Tati Tati Wadi Wadi seeks ongoing and respectful conversations with government in a collaborative and co-managed structure, with access to talk directly to people in leadership positions, and not have their voice diluted through gatekeepers or through people with any conflicts of interest on Country.

Tati Tati Wadi Wadi asserts that collaboration should be cohesive across land, fire, biodiversity and water, to produce a shared perspective and better outcomes for Country.

"The Northern Victoria Water Resource Plan will provide the opportunity to build on these objectives and, through deeper engagement, identify specific outcomes for water on Country."

11.3.5.5 Water resource plans

Introduction

The Victorian Government commenced discussions with Tati Tati Wadi Wadi regarding water resource plans in 2017, following the funding of the Tati Tati Wadi Wadi Aboriginal Waterway Assessment. Tati Tati Wadi Wadi included Victorian Government water resource plan representatives in the Aboriginal Waterway Assessment at several locations and discussed some of the observations and emerging objectives for water in subsequent meetings in the Robinvale area. Representatives from Tati Tati Wadi Wadi met with the government and MLDRIN in a planning meeting to map out the formal approach to contributing to Victoria's water resource plans. Through MLDRIN, the Department of Environment, Land, Water and Planning provided funding for workshops and gatherings on Country, including a Nation meeting held on October 29 2018 to finalise the Water Resource Plan objectives and outcomes.

Over these meetings, workshops and gatherings on Country, Tati Tati Wadi Wadi has identified key objectives over a series of topics:

Caring for Country

"Tati Tati Wadi Wadi have a cultural responsibility to make sure water that flows through Country is healthy and flows downstream for Traditional Owner groups. We need to be resourced and supported to be able to fulfil that cultural responsibility."

Approved at the Tati Tati Wadi Wadi Nation meeting, October 29, 2018

Tati Tati Wadi Wadi have approved a series of objectives for caring for Country, in relation to water and to land impacted by water use, activities and regimes.

The Traditional Owner group has also outlined a need to work in partnership with Government to be a part of a coordinated approach to monitor annual water flows and the impacts of water management and planning on Country, including rivers, creeks, wetlands, lakes, floodplains and swamps and their associated ecosystems.

Capacity through government resourcing was an objective raised by many participants in the Tati Tati Wadi Wadi meetings. Government funding was seen as a key to Tati Tati Wadi Wadi to revive cultural sciences, enabling them to use their cultural methods to improve the health of Country, and pass down the knowledge to younger generations.

Connected Country

Meetings on Country with Tati Tati Wadi Wadi included several discussions on infrastructure to change water flows or courses, including structures installed as part of the Murray-Darling Basin Plan Sustainable Diversion Limit Adjustment Mechanisms.

"Tati Tati Wadi Wadi do not agree and do not provide permission for the construction and operation of structures to regulate water on Country. Tati Tati Wadi Wadi do not agree to Sustainable Diversion Limit Adjustment Mechanisms in replacement for natural flows.

Don't put structures into land where our ancestors are."

Approved at the Tati Tati Wadi Wadi Nation meeting, October 29, 2018

Tati Tati Wadi Wadi wants environmental water delivered on Country in a way that links the channel of the river to the floodplains, creeks and wetlands, rather than through artificial means or infrastructure. The Traditional Owner group has stated to the Victorian Government through the water resource plan consultation that structures on Country are barriers that impede on their wellbeing and are the equivalent to environmental pollution.

Respect and control

For water on Country, Tati Tati Wadi Wadi people seek to be ongoing and equal participants with government departments and their delivery partners, including catchment management authorities and water corporations.

Table 37: Tati Tati Wadi Wadi - Objectives and outcomes

Objectives	Outcomes
Tati Tati Wadi Wadi want more healthy, fresh water to flow through our Country, particularly over winter, every year.	Tati Tati Wadi Wadi determines the level of improvement needed for water quality and quantity, based on our determination of what meets our cultural requirements and outcomes.
	Tati Tati Wadi Wadi to assess and monitor whether there is improved water quality and more volumes of water required, and if that satisfy our cultural needs and objectives.
Funding to be provided for each Traditional Owner Nation as identified by MLDRIN in the water resource plan areas to have an Aboriginal Water Officer and water program funded and supported	We are resourced to work on Country and recognised, respected and remunerated for our expertise.
Aboriginal Waterway Assessments, cultural flows and management plans be resourced by government, and prepared or conducted on Tati Tati Wadi Wadi Country	Tati Tati Wadi Wadi be resourced, supported and empowered to conduct Aboriginal Waterway Assessments, manage cultural flows and undertake management plans.
	Tati Tati Wadi Wadi to work with Catchment Management Authorities to discuss their water needs and be involved in bids for water for the environment, and the timing of when water is released.
Tati Tati Wadi Wadi to be gainfully employed to use cultural practices in a sequence agreed by Tati Tati Wadi Wadi people to improve water quality and increase cultural outcomes, including traditional burns and de-snagging.	Water quality and volumes support cultural outcomes for water on Country.
Tati Tati Wadi Wadi people to have access to water and waterways on Country for cultural wellbeing, cultural economic purposes, practices including swimming, drinking, canoeing	Tati Tati Wadi Wadi values and uses for water are supported, encouraged and facilitated.
Cultural values are protected and adhered to by private and public landowners	Water management needs to be reviewed, to ensure water on land that is privately owned can be managed in a manner that is respectful of cultural values
Ecological restoration and conservation is driven by Tati Tati Wadi Wadi traditional ecological knowledge, with intellectual property retained, expertise fully funded, and support provided.	As equal participants, engagement between Tati Tati Wadi Wadi and government and agencies is ongoing, resourced and respectful and Tati Tati Wadi Wadi are considered as equal participants in making decisions

continued

Objectives	Outcomes
Tati Tati Wadi Wadi have ongoing collaboration and ultimately empowerment with government and agencies to restore connectivity of wetlands and waterways, and improve the health of water on Country, and on how water is used and managed on Country	Tati Tati Wadi Wadi people work with government and delivery partners to make decisions to improve the health of water on Country
We are adequately resourced and given the opportunities, and provided the water, to have control of how and when cultural watering objectives are met	Tati Tati Wadi Wadi have access to water entitlements, and to have a seat at the table in regard to environmental watering decisions
Tati Tati Wadi Wadi asserts that Government needs to align its processes across land, water, fire and biodiversity to collaborate with the people to produce a shared perspective. That Government funds Tati Tati Wadi Wadi to prepare a Country Plan, that all government departments and agencies must refer to	Collaboration with Tati Tati Wadi Wadi is cohesive and reflective of a shared perspective that is designed to allow Tati Tati Wadi Wadi to go directly to government

11.3.5.6 Case study

Tati Tati Wadi Wadi spoke in great detail in consultation with Victoria's water resource plans about waterways of significance, referring to the lakes and the wetlands as lungs, and a great, inter-connected system hosting many ancestral sites. The people spoke of how water decisions made in isolation of considerations for Country degraded culturally significant sites through poor water quality, loss of flows, pest species dominating landscapes due to changed water management regimes, and of sites being cut off from the rest of Country. As an example of an area of interest, the Tati Tati Wadi Wadi group talked with DELWP several times at Margooya Lagoon.

Margooya Lagoon, east of Tol Tol, is easily accessible to the Robinvale township and supports an abundance of native flora and fauna. The lagoon is important to the Tati Tati Wadi Wadi Robinvale community, not only because of its proximity to town, but as an important cultural site.

Concerns around Margooya Lagoon

While the Margooya Lagoon has an environmental watering plan developed by the Mallee Catchment Management Authority, Tati Tati Wadi Wadi are concerned with:

- poor water quality
- degraded habitat for birds, native fish, plants
- the regulator installed at the lagoon, which waters the lagoon from the opposite end from the original feeder creek (dry during consultation in 2018)

Tati Tati Wadi Wadi wants to be involved in the water management of the Margooya Lagoon to achieve:

- revegetation of native plants for cultural practices and as habitat and food for bird, fish and fauna
- re-stocking native fish into the lagoon;
- reinstatement of how the lagoon receives water.

The Traditional Owner group would also like to have a protected place at Margooya Lagoon for them to visit and camp, without sharing with outside visitors.

Margooya Lagoon values and uses

Accessible as it is to town, Tati Tati Wadi Wadi consider the Lagoon to be a significant place to connect with Country. They would like to improve the traditional access of the Lagoon to improve accessibility.

The creation of a culturally safe place would enable Tati Tati Wadi Wadi to re-energise culture and educate younger generations.

11.3.5.7 Values and uses

Consultation with Victoria's water resource plans naturally included considerable discussion around the values and uses water has for Tati Tati Wadi Wadi people, including its importance in the past, how it is valued today, and aspirations for the future.

There was talk about the many scar trees that are on Country and how they need water to survive and stay in the landscape, the ceremonial grounds that are now covered with thistles and not receiving any water, the connection of language, and discussion about many individual waterways and water bodies and their connection to Tati Tati Wadi Wadi.

Values and uses and the relevant waterways and water bodies discussed include but are not limited to:

- Old Camp Creek and Bumbang Creek, both which have cultural values.
- Belsar Island which was a place to visit, fish and swim
- Fish traps at Hattah Lakes and Belsar Island
- Thousands of generations of Traditional Owners, including descendants from Tati Tati Wadi Wadi around Chalka Creek.
- Lake Mournpall which is an important part of the cultural landscape
- Murrumbidgee Junction and Wakool Creek, on the border
- Burra Creek, which has no water at all, and includes an ancestral site
- Wood Wood, which needs water for the trees and the ancestral sites
- Nyah-Vinifera, which has a ceremonial site and many ring trees.
- Kulwin, as a potential area of significance for groundwater
- Lake Tyrrell, which has cultural significance for many clans, including Wergaia which as part of Barengi Gadjin Land Council has Native Title over part of the area. Tati Tati Wadi Wadi believes Lake Tyrrell needs a resource assessment to understand when and how the water should flow to the lake. There is a thought that Tyrrell was once connected to the Murray, not just the Wimmera-Mallee water system.

Tati Tati Wadi Wadi describes gadini (water) as central to beliefs, culture and survival as a First Nation. As stated in the Tati Tati submission to the Murray-Darling Basin Plan (2012), Tati Tati Wadi Wadi people have a "deep relationship with the waters, rivers, lakes, creeks, lagoons, tributaries, wetlands, trade routes, gathering places and sacred sites in our traditional lands, all of which hold great significance to us."

The submission explains water has economic importance as a source of food, fibre, medicine and helps grow the plants used to make tools and cultural implements, and that the decline in the water quality and changes to the way water flows and is distributed has had a corresponding socio-economic impact on Tati Tati Wadi Wadi people.

In the words of the Tati Tati Wadi Wadi people, water is integral to song lines and creation stories.

11.3.5.8 Cultural flows

Consultation with Tati Tati Wadi Wadi has included discussion on cultural water entitlements, as a means to achieve either cultural outcomes, or provide economic opportunities. The people see that having a say on how environmental water can be used, including where, when and how, will improve cultural outcomes, however having access to water entitlements as a Traditional Owner group would give greater autonomy in how that water may be used. In addition, as First Peoples, Tati Tati Wadi Wadi assert they have an entitlement to cultural water rights. In its submission to the Murray-Darling Basin Authority on the Murray-Darling Basin Plan, it was stated that:

"The Tati Tati vision is for the Murray–Darling Basin Authority and its partner authorities to respect our right to own Gadini water and to provide direct water ownership rights with an allocation of 10 gigalitres every two years to be transferred – with funding – to Tati Tati. This would enable Tati Tati to ensure that our Gadini water system sustains our traditional, spiritual, cultural, economic and social existence for the present and into the future.

This water will help to replenish and restore highly culturally significant places for Tati Tati people... there should be water allocations for Traditional Owner First Nations to enable us to discharge our cultural responsibilities."

Tati Tati Traditional Owners Submission on the proposed Murray Darling Basin Plan, April 2012

"Water encompasses Country like a living, breathing thing"

Approved at the Tati Tati Wadi Wadi Nation meeting, October 29, 2018

11.3.6 Wadi Wadi

Wadi Wadi Nation is represented in the Wimmera-Mallee Water Resource Plan through interests in the culturally rich Lake Tyrrell, a terminal lake at the edge of the Avoca Basin. Lake Tyrrell is Victoria's largest salt lake and the largest saline groundwater discharge lake in the Murray-Darling Basin.

Wadi Wadi Country is located just west of Swan Hill, extending west towards Ouyen and south of Robinvale, straddling the Murray River.

A joint consultation was undertaken with NSW Department of Industry (DOI Water). This was the first time NSW and Victorian state governments delivered a joint consultation for water resource plans and agreed to adopt NSW's approach to engagement. This involved contracting independent Aboriginal consultants, Strategic Small Business Solutions (SSBS), to undertake the engagement to provide a sense of independence, and to safeguard cultural knowledge.

All material in the following parts is First Nations Cultural Knowledge provided by Senior Traditional Owners and Traditional Owners of the Wadi Wadi Nation for this consultation report. Senior Traditional Owners also provided guidance on the consultation process and report draft.

Wadi Wadi contribution was reviewed and signed off by nine senior Traditional Owners who were nominated by the MLDRIN delegates.

Figure 32: Wadi Wadi workshop participants on the Murray River in Swan Hill

Credit: DELWP

11.3.6.1 Themes

"Managing water is complex and we need a seat at the table and there are a few seats at the table available now. That is the opportunity for the First Nations people right now. Get your information into the water resource plans to have your say"

Darren Murray, Principal Aboriginal Cultural Liaison Officer, DOI

From the interviews and workshops, it was evident that the following issues emerged as crucial to the Wadi Wadi Nation participants;

- water represents life
- grave concerns over present care of waterways is paramount
- special memories and spiritual and physical cultural connections to waterways are integral,
- accessibility is an issue
- First Nation management or input into waterways is strongly desired
- a firm belief that First Nations people hold solutions to present day waterways problems is collective
- financial assistance is required to repair and maintain damaged waterways under First Nations control and stewardship.

Figure 33: Murray River at Robinvale

Credit: Andrew McMahon, Strategic Small Business Solutions

Water is "Life"

The Wadi Wadi Nation participants said simply that the word water to their people is "Life".

Water is connected to all aspects of their lives, physically, culturally, and spiritually. It is the actual presence of a body of water that is crucial, as the body of water and the animal and plant life it contains connects to the land and the land connects to the animals and people it supports.

Water for connectivity denotes well-being, in the physical, spiritual and cultural sense.

First Nations views on water for survival in the physical sense differs from the value First Nations people place on water and waterways.

For example, a Wadi Wadi workshop participant noted upon first viewing a digital map of the Nation waterways that a particular lake had taken on the physical form of a very young baby.

The importance of this discovery was evident the next day when it was divulged to the consultants that the baby of the lake had been a discussion topic amongst Nation members at the previous nights' BBQ and beyond.

Care of waterways

Grave concerns over current care of waterways was a strong recurrent theme emerged across all face to face interviews and during the workshops. That the current care of and for Nation waterways is inadequate, ineffective and damaging to the waterways was/is a collective concern of all participants. The colour and quality of the water in the rivers is not as remembered in the childhoods of the elders and TO's. There were stories of clear and concise memories of children fishing in the river with mothers and grandmothers and being able to "clearly see the yellowbelly approaching".

Water clarity is not the case today. First Nations Wadi Wadi people collectively describe the water as murky. Reasons cited for the murky quality of the waterways are pollution from recreational boats, racing boats, paddle steamers with diesel engines, poor stewardship, less native plants, more weeds, erosion and a rapid decline in fish stocks due to lack of breeding space.

There is serious concern for Aboriginal youth and the cultural experiences they miss out on that tie them to family, identity and tradition. Due to the rivers poor water quality, particular memories of Christmas Day celebrations on the river, with everyone swimming to cool down are not occurring as often, or not at all in particular regions as the Traditional Owner's do not consider the river healthy enough to swim in.

Carp are of huge concern to the Wadi Wadi people, their prevalence and the long-term riverbank damage results in the decimation of fish native to the river system. There is major concern that the premise of sharing water, prevalent amongst First Nation communities is a concept not achievable under current western style governance methodology. First Nations people clearly expressed a belief of favouritism towards farmers in the current water sharing system, and that farmers either do not want to or do not know how to effectively and efficiently manage waterways.

Cultural connections

Special memories physical, spiritual and cultural connections to waterways are paramount to the people. If the waterways are not sustained naturally, the land suffers, the animals and plant life suffer, and the question of survival becomes a real and genuine concern.

The concern for First Nations people is not just one of the survival of the people, but of the survival of the land itself. Healthy water is at the core of the health of the land and the entire eco-system.

Special memories, physical, spiritual and cultural connections are borne out of lived experiences on and around the water and waterways. Memories of TO's grandfathers burning bark and placing in the river to draw fish to the area in the then clear waters were shared.

Figure 34: Culturally significant artefacts

Credit: Andrew McMahon, Strategic Small Business Solutions

Historically for Wadi Wadi people the waterways are integral to the stories that are passed down from their ancestor's generation after generation about caring for the water and the land.

Traditional Owners are very deeply concerned that the knowledge held for millennia may be lost as the waterways suffer and the occasions for creating memories connected to water and land decline and the physical, spiritual and cultural connections are lost to Wadi Wadi youth.

Additionally, younger members of the Wadi Wadi Nation expressed a deep yearning to gain more knowledge of the water, the land and the history of their recent and long departed ancestors, so they may be able to continue their inherent culture and pass the lessons onto their children in perpetuity.

Accessibility

Accessibility to waterways is vital to the First Nations Wadi Wadi people. The water, land, plants and animals cannot be monitored for health, quality and cared for, fish cannot be accessed in the traditional way for eating and sharing with family, fish stocks cannot be monitored, and maintenance of the waterways and significant and sacred sites is problematic.

The recognition and accessibility to birthing trees, burial sites, scar trees, artefacts and the respect due to massacre sites is of concern.

Cultural events are less likely to occur due to lack of accessibility and continuity of cultural identity may be at risk.

11.3.6.2 First Nation management

First Nation management and input into waterways is strongly desired and financial assistance is required to repair and maintain damaged waterways under First Nations control and stewardship. From the workshops emerged a constructive plan to for the Wadi Wadi people to form a committee, register a corporation with ORIC and apply for funding through the Aboriginal Water Unit at DELWP. A DELWP employee presented at the Workshop and advised of funding pathways available to successful applicants.

Wadi Wadi people expressed their desire to run a program of waterways monitoring and management, using First Nations rangers to care for the waterways using proven traditional methods. It was noted that in some areas, First Nations people were already attempting to care for waterways by daily walking the banks and removing rubbish, such is their concern for the decimation occurring.

It was identified that funding for a boat, a four-wheel drive and wages are required to begin a program, the concept being that First Nations rangers would act a conduit to authorities to advise of illegal incidents, but also as a deterrent to potential criminal activity. First Nations people would also act as educators to the public, about caring for the river using sustainable methods of management and control. From this, an income stream could be possible, with culturally appropriate tours of First Nations history being made available to tourists, thus providing funding for the continuation of the caring for waterways program.

11.3.6.3 Stewardship

A firm belief that First Nations people hold solutions to present day waterways problems is collective. Throughout the consultation journey with the Wadi Wadi Nations Traditional Owners and the Wadi Wadi workshop participants it was clear that there is a common belief that solutions exist for the current problems with the waterways. The consensus presented was that these solutions have been available for all time, there is knowledge accrued over thousands of years and is there for the asking, the First Nations people just need to be asked and more importantly, actively listened to with action taken using the knowledge shared, with continuing involvement and real, genuine and meaningful inclusion of First Nations people.

A First Nations Wadi Wadi Elder described in detail instances of sharing knowledge with water authorities on where to sink drills to access water and being within mere metres or centimetres of the water table as proven when accessed. This ability the First Nations people attribute to is down to being so connected to the land they can read it, from experience, from memories, from oral history and from an innate ability to feel the land and its individual story.

11.3.6.4 Categories of values and uses

Table 38: Wadi Wadi - Values and uses

Themes	Categories	Detail
Water is "life"	Connectivity- physical, spiritual and respect for all lifeforms including the land and water itself	The emotive and symbolic thoughts, feelings and ideas evoked by images and visual connectivity with bodies of water such as the "baby of the lake" are representative of the water is "life" ideology. Community gatherings, corroborees, healing properties, cultural identity are all interwoven with the water is "life" theme.
	Animals	Murray cod, river mussels, yabbies, Yellowbelly, redfin perch, black bream, tench and catfish, birdlife, kangaroos and rabbits, turtles, turtle eggs, swans, swans' eggs and platypus.
	Plants	Bush medicine (old man weed), burning bark (for fishing).
	Physical and emotional well-being	Participants reported strong feelings of water bodies acting as calmatives, relaxing and destressing them when feeling low or anxious. Older Wadi Wadi nation members recalled physical well-being when they were able to access waterways and maintain physical activity on a regular basis, for food gathering and recreational purposes.
		In one instance, a member who trained in her youth as swimmer off country and stalled, returned to Wadi Country and built her strength swimming the Murray River where the spiritual connectedness she felt inspired her on to winning gold medals.
		She also recalls the Mob swimming alongside her, feeling the connections and enhancing their own physical and emotional well-being.
		Another Mob member tells the story of a drug addicted First Nations youth being ordered to spend time on the river at the suggestion of his father. The youth destressed, connected to the water and is now recovered.

continued

Themes	Categories	Detail
Grave concerns over current care of waterways	Inadequate, ineffective and poorly managed waterways	Stories of algae build up and disappearing water bodies and swamps, lagoons and billabongs were common throughout the interviews and workshops. Deep concern over declining and decimation of native fish stocks due to lack of fish breeding grounds and severely polluted and eroded rivers was voiced repeatedly. The empty swamps contribute heavily to the declining fish stocks and they (empty swamps) are directly related to poor water management. To First Nations Wadi Wadi people, water sharing is a duty, it is a resource to take care of all things, past, present and future and it is feared that Western style management systems inherently do not understand how to effectively share water.
Accessibility	Restricted and problematic accessibility to waterways	Restricted access to waterways, through legally enforced restrictive policies allowing farmers excessive access to water or through societal recreational pastimes such as 4WD access destroying habitat for both plants and animals and damaging natural pathways to waterways is causing concern to Wadi Wadi people. They feel they are unable to access fresh food sources, bush medicine or to care for the waterways as required culturally. Lore customs are passed from generation to generation on caring for the land and the water and restricted accessibility is counteractive to that process.
First Nations stewardship over waterways	Custodial First Nations ownership	First Nations Wadi Wadi people see control and cultural ownership of the waterways as integral to the future of water in Australia. To that end, a committee was formed with the intent of forming an Aboriginal Corporation to run a 'Management and Monitoring' Waterways program under First Nations control. Initially funding would be required through the Victorian Aboriginal Water Program.
First Nations solutions to waterways issues	Collective consensus	Across the interviews and workshops was the belief that solutions to restore the water quality and address the water sharing issues are available and positive outcomes are achievable if the Wadi Wadi people can take control of the issues through the implementation of the above-mentioned water management program.

11.3.6.5 Feedback

Feedback from First Nation Wadi Wadi Members are outlined in Table 40 below.

Table 39: Feedback from First Nation Wadi Wadi members

Feedback	Source
"Water is Life"	Workshop
"Empty waterholes, swamps, lagoons and lakes are heartbreaking"	Face-to-face interview
"I connected spiritually to the river on my Country and trained in that river and won gold medals in state swimming championships"	Face-to-face interview
"There is no separation of the land from the water - they need each other	Workshop
"It is Aboriginal lore to protect and care for the water and the land"	Face-to-face interview
"Anyone, no matter where they are from, or animals or plants who are on Country need to be protected and cared for with the land and the water"	Face-to-face interview
"Let the cultural flows come back naturally"	Face-to-face interview
"The river itself is a lifeforce to us"	Face-to-face interview
"Culturally and spiritually the river, the creeks, they are a part of you"	Face-to-face interview
"Us TO's think this is special that we are being asked what we think about water"	Face-to-face interview
"We, the Aboriginal people have already restored (through funding) a dried-out wetland, Perricoota, cause we know how to do it and the birds are back now and breeding. Now it needs protecting but there are no people on the ground to do that"	Face-to-face interview
"Christmas Day celebrations were very special on the river, in those days we (all the kids) could swim in the river with the adults watching over us, but now, we don't think the river is right to swim in. So we don't really have Christmas down here. We drank the river water until the 1980"	Face-to-face interview
"Oh yes, we always drank the river water, it was clear and bright, and you didn't have to take your own water with you like you do now"	Face-to-face interview
"Aunty used to send us kids down to the river to spear fish for our tea. We always got good fish to feed us all. Now I have a boat to fish in and all I can catch is carp"	Face-to-face interview
Ceremonial occasions, one TO and Wadi member reported their grandfather was a Ceremonial Man who would conduct initiation ceremonies in the River	Face-to-face interview

continued

Feedback	Source
They want to be able to bring these rites of passage back to community, but would not let the young people into the river now as it currently is	Face-to-face interview
"Water is for cleansing"	Face-to-face interview
Water connects Aboriginal people, "upstream share with downstream"	Face-to-face interview
"We still get inspiration just being near the water, I live the culture everyday but when I'm near the water I dance"	Face-to-face interview

11.3.6.6 Evaluation

Table 40: Wadi Wadi - Risks

Themes	Categories	Detail
Water is "Life"	Connectivity	Poor water quality lessens accessibility that and weakens connectivity. Water is now not drinkable and a bad colour and not good for swimming. Cultural connection to water is integral to identity
	Animals	Less animals, far less native fish, yabbies, freshwater mussels, a finding of 8 netted (1 albino) platypus which all died, less fresh food available for people, carp are devastating the rivers
	Plants	Overgrowth of weeds, less to no bush medicine plant life available
	Physical and emotional well- Being	Less physical activity leading to health issues, poor diet lacking nutrients from fresh foods, less access to the calmative effects of the waterways leading to spiritual anxiety, depression and perhaps drug and alcohol problems
Current care of waterways is inadequate	Waterways damaged	Algae build up, damaged riverbanks, erosion, poor water quality, poor flow, 12 empty swamps, lagoons and creeks, silt has doubled (firestick burning solves silt issue)
Stewardship	Restricted access	Inability to care for water and land as required by First Nations Lore and gather food and plants for traditional purposes
Solutions	Custodial control	Without First Nations control and input, water problems will continue and worsen
	Problem solving for waterways	First Nations Wadi Wadi members collectively agree that they hold the knowledge to solve the current issues and maintain strong, healthy and viable waterways into the future

11.3.6.7 Impacts

Table 41: Wadi Wadi - Impacts

Feedback	Source
"There is so much pollution from the boats, there are so many on the river"	Wadi Wadi member
"The race in Echuca starts in the wrong place, it is killing the area the fish breed in"	Wadi Wadi member
"There was so much silt from not opening the gates enough, that when gates were opened the river went black"	Wadi Wadi TO
"A farmer let something into the river and the gum trees died"	Wadi Wadi TO
"Uncontrolled tourism causes the river to be unhealthy"	Wadi Wadi TO
We need more of this, this asking us TO's what to do about the Water so we can fix it"	Wadi Wadi TO
"The breeding grounds are affected in the river and now the creeks and the off-shoot waterways are wet and dry depending on weir releases, the fish stocks are too low now"	Wadi Wadi member
"We need water put back into the swamps, the bush tucker and medicine are gone"	Wadi Wadi TO
"Water releases are mainly for the farmers, the irrigators"	Wadi Wadi TO

11.3.6.8 Feedback

Table 42: Wadi Wadi - Feedback

Quote	Source
Government and farmers don't know how to share the water, so our sharing water beliefs are at risk.	Wadi Wadi member
We have no rights, not in this conservation, and we need a licence to be connected to water.	Wadi Wadi TO
Our way is a preserved way of life – and advanced way of looking after Country, that way is at risk of dying out.	Wadi Wadi member
Our storytelling, our gathering on the water, our language has all changed because of a need for secrecy.	Wadi Wadi member
The Government need to realise culture is at risk and needs to be practiced traditionally and we need access for connection to our water and Country.	Wadi Wadi TO
We see illegal fishing and we don't like it.	Wadi Wadi member
Parks and Wildlife have restricted culturally significant areas.	Wadi Wadi TO
Physical and spiritually emotional places are not accessible and are of historical significance.	Wadi Wadi TO

continued

Quote	Source
The feelings of safety and healing have been lost because we can't spend time in the water, putting our health at risk.	Wadi Wadi member
When we lived on the river as kids, the river was a shop, we got our food and our water and now we can't, and the young ones can't. We only ever took what we needed.	Wadi Wadi TO
Drug, alcohol and domestic violence issues are occurring and putting us at risk, because of a lack of access to water, to culture and cultural activities.	Wadi Wadi member

11.3.6.9 Objectives and Outcomes

The MDBA Part 14 Guidelines advise the aim of consultation processes should be 'to identify Traditional Owners' objectives for water management, and the desired outcomes that the objectives would contribute towards.'

'Objectives are commonly understood to mean 'aspirations' or 'goals' and is often expressed as wishes.'

Table 43: Wadi Wadi - Objectives

Feedback
To have full "First Nations control of bush and water and that will result in fixing the problems".
"To every problem there is a solution and Aboriginal people are the solution and have the solution to water problems".
"Everything be respected, respect everything TO's have fought for – Respect falls under Lore.
"We want government to engage more with Aboriginal people".
To no longer feel like we are sharing our knowledge with Government and not being listened to. We are Traditional Owners of the land and should be Custodians of the land".
To have genuine, real world jobs for Aboriginal people, like water and land rangers. To have MLDRIN advocate for funding so Wadi Wadi can set up a corporation through ORIC and apply through the Aboriginal Water Unit at DELWP for funding for an Aboriginal Water Ranger Program (AWRP) to operate in the Wadi Wadi area.
We want to define our objectives and work towards outcomes.
To stop going around in circles, sick and tired of it, we want to move forward.
To have cultural sites of significance identified and protected.

Table 44: Wadi Wadi - Outcomes

Feedback
Carp are controlled, fish are re-stocked and breeding grounds are monitored and maintained, plants and bush medicine thrive again as First Nations control and management programs are implemented.
Rivers flow naturally again, waterholes fill up naturally and swamps will be healthy and full of wildlife. We want to drink the water, swim in the water and heal ourselves and our kids in the water.
Cultural identity, spirituality, connectivity and accessibility to water are all restored and rebalanced through respect for Aboriginal knowledge. Burial sites and sites of historical significance can be monitored and respected. Spirits can rest and not be upset by being disturbed.
Good communication with government and ongoing commitment from government to respect and act on Aboriginal Lore.
Receive funding with MLDRIN support for funding application to AWP and commence AWRP on Wadi Wadi traditional land, to begin culturally appropriate training and implement traditional methods of managing waterways. The ranger will report to the Wadi Wadi Corporation Committee with the committee reporting to the funding body. Observation and diligence is the key with the rangers reporting problems to appropriate authorities as required.
Signage will be in place and Aboriginal rangers will be surveying and maintaining and monitoring the rivers in line with the AWRP policies and procedures.
To have moved forward and have ongoing positive outcomes and decision making by water planners.
To have moved forward with the identification of all culturally significant sites and protective mechanisms in place where required.

11.3.7 Wamba Wemba

Wamba Wemba contribution was distributed to the Wamba Barapa working group on 11 December 2018 by the First Nations Legal and Research Services. There were no content amendment suggestions or objections to the report. A working group meeting was planned for 23 January 2019 for further discussion and feedback about the draft contribution. This meeting was cancelled due to sorry business and may be rescheduled for February 2019. As a result, any further amendments will be captured in the Northern Victoria Water Resource Plan.

11.3.7.1 Description

Clans/family groups

The Wamba Wemba Nation is defined by many clan groups that form approximately 16 family groups for the Nation. The clan groups are descendants of Wamba Wemba families.

Country

Wamba Wemba Nation is represented in the Wimmera-Mallee Water Resource Plan through interests in Lake Tyrrell and the Avoca River.

Wamba Wemba areas of interest are around the Loddon River, reaching northwards from Kerang, Victoria to Swan Hill, and including the area of the Avoca River, southwards towards Quambatook. In a north easterly direction. Their areas of interest goes over the New South Wales- Victorian border to Boorrorban and Moulamein, and extends to the vicinity of Barham and Lake Boga in Victoria.

Scope

Traditional Owners at the Nation meeting agreed to make the same contribution for both the Wimmera-Mallee Water Resource Plan and Victoria's North and Murray Water Resource Plan.

During the initial planning meetings, key contacts decided to make separate contributions for water resource plans located in Victoria and NSW. This document focuses on aspirations of the Wamba Wemba on the Victorian side.

Organisations/Working Groups (NRM)

The main organisations and groups that Wamba Wemba people are involved in (within Victoria) are:

Table 45: Wamba Wemba - Organisations and groups

Organisation/Working Group	Brief Description
Wamba Barapa Working Group (through First Nations Legal and Research Services)	They are in the process of progressing their native title claim and have requested that DELWP engages with the group where possible regarding on matters that affect their rights and interests on Country.
Barapa Wamba Water for Country Steering Committee	They are funded through DELWP Aboriginal Water grants and work with the NCCMA to make decisions on the Barapa Wamba Water for Country Project.
Wiran Aboriginal Corporation	They currently have four directors who are focusing on setting up the governance structures.

11.3.7.2 Current or pending agreements

Native Title and Traditional Owner Settlement Act

The Wamba Wemba and Barapa Barapa peoples are in the preliminary stages of their native title matter which may include progressing to a settlement agreement under the Traditional Owner Settlement Act 2010 (Vic).

Registered Aboriginal Party (Cultural Heritage)

Wamba Wemba do not currently have RAP status, however, the group is undertaking the required preliminary work to apply to be recognised as a RAP for their Country.

Traditional Owner views regarding arrangements

Traditional Owners noted frustration with the engagement process and advocated to be included at all levels of negotiations. Wamba Wemba Traditional Owners have expressed that the engagement process with stakeholders must be open and transparent and the group is adequately resourced to engage at an equal level with stakeholders. The Wamba Wemba group has noted that there are challenges in acquiring resourcing for the Corporation and to call full group meetings to consider stakeholder proposals.

11.3.7.3 Existing reference materials

Aboriginal Waterway Assessment

An Aboriginal Waterway Assessment was undertaken in 2015 by Wamba Wemba in the Werai Forest, NSW as part of a pilot research undertaken by the MDBA to test the tool in the Australian context.

Wamba Wemba look forward to ways to work with Victorian Government agencies to do an Aboriginal Waterway Assessment in future and to link the results with environmental watering programs.

Use and Occupancy Mapping

In 2009/10 a use and occupancy mapping project was conducted by the MDBA in conjunction with MLDRIN, Yarkuwa and the Deniliquin Local Aboriginal Land Council in the Werai Forest, NSW. Many Wamba Wemba Traditional Owners were involved in the project and several Traditional Owners were trained in use and occupancy mapping and have permission to continue using the tool.

Kerang Wetlands Ramsar Action Plan

NCCMA developed a detailed action plan in coordination with the multiple stakeholders with a role in managing these wetlands. This included Wamba Wemba and Barapa Barapa Traditional Owners who were involved in identifying cultural values and specific management actions to look after the wetlands.

Additionally, the North Central CMA has co-ordinated monitoring and NRM programs in the area in collaboration with Traditional Owners including: weed control, revegetation, controlling rabbit populations and fencing high priority vegetation.

Barapa Wamba Water for Country Project

The current project builds on the Barapa Water for Country project, which commenced in 2014 to identify and map traditional values and sites of cultural significance in the Gunbower Forest. The second phase of the project focused on flow objectives and how these will deliver cultural outcomes in the Gunbower Forest. In 2018-19 the project has extended to gain understanding of the cultural values and aspirations of wetlands on Wamba Wemba Country.

The Tyrrell Project

The Tyrrell Project is a community driven project to deliver multiple NRM outcomes at the internationally renowned Lake Tyrrell, along with the Tyrrell and Lalbert Creeks; and, wetlands connected to the Wimmera- Mallee Pipeline. The Mallee CMA is co-ordinating the project with the advice from communities and Traditional Owner Groups including Wamba Wemba.

Victoria's Framework of Historical Themes

This project included a case study on the social and cultural heritage landscape of Lake Boga.

North Central CMA Waterway Strategy 2014 – 2022

Recognises the knowledge, culture and perspectives of Aboriginal people and the importance of rivers and wetlands for Aboriginal values and uses. Actions in the strategy include:

"The North Central CMA will work with Traditional Owner groups to strongly align the 2014-22 North Central Waterway Strategy and 'Whole of Country Plans' and continue to explore opportunities to work with Traditional Owner groups on the strategy's priority waterways" (p.14). The North Central CMA will see management.

Mallee CMA Waterway Strategy 2014-2022

Recognises that Traditional Owners continue to have connection with the Mallee's natural landscapes and values near waterways. It outlines the following goals:

"To protect the extent and condition of Cultural Heritage (Indigenous and non-Indigenous) sites associated with waterways; and to increase community capacity for, awareness of and participation in waterway management."

The strategy outlines the following principal "Traditional Owners - the skills, knowledge and perspectives of Indigenous people will be incorporated into waterway management."

11.3.7.4 Preferred means of engagement

The Wamba Wemba currently have two MLDRIN delegates.

The Wamba Barapa Working Group is an interested stakeholder and a point of contact for proponents undertaking work on Wamba Wemba Country. Luke Hockey of First Nations and Legal Research services is a preliminary contact point for the Working Group. For any substantial and important decisions regarding activities and projects on Wamba Wemba Country, the working group will refer these decisions to the full native title group. Some members requested to engage directly with Wamba Wemba people and not through peak body organisations.

During the consultation most people indicated that they preferred receiving information via post rather than email. They also appreciated face to face engagement as it shows respect.

Wamba Wemba have concerns from the lack of consultation from all government departments and water agencies to date and provided an example that environmental watering decisions seem to be made before the general public including Traditional Owners know about them. It would be interesting to know what is being watered; why it is being watered; and how much water

is being delivered over how many days. This would allow the opportunity to visit the site or co-ordinate an event associated with the watering.

Representatives from Wamba Wemba indicated that they would like to be aware of NRM projects across the sector and it was suggested to meet more regularly as a Nation to learn about and have input on various projects across the relevant teams/organisations.

Representatives felt that government do not have a clear understanding of the Aboriginal social structure (Nation Groups, clan groups, family groups) and how to engage effectively. There was a suggestion that there should be a representative from each family group involved.

11.3.7.5 Values and uses

The following statement was prepared by Ken Stewart and shared during the workshop receiving support by other Traditional Owners to include it in the Water Resource Plan as an explanation of why Country is important.

"OUR LAND and WATER

As a person of Aboriginal descent with close ancestral links to both Murray River Country and the Mallee/Wimmera Country there are many materials as well as ethereal markers in the present landscape that connect us to our People's long history of association with the Landscape.

With the passing of time since European colonisation there has been a rapid decline in the practice of cultural traditions that have been passed from one generation to the next since time immemorial.

This makes all archaeological sites highly significant to firstly our Elders as some of them witnessed our Ancestors living the cultural practices that created these sites, secondly to me and my generation as this is how and where the Elders pass on to us the knowledge and wisdom of our culture, thirdly to our children and the future generations as this is our Ancestral Legacy.

While this holds true for all material culture sites such as mounds, middens, scarred trees and artefact scatters our burial places and the skeletal remains they hold are sacrosanct and are the most sacred sites we know because these are the resting place of our Ancestral families.

I and many others of my Aboriginal Countrymen and Countrywomen feel that we have been entrusted with the care and protection of these sites and song lines until it is time to pass this responsibility to the next generation."

Kenneth Stewart

11.3.7.6 Workshop and field trip

During the workshop, an open discussion was had about why water is important to Wamba Wemba people with consideration of environment, social, economic and spiritual aspects. Aboriginal values and uses of water were also spoken about more informally during the field trip. The main themes that emerged included:

Lifeline

During the workshop water was described as "*a lifeline – without it we have no fish or animals*". Another person mentioned "looking after the environment is looking after culture". The presence and quality of water is the largest influential factor on the cultural health of the rivers, lakes and wetlands. Water itself is a cultural value simply by its presences and its' wide-ranging effects on other cultural resources.

Identity

There is an inextricable connectivity between identity, spirituality and water. During the workshop one Traditional Owner mentioned "water is important to maintain identity and spiritual connection". Wamba Wemba identity is bound through their connection to land and water and includes: totems, language, stories, beliefs and values.

Plants and Animals

There is a spiritual, cultural and ecological connection between water and the animals and plants that depend on water. During the workshop and field trip there was mention of plants used for bush medicine, food, craft such as basket weaving and ceremony artefacts. Scar trees are valued as a historical reminder of traditional harvesting techniques.

Animals commonly discussed included: turtles, black swans, fish, Murray cray and yabbies. The red tail black cockatoo and brolga were noted as being important. It is culturally important to preserve these animals to hunt and fish and continue a social/spiritual connectivity to the waterways.

"Murray cray is a delicacy food used in ceremonial occasions like weddings…Only take the big ones, not the ones with eggs. Aboriginal people only took what they wanted to use".

Wamba Wemba workshop participant, October 2018

Livelihoods

It was mentioned that waterways support livelihoods whether it's through providing food sources to eat, sell or to enjoy hunting as a customary activity. It was also recognised that there are potentially economic opportunities through aquaponics etc.

Lake Tyrrell

During conservations with one Traditional Owner, they highlighted Lake Tyrrell as a sacred place for men to navigate at night time "sky reflection".

11.3.7.7 Literature

Further Wamba Wemba values and uses are listed below based on a literature review.

Social and Cultural History of Lake Boga

Lake Boga has a rich social and cultural history and has a case study prepared on it to demonstrate Victoria's heritage (Heritage Council, 2018). The Aboriginal values for Wamba Wemba people identified in the case study include:

- Stories associated with the formation of the landscape, explaining the lack of trees around the lake, features associated with the lake and the river, the local fauna and the moon. (The formation of ancestral landscape)
- Evidence of numerous campsites and middens containing food remains of bone and fresh water shellfish, earth ovens used to cook meals, surface scatters of stone artefacts and burial sites. (Aboriginal economy, resources and customs)
- The Wamba Wemba occupied a wide area within the Kerang Lakes system including Lake Boga and nearby Lake Mannaor as well as land up to the banks of the Little Murray River (Barne Mille) and the Murray River.
- European settlement placed pressure on the Wamba Wemba populations as pastoralists were threatening their land, resources and cultural traditions. The Moravian Mission was established in 1851 and closed in 1856 unable to attract many Aboriginal people.
- In the late 19th century, land selectors moved into the area and water supply was formed to supply the new agricultural settlement. The town of Lake Boga developed to include railway station, shops and a school.
- Many Wamba Wemba people worked on rural land selections or worked on pastoral or agricultural properties, delivered mail, worked as shearers or within the town itself.

During the field trip it was evident that Traditional Owners maintain a close association with Lake Boga and the township. This included the primary school and the cemetery and memories of spending time with family along the edges of Lake Boga.

Kerang wetlands

The Kerang Wetlands Ramsar Site Action Plan (State of Victoria, 2017) highlights Aboriginal values (Wamba and Barapa) including:

- mounds, scar trees, middens, burials, hearths, surface scatters and isolated artefacts
- the wetlands continue to function as places of spiritual and cultural connection
- the wetlands provide habitat for flora and fauna that are important resources for food and medicine

There is an abundance of cultural heritage sites with many recorded on the Aboriginal Cultural Heritage Register and Information System (ACHRIS). There are also sites that are not registered as a means of privacy and protection from the public including:

- important places for ceremonial or spiritual purposes
- places of gathering and social meetings
- camp sites
- fishing or food gathering sites
- places of trade

- women's and men's sites
- burial and ceremonial sites

11.3.7.8 Risks and impacts

During the workshop, Traditional Owners were asked "What are some of your concerns about water management and its impact on Aboriginal use and values?".

> "If you don't look after the bush it will impact the river – everything is connected. Water affects everyone and influences multiple systems (economics, food, etc.)"
>
> **Wamba Wemba workshop participant, October 2018**

The main themes raised included:

Water quality decline from land clearing, erosion of the river banks, blue green algae and blackwater events. The decline in water quality is reducing the cultural health of waterways by rendering the water unusable for humans and impacting plants and animals.

Inappropriate recreational use such as jet skis, boats and 4x4 produce pollution and destroy habitat.

Water regulation has completely changed the flow regime and near Swan Hill the river drops to very low levels impacting on social use and enjoyment of the river. Additionally, many wetlands in were noted to be drier than normal and a general comment that trees look stressed and cultural resources that would normally be expected are absent.

Water oversubscribed creating a barrier for Aboriginal people to enter the water market and sustain a livelihood with one person commenting "land is worth nothing without water". There is also recognition that water needs to be respected, conserved and it is important for keeping Country healthy.

Over fishing of the rivers and people not following good fishing practices "only take what you need – that's what we have done for generations". Additionally, there were comments that now the river is full of carp and there was also concern releasing the carp virus and what the side effects will be.

Lack of involvement of Aboriginal people in water management has been detrimental to environmental and cultural health of waterways. Traditional Owners feel like a minority, are not adequately engaged and noted a lack of transparency the way water is managed and where the funding is going. It was also mentioned that people are not spending as much time on Country anymore and are losing the understanding of the landscape, where things are and why. One person mentioned that there is particularly a lack of women involved.

Un-named Waterways: during the workshop it was raised that there are many un-named waterways that have Aboriginal values and uses and may not be included in plans/ conversations.

> "Lake Tyrrell is a sacred place for men to navigate at night time "sky reflection". A lot of people want to see it changed. It is as old as Mungo. Would like to see it protected. At the moment the Mallee Ralley goes through the state park and

should be moved to private property. They have dates, stories, tangible heritage and could go for UNESCO heritage. But they wonder how it will impact people living there. They've had burials destroyed, scarred trees burnt down. It's of world heritage when you learn what's there. 20,000 tourists visit each year to take selfies. Need structures to manage so they don't cause damage. Currently applying for intangible heritage overlay. Could be years away."

Wamba Wemba workshop participant, October 2018

11.3.7.9 Objectives and outcomes

The Wamba Wemba people have had a living connection with the rivers and wetlands for tens of thousands of years and are recognised as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage. They have an interest in managing waterways to protect cultural heritage due to long connection to the land and resources.

During the workshop, Traditional Owners were asked "How would you like the water in rivers and groundwater managed?" and "what is your vision for water management in 5 or 10 years?". The responses have formed the objectives and outcomes for the Water Resource Plan.

Table 46: Wamba Wemba - Objectives and Outcomes

Objectives	Outcomes
Encourage kids to stay in school and provide opportunities such as water sampling to start engagement.	Clear pathways for youth to work in the water sector and go into leadership positions
Provide a pathway for employment for youth in the water sector.	
Set-up cadetships for youth.	
Provide training and mentoring to promote leadership	
Every CMA to have a dedicated Aboriginal position or identified role (meaningful position that is supported with ongoing training, clear positions description, long term contract and structure).	
Government agencies to have direct engagement with Traditional Owners especially regarding job opportunities e.g. water quality monitoring, fish and bird monitoring, weed control, fencing, revegetation, fish habitat/fish ladder construction, installation of fish screens, etc.	

continued

Objectives	Outcomes
Building strong networks between Aboriginal people, Traditional Owners and Government for forward progression. Suggested on-going engagement (hold forums twice a year with waterway units, CMAs, Parks, TO's etc.).	Working in partnership with Government organisations
To secure ongoing project funding for the Water for Country project.	
Traditional Owner Involvement in environmental watering decisions to look for opportunities for cultural outcomes and to minimise the impact on cultural values.	
Improve communication and engagement across all government departments and other agencies.	
To develop a project between NCCMA and Traditional Owners to restock Murray cray and yabbies. Potential to apply cultural mapping.	
To link outcomes from Aboriginal Waterway Assessments and Use and Occupancy Mapping to inform environmental watering programs.	
Replenish fish stocks (good for culture/ traditional practices)	
Manage recreational users of waterways (jet skis, boats and 4X4)	
Work together with other Traditional Owner groups to create change.	
Undertake full assessment of waterways in the Country. Document Elders knowledge as we go, build the information over time. We are unable to tell the government everything in a day	Document, learn and share knowledge to preserve culture
Do a skills audit across Wamba Wemba to understand who can contribute to what projects. A number of Traditional Owners are trained in cultural mapping.	
Consideration of Aboriginal values and uses for unnamed waterways as well as named waterways	
Dual naming system in place with the Aboriginal name and history of the site	
Learn cultural knowledge to pass onto the younger generations. Teach language of everything related to land and water. If Aboriginal people do not work together the culture will be lost	
Reinstate more natural watering regimes wherever possible.	Protect and manage culturally significant sites
Manage flows to restore habitat and protect wildlife especially for species of cultural and iconic significance e.g. black swan, Murray cray, yabbies, red tail black cockatoo and brolgas for example.	
Improve management of tourism to minimise damage of cultural sites	

continued

Objectives	Outcomes
Joint management of waterways through funding and job positions (rangers, fisheries positions)	Work towards self-determination
Build a cultural centre to share history and cultural significance of Lake Boga. It may include a conference room, tourist information and sells arts/crafts.	
Secure land for cultural learning and set-up livelihoods on Country. Secure water shares/licenses and have the opportunity to trade.	
Develop activities/program to support women to connect with waterways such as: collecting reeds for basket weaving, collecting eggs etc.	
Restore and maintain vegetation with bush medicine, craft, ceremony artefacts and food sources (for example, native grasses, common nardoo, old man weed, cumbungi, common reeds).	

The ultimate goal is for healthy bush, healthy rivers and healthy people.

11.3.7.10 Environmental and cultural flows

During the workshop and field trip there were many discussions regarding cultural flows and environmental flows. A couple of people even questioned why there is any difference between them at all, given that healthy community is so closely related to healthy country, and environmental water is delivering healthy county.

Subsequent to this, Traditional Owners thought there needs to be more collaboration between environmental water managers and Aboriginal groups, so that there is greater understanding of each other's objectives. One example was highlighted during the engagement that some environmental water targeted breeding and movement of Murray Hardyhead (which some Traditional Owners couldn't see the value in), yet environmental watering managers are trying to discourage Redfin (which is a favoured fish to eat for some Traditional Owners). This conversation highlighted the difference between environmental flows and cultural flows – cultural flows should be something that Aboriginal groups have complete control over, and not be bound by restrictions that apply to environmental water. While there will be large crossovers between environmental and cultural flows (e.g. looking after river-red gums, Murray Cod), there will also be difference (e.g. environmental flows would target Murray Hardyhead while Aboriginal groups may want to farm Redfin), which is why cultural flows are needed in addition to environmental flows.

Another point that came up repeatedly was that there was inadequate cultural assessment during environmental watering events. An example given was of watering at Hattah Lakes could impact on burial sites or scar trees, yet there was no Traditional Owner on site to make sure the significant sites were not affected.

During the consultation representatives from the Mallee CMA and North Central CMA were keen to listen and work together to scope meaningful projects with cultural outcomes through the environmental watering program.

Other concerns raised about cultural flows were about the National Cultural Flows Research Project. Some Traditional Owners were wondering how it could be endorsed when they had not been consulted.

11.3.7.11 References

State of Victoria, Mallee Catchment Management Authority (2014) Mallee *Waterway Strategy 2014 - 2022*

State of Victoria, North Central Catchment Management Authority (2014) *North Central Waterway Strategy 2014 - 2022*

State of Victoria, North Central Catchment Management Authority (2017) *Kerang Wetlands RAMSAR Site Action Plan*

State of Victoria, Heritage Council (2018), *Case Study 6: Lake Boga, Social and Cultural Heritage Landscape*

11.3.8 Weki Weki

Weki Weki Nation is represented in the Wimmera–Mallee Water Resource Plan area through interests in Lake Tyrrell particularly nearby the area around Sea Lake. Consultation with the Weki Weki has indicated that they are on track to submitting their contribution to the Northern Victoria Water Resource Plan. Please refer to Appendix D for the consultation to date and refer to the final version of the Northern Victoria Water Resource Plan for their contribution that is also relevant to the Wimmera-Mallee Water Resource Plan. DELWP has been allowing the time that Weki Weki need to develop and finalise a meaningful contribution.

11.3.9 Wotjobaluk Peoples (represented by Barnegi Gadjin Land Council)

The Wotjobaluk People's updated contribution was signed off by the Barengi Gadjin Land Council Board in February 2019.

11.3.9.1 Description

The Wimmera River, the Avon-Richardson and the lakes and woodlands of the Wimmera and Mallee plains have sustained the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagalk peoples for thousands of years.

These groups, often referred to collectively as the Wotjobaluk Peoples or Wotjobaluk Nations and represented by Barengi Gadjin Land Council Aboriginal Corporation (BGLC), were recognised in the 2005 Native Title Consent Determination, the first in south-eastern Australia. The Wotjobaluk Peoples were recognised as having non-exclusive Native Title rights over some Crown reserves along the banks of the Wimmera River, between a point north of Lake Albacutya to the junction of the Wimmera River with Yarriambiak Creek, including Lake Albacutya & Lake Hindmarsh. This does not include the waters of the river. The *Native Title Act 1993* also does not provide for a right to negotiate over water.

BGLC also entered into an Indigenous Land Use Agreement (ILUA) with the Victorian and Australian Governments in 2005. Under the ILUA, related agreements provide for the grant of freehold title to three parcels of land over which the Native Title holders have demonstrated a strong cultural and historic connection (including land near the former Ebenezer Mission site).

Representatives of the peoples of the Wotjobaluk Nations , as of January 2019, are in negotiations with the State to assess what benefits may be available through the *Traditional Owner Settlement Act*.

BGLC is a Registered Aboriginal Party over a large part of Wotjobaluk Country under the Victorian *Aboriginal Heritage Act*.

The 'Growing what is good' Country Plan outlines what Wotjobaluk Nations peoples want for Country, including land, flora, fauna and water. The Country Plan is seen as an important reference document for anyone wanting to work with Wotjobaluk Nations peoples, including Government.

The Wotjobaluk and Wergaia Nations are members of MLDRIN, and Barengi Gadjin Land Council, as a foundation member, is represented on the Federation of Victorian Traditional Owner Corporations Board.

Barengi Gadjin Land Council is represented on the Wimmera-Mallee Pipeline Wetlands Environmental Watering Advisory Group coordinated by North Central CMA. It also has representation on the Mallee CMA Aboriginal Reference Group.

11.3.9.2 Preferred means of engagement

Barengi Gadjin Land Council has confirmed the preferred engagement for Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagalk peoples with government is via Barengi Gadjin Land Council. Individual Wotjobaluk Nations people cannot speak on behalf of the community. BGLC asks that those looking to engage with Wotjobaluk Nations peoples take the time to review the 'Growing what is good' Country Plan before commencing engagement with the corporation.

Barengi Gadjin Land Council also requests that as its recognised boundaries include Lake Tyrrell, that it is informed if Government engages with any other Traditional Owners in regards to water matters and Lake Tyrrell.

Introduction

Wotjobaluk Nations peoples and Water Resource Plans

"We are part of Wotjobaluk Country. It links us to our ancestors and spirits and it is the foundation of our future. If Country is treated with respect and care, and we can act on our responsibility for Country, then Wotjobaluk Country will continue to provide for us."

'Growing what is good' Country Plan, 2017

Discussions between Barengi Gadjin Land Council and DELWP commenced in 2016, with a discussion that a lack of resourcing was a major impediment to progressing their water aspirations, and participating in Government planning and policy discussions.

As a result , in 2016, the Victorian Government, together with Barengi Gadjin Land Council Aboriginal Corporation and the Wimmera CMA, funded an Aboriginal Water Officer position, based at the Wimmera CMA. The funding also provided for the Wimmera River Aboriginal Water Project, to improve recognition of Aboriginal cultural connection to waterways and wetlands and support Traditional Owner aspirations in the lower Wimmera River system. The project represented a grassroots, localised approach to identify Wotjobaluk Peoples' water resource objectives for a specific part of the Wimmera. It will be used to improve cultural, environmental, social and economic conditions, and to identify management options to achieve these objectives.

Figure 35: *River Scene* by Aunty Nancy Harrison, painting showing the pathways and Wimmera River coming from a cultural camping area

"We have a huge connection to the Wimmera River; it is a creation story path and has a very special place in our hearts. It is a major part of who we are as people."

Aunty Nancy Harrison, Yanga Track Wanjab, Gadjin and Murnong 2012

A collaboration between DELWP, Barengi Gadjin Land Council and the Wimmera CMA, the Wimmera River Aboriginal Water Project was extended in 2017 for a further 12 months to provide increased evidence for Aboriginal watering outcomes based on Traditional Owner values and uses in relation to managing water. The project also increases capacity and support for Traditional Owners to effectively participate as water users, and raises awareness and appreciation of Aboriginal cultural and customary interests in land, water and natural resources. The project has included:

- engagement and foundational work to prepare for watering of the Billabong and other significant cultural places
- participation in governance training with Aboriginal Victoria to increase capacity for Aboriginal community representation on boards
- introduction of cultural awareness training for Wimmera CMA staff and board
- support for Barengi Gadjin Land Council business development, and training at Wail Nursery
- participation in community events in partnership with BGLC and Goolum Goolum to recognise Closing the Gap Day and Reconciliation Week
- A bark canoe event on the Wimmera River, at Dimboola

The Water Resource Plan funded and DELWP staff attended the lower Wimmera River Aboriginal Waterway Assessment, after which representatives from BGLC and the Aboriginal Water Officer briefed DELWP on Country on the outcomes. Attendance and support of a community Bark Canoe Event, and attendance at an Earth Oven event, provided further input.

Barengi Gadjin objectives and outcomes

As a result of meetings, workshops and community gatherings attended and facilitated during 2016 and 2017, and as a strong reflection of the *Growing What is Good Country Plan*, Barengi Gadjin Land Council has developed the following water objectives and desired outcomes for accreditation:

Table 47: Objectives for Barengi Gadjin Land Council

Objective
1. Have the ability to manage and protect Wotjobaluk Country and culture through recognition of our traditional rights, respect for our knowledge and cultural obligations, understanding of our aspirations and understanding of our history before and since colonisation.
2. Develop our economic independence through education and training to build our capacity, so we can contribute to our Wotjobaluk community and the wider Australian community, and assistance to develop self-determination through economic ventures with water, including tourism and enterprise.
3. Participation and partnership with State Government in water policy and strategy formation, development, implementation and management to strengthen Traditional Owner communities' involvement and turn policy into effective management on the ground.
4. Partner with catchment management authorities and water corporations to collaborate, develop and implement plans for the protection and rehabilitation of waterways and wetlands on Wotjobaluk Country.

continued

Objective
5. Our involvement is adequately resourced to ensure participation in the formation, development and management of water policy, strategy and plans impacting Wotjobaluk Country.
6. Build capacity through employing, procuring and training Wotjobaluk Peoples in water management and planning. Create enterprises around Wotjobaluk cultural water practices.

Table 48: Outcomes for Barengi Gadjin Land Council

Desired outcomes and priorities for Barengi Gadjin Land Council	
1. Gurru, Ngalpakatia Ngelpagutya and surrounds: ancestral connections	• a cultural survey around Gurru (Lake Hindmarsh)
	• restore cultural water flows and recreate the full breadth of Traditional Owner ecological knowledge to inform management practices that heal Country
	• review Ngalpakatia/Ngelpagutya (Lake Albacutya) Ramsar Wetland Management Plan
	• restore cultural water flows and re-create the full breadth of Traditional Owner ecological knowledge to inform management practices that heal Country

continued

Desired outcomes and priorities for Barengi Gadjin Land Council	
2. Barringgi Gadyin (Wimmera River): the lifeblood of the Wotjobaluk Peoples	• continue to develop the River Yarns event, to share and re-create cultural knowledge about the River using the Aboriginal Waterway Assessment tool to help with this
	• demonstrate alignment between environmental watering and cultural objectives, and advocate for environmental and cultural flows
	• increase awareness and appreciation of Wotjobaluk culture and customary interests in land, water and natural resources
	• increase protection and rehabilitation of significant cultural places
	• restore native vegetation so there is a continuous corridor re-established along the length of the River
	• increase employment, training and economic development for Wotjobaluk Peoples through water-related projects
	• install fish and bunyart (eel) ladders at each of the weirs along the River
	• work with the Catchment Management Authority, Victorian Environmental Water Holder and Commonwealth Environmental Water Holder and other relevant Government bodies so the release of environmental water, when available, can be timed with cultural outcomes and community events.

continued

Desired outcomes and priorities for Barengi Gadjin Land Council	
3. The Ranch, the Common and the Billabong: historical connections	• create a management committee of Traditional Owners to oversee implementation of the management plan for the Ranch, including water requirements
	• restore indigenous plant and animal habitats, with particular attention to controlling priority weeds in the Ranch and the Billabong
	• renovate the Ranch, including the Billabong, to provide facilities for meetings and short- term accommodation
	• restore a natural flooding regime to the Billabong
	• work with the Catchment Management Authority, Victorian Environmental Water Holder and Commonwealth Environmental Water Holder and other relevant Government bodies so the release of environmental water, when available, can be timed with cultural outcomes and community events
	• explore the impacts of land use change and non-Wotjobaluk settlement on natural hydrology.

Values and uses

Barengi Gadjin Land Council has stressed that all waterways and water bodies on Country as outlined through the Native Title agreement and the RAP, and any identification of Country through further processes, including extensions of boundaries, are important to Wotjobaluk Nations peoples.

The Water Resource Plan objectives and outcomes for the Wotjobaluk Nations peoples are a clear indicator of the importance water has, traditionally, historically and economically. The following case study is an example of water values and uses for the Wimmera River.

River Yarns

In March 2017, we held our first of many River Yarns. This is stage one of the Wimmera River project that was allocated to BGLC and the Wimmera CMA to implement. The project is about Traditional Owner aspirations and values of the Wimmera River.

With BGLC and MLDRIN, we had a five-day project where the Traditional Owners of the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk peoples went along the Wimmera River starting from Horsham at one of our sacred sites named Wopert Bungandilar (Place of Feathers), the last resting place of our dreamtime story Tchingal the emu, through to our Ramsar wetlands site, Lake Albacutya. The Traditional Owners on the way had to fill out an assessment form called an Aboriginal Waterway Assessment. They had to reflect on how the landscape has changed and how can we get it back to the way it was, whether it be where they used to fish or swimming holes or just social, recreational and cultural uses of the water. It was a great week where Traditional Owners got to go back to where they grew up and tell the stories of what was around and what they used to do and also an emotional week for Elders to visit their past.

– Ben Muir, Aboriginal Water Officer Wimmera CMA

Aboriginal Waterway Assessments were undertaken at many sites along the Wimmera River in 2017 by Traditional Owners as part of River Yarns with BGLC, MLDRIN and Wimmera CMA – supported by Water Resource Plans. At this time Traditional Owners collectively agreed that re-watering and rehabilitating the Ranch Billabong would be highly beneficial for Country and Community. BGLC successfully applied for a grant under the Victorian Government $4.7 million cultural objectives program to restore flows to the Billabong, at the Ranch in Dimboola.

The 'Come along and we will re-water The Billabong' project, approved mid 2018, included the employment of an Aboriginal Water Officer within BGLC. It was recognised that surveying, planning and on-ground works programs for the nominated site would benefit the Ranch Billabong, however the learning and capacity building from the project would benefit the whole community and inform future projects identified, including Ebenezer, Antwerp and Goyura, all of which are adjacent to the Wimmera River and/or its tributaries (Datchak Creek and Yarriambiack Creek) and many more billabongs along the Wimmera River where Native Title is held.

The employment of an Aboriginal Water Officer was vital to provide the resourcing for BGLC to manage the project, and will build the internal capacity of BGLC to engage in the water entitlement and planning frameworks, for this project and into the future.

Cultural flows

Barengi Gadjin Land Council Aboriginal Corporation has indicated a desire for cultural flows as defined by the Echuca declaration for surface water and groundwater.

The Wimmera-Mallee Water Resource Plan acknowledges that Barengi Gadjin Land Council Aboriginal Corporation is seeking cultural flows and the conversation about these flows will continue as Victoria implements the Aboriginal Water Policy.

BGLC has expressed its strong interest in accessing water to support farming of indigenous plants as a commercial enterprise.

11.4 Having regard to Traditional Owner water values and uses

Traditional Owners have cultural, spiritual and economic connections to land, water and resources through their associations and relationship with Country. They have managed land and water sustainably over thousands of generations but historically Aboriginal connections and rights to water have not been an influencing factor in the development of Victorian water policy.

The environmental and consumptive uses of water are relatively well understood as water resource planning concepts; however, Aboriginal values and uses of water are not as well understood by Government.

Traditional Owner water values and uses are discussed further in the individual Traditional Owner contributions.

11.4.1 Assessing risk to Traditional Owner values and uses – a precautionary approach

While Traditional Owner values and uses of water encompass a wide range of cultural and environmental benefits, Victoria's Water Resource Plan Risk Assessment grouped these benefits together as 'Aboriginal Water' as the limited information did not support risks to be assessed differently for each sub-group of Aboriginal use.

Aboriginal Water is an emerging term to describe the full range of Aboriginal interests and aspirations in water. It encompasses 'Aboriginal environmental and cultural outcomes' and 'cultural flows' including entitlements and identifies improvements in environmental outcomes, and economic benefits for Aboriginal communities.

Due to the historical exclusion of Traditional Owners in water ownership and management, a number of very high risks to the availability and condition or quality of surface water to support Aboriginal beneficial uses have been identified in the Wimmera-Mallee Water Resource Plan Risk Assessment (see **Part 7** and **Appendix B**).

11.4.1.1 High and very high risks to the availability and condition of water to support Traditional Owner water values and uses

Several high and very high risks were identified in respect of the condition and availability of water to support Traditional Owner water values and uses. These risks are identified in **Table 49** below.

Table 49: Risks to availability and condition of water to support Aboriginal water values and uses

Risk	Availability of water	Condition of water
Surface Water		
Very High	climate change government failure to proceed with strategies and programs for improved management of land use practices.	climate change government failure to proceed with strategies and programs for improved management of land use practices

continued

Risk	Availability of water	Condition of water
High	extreme drought bushfire farm dams.	extreme drought farm dams extreme wet bushfire land use change non-compliance with the Victorian Water Act earth resources development pest and weeds.
Medium risk:	extreme wet land use change increased utilisation of entitlements non-compliance with the Victorian Water Act major asset failure.	increased utilisation of (existing) entitlements flooding and overbank inundation point source discharge major asset failure
Groundwater		
Very High	climate change.	N/A
High	earth resources development	earth resources development
Medium	extreme drought bushfires land use change farm dams increased utilisation of water access rights increase in the number of entitlements leading to increased take	N/A

Continued availability of water relates to the ability for Traditional Owner communities to access water either at a particular time or in a particular volume. Therefore, the above identified causes or impacts on continued availability may change the seasonality of water (i.e. when it is available) or the volume of water available in the system for all users.

Condition of water primarily relates to water quality. Water quality is assessed in terms of whether the water is fit for purpose.

These risks are outlined in more detail in **Appendix B**.

Increases in earth extraction industries were seen to pose a threat to groundwater quality.

The risks to Traditional Owner water use were rated as very high to medium in recognition of the very limited information available to determine how Aboriginal water uses might be affected by the changes in the water resource. For example, Traditional Owner water use may be affected by salinity, pathogens or changes in surface water seasonality, but there was not sufficient information available on which to base this relationship.

Impacts on meeting environmental watering requirements and maintaining priority environmental assets are also recognised as risks to Traditional Owner water values and uses. These risk ratings are largely due to the lack of understanding and formal recognition of how Traditional Owner organisations and individuals may wish to use water and the volume required for those uses. Therefore, Traditional Owner water use is assumed to have a medium to very high sensitivity to any changes to surface or groundwater.

11.4.2 Strategies to address risk to Aboriginal water

The Basin Plan requires all medium to high risks to have strategies developed to address them. There are dozens of strategies cited to address risks to Traditional Owner values and uses. This is because addressing the cause of the risk – for instance, climate change or non-compliance – has its own set of strategies to deliver improved management of water resources including Aboriginal values and uses.

Risks related to Traditional Owner values and uses, and the strategies to address them are contained in **Appendix B** in **Table 31** to **Table 40** for the Wimmera-Mallee (surface water) water resource plan area and Tables 61 to 70 for the Wimmera-Mallee (groundwater) water resource plan area.

Table 78 in **Appendix B** contains an explanation of the strategies identified to address these risks.

As knowledge is shared between the water sector and Traditional Owners, more targeted strategies can be developed to further lower or mitigate risks to the availability and condition of water for Aboriginal values and uses.

The core strategy for addressing risks to Aboriginal water values and uses is Strategy 31 – recognising and managing for Aboriginal values. This strategy is cited for every risk associated with Aboriginal values and uses. Strategy 31 is a reconfirmation of Chapter 6 of *Water for Victoria* recognising and managing for Aboriginal values and the four actions contained within that chapter. The development of Victoria's Aboriginal water policy is discussed below. Under the Basin Plan, the Basin states are required to report annually on the effectiveness of the management of risks to Basin water resources.

Upon accreditation of the Wimmera-Mallee Water Resource Plan, the Victorian Government and its agencies are obliged to report annually on compliance or progress with the water resource plan, including strategies to mitigate risk (section 10.43). The MDBA has a role in enforcing compliance with accredited water resource plans across the Basin. Victoria has committed to review the content of the Wimmera-Mallee Water Resource Plan upon any change of policy or statutory instrument to determine whether it is consistent with Victoria's approach to water resource management. If the change of policy or legislation requires amendment to the water resource plan, Victoria is required to undertake consultation regarding the proposed amendment and provide reasons to the MDBA regarding the need for the amendment. These commitments are outlined in **Part 1**.

11.4.3 Identifying opportunities to strengthen protection of Aboriginal water values and uses: Victoria's Aboriginal Water Program

Throughout 2015 and 2016, the Victorian Government worked with Traditional Owners and Aboriginal communities to develop a new Aboriginal water policy which became a cornerstone of

the *Water for Victoria* policy paper released in October 2016. The policy was developed in partnership with Traditional Owners through a specially formed Aboriginal Reference Group, extensive consultation under the Victorian Water Plan Aboriginal Reference Group, and supplementary commentary from community sessions and submissions over an 18-month period. The aims were to ensure greater Aboriginal inclusion in decision-making, and to incorporate Aboriginal values and uses of water into the State's water management and planning framework.

The Aboriginal water policy sought to redress the very limited opportunity Traditional Owners had previously had to be involved in water planning and management decision-making. It included a $4.7 million investment to help identify Aboriginal water objectives, and a further $5 million to work in partnership with Traditional Owners and Aboriginal Victorians to develop a roadmap for access to water for economic development. The Victorian Government committed to identify seed funding and business finance opportunities to support Aboriginal enterprises investing in water.

The Victorian Aboriginal water policy provides a framework to support the preparation and implementation of water resource plans that meet the requirements of the Basin Plan (Chapter 10, Part 14). It provides three broad strategies for addressing risks as identified in the Risk Assessment (Appendix B). These are for the Victorian Government to:

- recognise Aboriginal values and objectives
- incorporate Aboriginal values and traditional ecological knowledge in Victorian water management and planning; and
- work with Traditional Owners and Victorian Aboriginals to build capacity to increase Aboriginal participation in water management.
- *Water for Victoria* directs an ongoing partnership approach between Traditional Owners and Victorian Government water managers to:
- support Aboriginal participation in Victorian water planning and management frameworks through collaborative structures that address the rights and interests of Victoria's Traditional Owners,
- increase capacity for shared benefits to realise Aboriginal water outcomes through working with water corporations, CMAs and the VEWH, and
- build capacity to increase Aboriginal participation in water management.

The above objectives and outcomes reflect the actions identified in Chapter 6 of *Water for Victoria* and are reflected in the accredited text below. Objectives and outcomes identified by each Traditional Owner group are included in Part 8.5.

10.52(1)(a) For the purposes of section 10.52(1)(a) of the Basin Plan, the following objective of Indigenous people is identified in relation to managing the water resources of the Wimmera-Mallee water resource plan area:

a. To develop respectful partnerships between Traditional Owners, Aboriginal Victorians and the Victorian Government to:

i. recognise Aboriginal values and objectives of water in Victorian water management, policy and planning

ii. include Aboriginal values and traditional ecological knowledge in Victorian water management, policy and planning

iii. facilitate Aboriginal access to water for economic development in Victorian water management, policy and planning

iv. build capacity for Aboriginal participation in Victorian water management, policy development and planning

b. The specific objectives for the Barapa Barapa Nation are identified in **Table 30** of the Wimmera-Mallee Comprehensive Report.

c. The specific objectives for Nation groups represented by the Barengi Gadjin Land Council are identified in **Table 47** of the Wimmera-Mallee Comprehensive Report.

d. The specific objectives for the Dja Dja Wurrung Clans Aboriginal Corporation are identified in **Table 33** of the Wimmera-Mallee Comprehensive Report.

e. The specific objectives for Nation groups represented by the First Peoples of the Millewa-Mallee are identified in **Table 36** of the Wimmera-Mallee Comprehensive Report.

f. The specific objectives for Tati Tati Wadi Wadi Nations are identified in **Table 37** of the Wimmera-Mallee Comprehensive Report.

g. The specific objectives for Wadi Wadi Nation are identified in **Table 43** of the Wimmera-Mallee Comprehensive Report.

h. The specific objectives for Wamba Wemba Nation are identified in **Table 46** of the Wimmera-Mallee Comprehensive Report.

10.52(1)(b)

a. For the purposes of section 10.52(1)(b) of the Basin Plan the following outcomes for the management of water resources of the Wimmera-Mallee water resource plan area that are desired by Indigenous people are identified:

i. To partner with the water sector to make sure that the legislated objectives of the Victorian Environmental Water Holder consider identified Aboriginal water-related environmental outcomes

ii. To incorporate traditional and ecological knowledge into water planning and management using Aboriginal Waterway Assessments and other tools developed by Traditional Owners

iii. To achieve shared benefits in water resources

iv. To be notified by water corporations when opportunities to access water entitlements arise

v. Sustainable water strategies to be prepared considering opportunities for access to water for economic development for Aboriginal Victorians.

b. The specific outcomes for the Barapa Barapa Nation are identified in **Table 30** of the Wimmera-Mallee Comprehensive Report.

c. The specific outcomes for Nation groups represented by the Barengi Gadjin Land Council are identified in **Table 48** of the Wimmera-Mallee Comprehensive Report.

d. The specific outcomes for the Dja Dja Wurrung Clans Aboriginal Corporation are identified in **Table 34** of the Wimmera-Mallee Comprehensive Report.

e. The specific outcomes for Nation groups represented by the First Peoples of the Millewa-Mallee are identified in **Table 36** of the Wimmera-Mallee Comprehensive Report.

f. The specific outcomes for Tati Tati Wadi Wadi Nations are identified in **Table 37** of the Wimmera-Mallee Comprehensive Report.

g. The specific outcomes for Wadi Wadi Nation are identified in **Table 44** of the Wimmera-Mallee Comprehensive Report.

h. The specific outcomes for Wamba Wemba Nation are identified in **Table 46** of the Wimmera-Mallee Comprehensive Report.

Section 10.52(3) of the Basin Plan also provides that opportunities to strengthen the protection of Aboriginal values and uses within the water resource plan area may be identified.

10.52(3) Opportunities to strengthen the protection of Aboriginal values and uses of water within the Wimmera-Mallee water resource plan area include:

a. legislative changes to improve the ways that Traditional Owners and Aboriginal Victorians are engaged in water management and planning, and to improve incorporation of traditional ecological knowledge and Aboriginal water objectives and outcomes in decision making

b. further engagement on the National Cultural Flows Research Project (released July 2018) to identify opportunities to progress understanding of, and respond to, cultural flows in Victoria

c. engagement on the review of the Wimmera-Mallee Long-Term Watering Plan to occur following accreditation of the Wimmera-Mallee Water Resource Plan

d. engagement on the implementation of the Water Quality Management Plan developed under Part 7 of Chapter 10 of the Basin Plan

e. engagement on the review of the Northern Sustainable Water Strategy; increased awareness of section 8A rights under the *Water Act 1989* (Vic) and to increase the capacity of relevant Traditional Owner groups to access these rights in the future

f. implementation of Aboriginal Participation Guidelines for catchment management authorities, which describe key principles and actions to support Aboriginal participation and inclusion

g. creation of several Aboriginal water officer positions during the development of this water resource plan and seeking funding to ensure these positions continue to progress the identification and implementation of values, uses, objectives and outcomes identified in this plan

h. continued implementation of the *Water for Victoria* Aboriginal Water Policy, as recommitted via the risk strategies and measures in this plan, to provide opportunities for further identification and protection of Aboriginal water values and uses in the Wimmera-Mallee area and to minimise or mitigate the high risks identified as much as practicable.

11.4.4 Building capacity and understanding

At the request of Traditional Owner groups seeking to expand their capacity to contribute to Victoria's water management and planning framework, DELWP has funded and supported a number of projects and positions to help build understanding of Aboriginal water needs in the Wimmera-Mallee water resource plan area.

Initial funding carried through to 2018 to continue to build information on individual Traditional Owner group objectives and aspirations, and determine how government can best respond. This approach recognises that water resource planning and Traditional Owner timelines do not always align. Following the expenditure of the initial funding, DELWP will evaluate the success of the projects and consider the best opportunities to continue building capacity of Traditional Owner groups.

11.4.4.1 Aboriginal Waterway Assessments

At the outset of the water resource plan process, Victoria committed to fund six Aboriginal Waterway Assessments (AWAs) in Victoria's share of the Basin, undertaken by MLDRIN in partnership with Traditional Owners, CMAs and other agencies, according to the requirements of each individual group.

The AWA program was established to consistently measure and prioritise river and wetland health so that Traditional Owners could more effectively participate in water planning and management in the Basin (MDBA, 2016). MLDRIN and Northern Basin Aboriginal Nations (NBAN) authorised the design and implementation of the AWA project. The MDBA's report on an AWA pilot program in 2015 identified the following three key components of the AWA:

- place status – a statement of whether or not the place is an area of cultural significance and whether local Traditional Owners would return to the place in the future.
- current use of the place – a measure of the value of a river or wetland to Aboriginal people based on whether food and other resources are available and suitable for cultural use.
- cultural stream health – a measure made up of eight stream health indicators such as vegetation, riverbed condition and water quality.

The AWAs are the property of Traditional Owner groups, who can choose how they use the reports compiled by MLDRIN, and how and when they wish to share information.

Of the six AWAs to be funded – including for Dja Dja Wurrung, Barengi Gadjin, Ngintait, and Tati Tati/Wadi Wadi – one application was received from Traditional Owner groups and undertaken on surface water within the Wimmera-Mallee water resource plan area. Please refer to the "River Yarns" case study presented in the Wotjobaluk contribution above.

11.5 Acknowledging existing legislative rights

Basin Plan requirements stipulate that a water resource plan must provide at least the same level of protection of Indigenous values and uses as existed before the Basin Plan (Section 10.55 of the Basin Plan). In determining whether the same level of protection exists since the commencement of the Basin Plan a review of existing arrangements in 2012 and any amendments to those arrangements since that time was undertaken. This section outlines these existing legislative and policy tools and arrangements.

It was determined that there was no lessening of protections since the commencement of Basin Plan. While legislative protections have not changed since 2012, Victoria has introduced new Aboriginal Water Policy under *Water for Victoria* which seeks to improve understanding of Aboriginal values and uses in water and build capacity of Traditional Owners to participate in water resource management (see **Part 11.4.3** above).

10.55 This Wimmera-Mallee Water Resource Plan provides the same level of protection as provided in transitional water resource plans for the Wimmera-Mallee (surface water) and Wimmera-Mallee (groundwater) water resource plan areas as it does not operate to limit any right to take water under section 8A of the *Water Act 1989* (Vic).

11.5.1 Native Title Act 1993 (Cth)

Native title is a recognition under Australian law that some Aboriginal and Torres Strait Islander people hold rights and interests in land and water where they continue to practice traditional laws and customs. These principles are contained in the Commonwealth Native *Title Act 1993*. The characteristics of Native Title vary for each group, deriving from traditional laws and customs of the relevant group. The manner in which Native Title is recognised will depend on what is claimed and what is negotiated between all of the people and organisations with an interest in the area.

The *Native Title Act 1993* does not provide for a right to negotiate over water. Current Native Title claims in Victoria are identified in **Figure 36** below.

11.5.2 Traditional Owner Settlement Act 2010

The *Victorian Traditional Owner Settlement Act 2010* allows the Victorian Government and Traditional Owner groups to make agreements that recognise Traditional Owners' relationship to land and to provide them with certain rights on Crown land.

Under this Act, a settlement package can include:

- a Recognition and Settlement Agreement to recognise a Traditional Owner group and certain Traditional Owner rights over Crown land
- a Land Agreement which provides for grants of land in freehold title for cultural or economic purposes, or as Aboriginal title to be jointly managed in partnership with the state
- a Land Use Activity Agreement which allows Traditional Owners to comment on or consent to certain activities on public land
- a Funding Agreement to enable Traditional Owner corporations to manage their obligations and undertake economic development activities
- a Natural Resource Agreement to recognise Traditional Owners' rights to take and use specific natural resources and provide input into the management of land and natural resources.

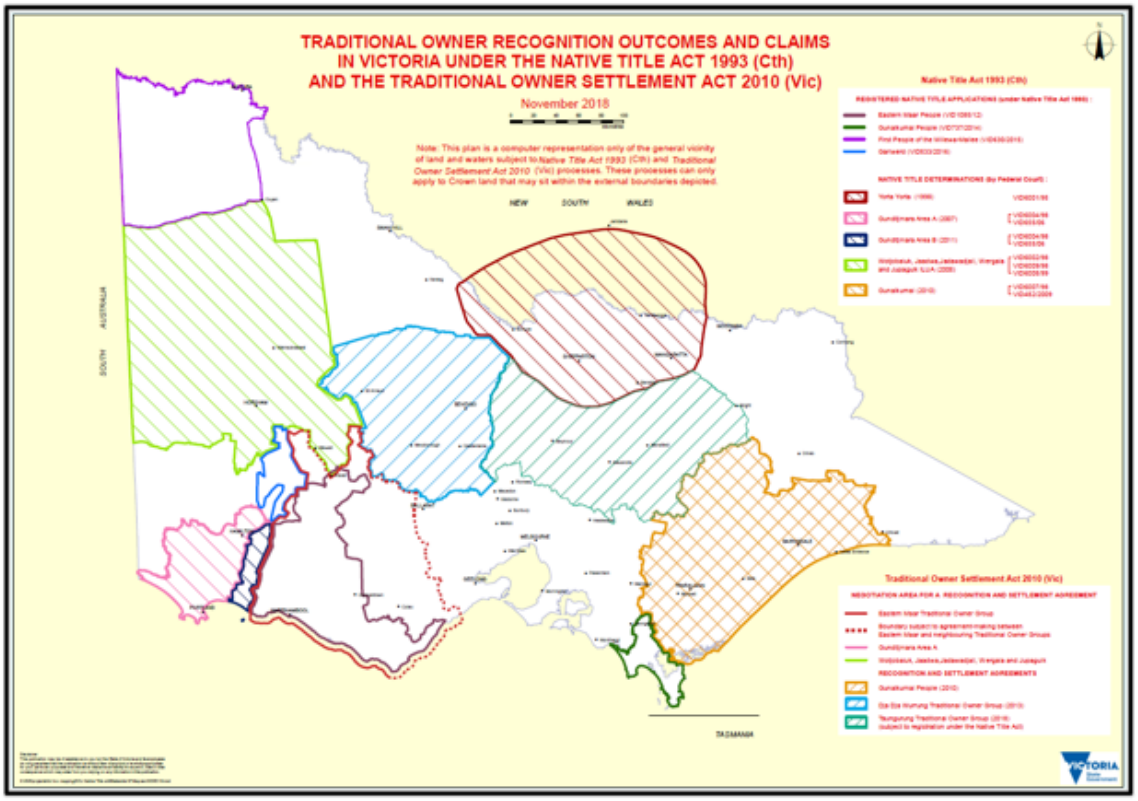

Figure 36: Traditional Owner recognition outcomes and claims in Victoria

11.5.3 Victorian Aboriginal Heritage Act 2006

Under the *Victorian Aboriginal Heritage Act 2006*, Aboriginal people are recognised as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage.

Registered Aboriginal Parties (RAPs) have responsibilities under the Act relating to the management of Aboriginal cultural heritage. While many cultural heritage sites are near water, the Act does not prescribe how water near or on culturally significant sites is to be managed.

11.5.4 Statutory rights to access water

Some limited recognition of Aboriginal rights to access water was introduced into the Victorian Water Act in 2013 for Traditional Owners who have a natural resource agreement under Part 6 of the *Traditional Owner Settlement Act 2010*.

The *Victorian Water Act 1989* provides that members of a Traditional Owner group bound by a land use activity agreement under the Traditional Owner Settlement Act 2010 have the right under Section 8A to take and use water.

> *8A Traditional owner agreement for natural resources*
>
> *If a Traditional Owner group entity has an agreement under Part 6 of the Traditional Owner Settlement Act 2010, a person who is a member of a Traditional Owner group bound by the agreement has the right to take and use water on the land that is subject to the agreement—*
>
> *a. in accordance with the agreement; and*
>
> *b. if the water is to be taken from a place from which water may be taken under section 8(1).*

Section 8A expressly states that this right is to "use water on the land that is subject to the agreement".

This leaves agreements being able to authorise water to be taken and used for traditional purposes, as per the definition in section 79 of the Traditional Owner Settlement Act 2010. The volumes of water that could be taken are those needed for traditional purposes. There are two types of uses for traditional purposes under section 79 of the Traditional Owner Settlement Act:

(a) any personal or domestic needs of members of the Traditional Owner group.

This is effectively the same as domestic uses (part of domestic and stock uses) under the Victorian Water Act 1989:

1. The rights of a Traditional Owner group with a natural resource agreement on land owned by a member of the group to take water and use it would be the same as the domestic and stock rights under section 8 of the Victorian Water Act. This would include irrigation of a kitchen garden and watering of stock. In this respect, section 8A of the Victorian Water Act does not add anything to rights the land owner already has under section 8 of the Act

2. the rights of a Traditional Owner group with a natural resource agreement on Crown land would be limited by the nature of the land and the uses to which it may be put under the Traditional Owner agreement

(b) any non-commercial communal needs of the members of the Traditional Owner group.

This could include, for example, redesigning parts of a waterway or building fish or eel traps. Section 82 *Traditional Owner Settlement Act 2010* allows "interference" with a "natural resource" which includes stone and gravel. It also allows diverting water to generate food produce for the Traditional Owner group to eat but not sell.

11.6 Cultural flows

Cultural flows are distinct from 'Aboriginal environmental outcomes', a term which may be used to describe outcomes chosen by Aboriginal people to achieve cultural benefits from environmental water delivery.

MLDRIN has developed the following definition of cultural flows, which is recognised in the Murray-Darling Basin Plan:

"Cultural flows are water entitlements that are legally and beneficially owned by the Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, natural, environmental, social and economic conditions of those Nations. These are our inherent rights."

MLDRIN Echuca Declaration, 2007

As water entitlements, cultural flows may have a commercial benefit where any revenue accrued goes to Aboriginal people, or they may be used for customary practices, environmental outcomes or personal use.

Ownership of water by Aboriginal people can bring many benefits, including:

- improved self-esteem and empowerment as a result of being able to care for Country
- improvements to health and wellbeing through being able to see Country in a healthy state as a result of using cultural water
- potential economic returns.

"As Traditional Owners, our community expectations are to use, develop and control water resources on and under our Country for economic purposes: to support and generate Aboriginal businesses that depend on water allocations; and to generate economic development opportunities through the trading of water resources on the market."

Federation of Victorian Traditional Owner Corporations
Submission to *Water for Victoria* discussion paper, 2016

While Aboriginal environmental outcomes can occur as a result of healthier rivers and wetlands, and Victorian Catchment Management Authorities and the Victorian Environmental Water Holder are working to strengthen Traditional Owner and Aboriginal Victorian involvement, any shared benefits are still delivered via environmental water, not cultural flows.

In Victoria, there currently are no specific provisions for cultural flows as Traditional Owner-held water entitlements, although Victoria's water management framework's existing instruments and processes could be used to purchase temporary water or a water entitlement on the water market.

Traditional Owner groups consulted under Victoria's Water Resource Plans have each indicated a desire for cultural flows for surface water and groundwater.

"It is our human right – the rights of the indigenous people of Australia. To be involved in water, have the right of access to water, and be participating players in the decisions made regarding water. "

Brendan Kennedy, Tati Tati Nation, July 19, 2017

The Wimmera-Mallee Water Resource Plan has been developed in response to the section 10.54 requirement of the Basin Plan to have regard to the views of Traditional Owners on cultural flows. Views can be seen through individual Nation contributions.

The Wimmera-Mallee Water Resource Plan acknowledges that Traditional Owners are seeking cultural flows and the conversation about these flows will continue as Victoria implements the Aboriginal Water Policy.

11.7 Engagement with Aboriginal communities

The development of the Wimmera-Mallee Water Resource Plan collaborated with Traditional Owners to meet the requirements of the Basin Plan.

Engagement with Traditional Owners has been framed by the Aboriginal Water Policy announced in *Water for Victoria*. The policy is the foundation of Victoria's response to what Traditional Owners have said they want for water on Country in the Northern Victoria Water Resource Plan.

Engagement preferences of Traditional Owners in the area for the Wimmera-Mallee water resource plan are included in the individual Nation contribution. More information on consultation of the Wimmera-Mallee Water Resource Plan will be included in the Wimmera-Mallee Consultation Report (**Appendix D**).

12. Environmental water

Part 12. Environmental water

The Basin Plan sets objectives and targets to guide the use of water for the environment. Victoria's environmental water planning and management framework ensures these targets and objectives will be met. Victorian legislation and subordinate legislative instruments provide the Victorian Environmental Water Holder and catchment management authorities with the functions and powers to manage environmental water in Victoria. State and Commonwealth governments' monitoring and evaluation programs are used to report progress towards meeting the Basin Plan environmental objectives.

12.1 Victoria's environmental water management framework

Environmental water management in the Wimmera-Mallee water resource plan area is governed by Victorian and Commonwealth legislation. The Victorian Water Act established the Victorian water entitlement framework which provides the basis for management of Victoria's water resources (see **Part 6**).

It also supports the environmental water planning and management framework which coordinates and defers responsibility for different tasks to different partners to bring about positive environmental results for waterways (rivers, wetlands and floodplains). A key element of the environmental water planning and management framework is effective monitoring and evaluation which allows for adaptive management of environmental water (see **Figure 39**).

The Victorian Water Act and the Commonwealth Water Act, including the Basin Plan, set out the objectives of environmental water in Victoria.

Although the Victorian Water Act pre-dates the Basin Plan, the powers and functions for managing environmental water entitlements in the Victorian Water Act closely align with Basin Plan requirements.

The Victorian Water Act establishes the Environmental Water Reserve (EWR in Victoria). The reserve comprises water that is set aside for the environment as an environmental entitlement or bulk entitlement, and through conditions on bulk entitlements, licences, permits or management plans. The objective of the Environmental Water Reserve is to preserve the environmental values and health of water ecosystems, including their biodiversity, ecological functioning, and quality of water and other uses that depend on environmental condition. Environmental entitlements or other environmental water holdings are protected under the entitlement management framework (see **Part 6.8**).

The Victorian water planning framework is supported by key policy documents which sit beneath the legislation. These documents, among other things, detail how water resources are shared,

provide guidance on integrated waterway health management, emphasise shared or multiple benefits of environmental water, and support resource management under climate change.

In the Murray-Darling Basin, environmental watering is further underpinned by the Basin-wide environmental watering strategy and the long-term watering plans developed in accordance with Basin Plan requirements.

Planning, delivery and monitoring are undertaken by a range of environmental water partners in Victoria and interstate. These are outlined in **Part 12.4** and detailed in the long-term watering plan.

12.2 Water that achieves or contributes to environmental outcomes

Across all water resource plan areas, there are three key ways that Victorian water management meets environmental objectives:

1. Environmental water entitlements (bulk entitlements and environmental entitlements), water shares and supply-by agreements that are held or managed by the Victorian Environmental Water Holder, Murray-Darling Basin Authority (MDBA) or Commonwealth Environmental Water Holder (CEWH) and may only be used for environmental purposes (see **Part 12.2.2.1**). Water shares are not applicable in the Wimmera-Mallee water resource plan area.
2. Passing flow requirements specified for environmental purposes under bulk entitlements or water supply protection area water management plans (see **Part 12.2.2.2**)
3. Other water managed through water system management rules, including passing flows not specified as having an environmental purpose, and unregulated river diversion rules. This includes water which remains in the system after consumptive and environmental entitlements are taken out - referred to as 'above cap' water - and water used primarily for consumptive purposes, but which can also have a benefit for the environment (see **Part 12.2.3**)

12.2.1 How water is managed differently in regulated and unregulated systems and declared and undeclared systems

The management of environmental objectives in Victoria's surface water systems depends on whether the water resources are unregulated or regulated and whether the system is declared or undeclared. For more information about water resource management in regulated and unregulated and declared and undeclared systems see **Part 4.1**.

In the Wimmera-Mallee water resource plan area there are no declared systems and the whole area is undeclared. The headworks systems are managed by Grampians Wimmera Mallee Water which regulates water supplies in the Wimmera and Glenelg supply systems and the East Grampians supply system and the Pyrenees supply system to supply water to the Wimmera-Mallee pipeline and towns.

Regulated systems contain structures such as dams or major diversion weirs which exert significant control over the flow of water in the river for consumptive users. The impact of regulation on the environment will depend upon the size and number of storages and weirs, the level of consumptive use, and the overall volume of flow the river receives.

Regulation of a river system has a significant impact on the environmental values of the system. Storages capture water during naturally high flow periods and can deliver unnaturally high flow down the river during summer for consumptive use, or divert water from the storages into pipes and channels. Storages create barriers to flow connectivity and biota migration. Environmental water is used to lessen the impact of regulation and consumptive uses of water.

In the Wimmera-Mallee water resource plan area, major unregulated systems include the Avon-Richardson system and the Avoca system. Environmental objectives in unregulated

systems are to protect the existing hydrology and conditions (habitat), rather than provide a specific flow to meet an environmental objective such as for fish, vegetation or connectivity.

In unregulated surface water systems, the impact on the environment is managed by specifying limitations on the timing and the rate of take in bulk entitlements and take and use licences. The volume of water which can be extracted by consumptive users can be further limited by restricting or banning take for take and use licence holders during times of low flow (see **Part 6.7.1**). Note that the domestic and stock take is still permitted even during bans which apply to use for irrigation and industry (see **Part 6.2**).

In undeclared systems, if it is deemed that the current sharing arrangements are not providing sufficient protection for the environment or the consumptive users, then the Minister may declare a water supply protection area for the protection of surface water or groundwater or both in a defined area.

Other water in the system also supports environmental water outcomes. This includes passing flows requirements that meet multiple objectives, and delivery of water from reservoirs to downstream users, or transfers from storages.

12.2.2 Held and planned environmental water

The Commonwealth Water Act provides for two types of environmental water: held and planned environmental water.

Held environmental water is defined under section 4 of the Commonwealth Water Act to mean *water available under a water access right, water delivery right or irrigation right for the purposes of achieving environmental outcomes (including water that is specified in a water access right to be for environmental use).*

Planned environmental water is defined by section 6 of the Commonwealth Water Act and has three key components:

- water committed or preserved by an instrument
- water committed or preserved for the purpose of achieving an environmental outcome or other environmental purposes as specified in an instrument
- water that cannot, to the extent it is committed or preserved, be taken for any other purpose.

12.2.2.1 Held environmental water in Victoria

In the Victorian context, held environmental water is any water held under an entitlement for an environmental purpose. This water includes:

- environmental entitlements (or in other areas bulk entitlements) issued to the VEWH to provide passing flows and water to be used for environmental purposes
- entitlements, such as take and use licences, supply by agreements or water shares held by the VEWH, MDBA or CEWH.

This water is considered held environmental water under the Commonwealth definition because it is water specifically committed to environmental purposes under a water access right.

Held environmental water is protected by Victoria's water entitlement framework which provides security to all entitlement holders, regardless of use.

Held environmental water is protected by the Victorian entitlement framework (see **Part 6**) which provides for:

- secure and enduring entitlements
- the limits on take through sustainable diversion limits and permissible consumptive volumes

- the clear consultative process for changing entitlements
- the annual process to allocate water to entitlements
- the ability to trade
- Ministerial intervention only during extreme events to ensure supplies for critical human water needs
- a regime for compliance and enforcement.

All entitlements in Victoria are recorded on the Victorian Water Register (see **Part 6.10**). Information regarding who holds the entitlement, where the water may be taken and used and the volumes that are authorised by the entitlement are described in the Victorian Water Register.

Part 12.5 below outlines how environmental watering objectives are achieved through the use of held environmental water, supported by passing or minimum flows and releases from storages. Protection and rules for passing or minimum flow obligations are outlined in the respective entitlement instrument for each system. The use of held environmental water is often closely integrated with other types of water use. For example, the VEWH works closely with CMAs and storage managers and, where practical, will seek opportunities to adjust the timing and route for delivery of consumptive water to achieve environmental objectives efficiently. This may include 'piggy-backing' delivery of environmental water on consumptive water or passing or minimum flow obligations, in order to maximise ecological outcomes.

Table 50: Held environmental water in the Wimmera-Mallee water resource plan

System	Entitlement	Volume (ML)	Holder
Wimmera and Glenelg Rivers	Commonwealth Environmental Water Holder	28,000	CEWH
	Glenelg compensation flow *	3,300	VEWH
	Wetlands	1,000	VEWH
	Wimmera-Mallee Pipeline product**	40,560	VEWH
	Passing flows***	NA	VEWH

* Can only be use in the Glenelg basin

** Is used in both the Wimmera and the Glenelg catchments

*** Passing flows are specified for rivers in the Glenelg and Wimmera basins

10.09(3) The Victorian Water Register contains the details of the characteristics of held environmental water in the Wimmera-Mallee water resource plan area and identifies who holds the entitlements to the water. The relevant page of the Victorian Water Register is published at **http://waterregister.vic.gov.au/water-entitlements/bulk-entitlements**.

12.2.2.2 Planned environmental water

Section 10.09(1) of the Basin Plan requires the identification of planned environmental water. A review of Victoria's bulk entitlements and statutory management plans in the Wimmera-Mallee water resource plan area was undertaken to determine planned environmental water in the area. The review looked for water which had the following conditions:

- water is committed or preserved
- the commitment or preservation is specifically set aside for achieving environmental outcomes either for a specific environmental purpose or environmental purposes more generally
- the water that is committed or preserved cannot be taken for another purpose because it is protected from other forms of take or use.

Is it difficult to align Victoria's arrangements to the Commonwealth definition of planned environmental water with its exclusive preservation requirements because:

- minimum passing flows that appear in some bulk entitlements are generally not preserved exclusively for an environmental purpose or outcome as specified in section 6 of the Commonwealth Water Act. Passing flow requirements tend to serve a number of outcomes (shared benefits) and are rarely identified as being solely for an environmental purpose.
- there is no expressed purpose of water solely for environmental purpose in any instrument relevant to the Wimmera-Mallee water resource plan area, apart from the held environmental water, so no water can be identified as planned environmental water.
- in other parts of Victoria where water is committed or preserved (i.e. required to exist within the system such as a minimum passing flow) for a specified environmental purpose or to meet a specific environmental outcome, the Commonwealth definition deems that water cannot (to the extent it is committed or preserved) be taken for any other purpose. In Victoria, this requirement cannot be met where a person has a right to take water for domestic and stock purposes and it is not accounted for in measuring for passing flow.

There is no planned environmental water in the Wimmera-Mallee water resource plan area.

10.09(1) No planned environmental water exists in the Wimmera-Mallee Water Resource Plan. As a result, no planned environmental water nor any related rules or arrangements associated with planned environmental water are identified.

12.2.3 Other water that contributes to the environment

Under the Basin Plan it was expected by the MDBA that a large portion of system water and/or above cap water would be identified as planned environmental water. **Part 12.2.2.2** explains what planned environmental water is, and is not, and why not all above cap or system water can be identified as planned environmental water under Victoria's framework. In Victoria this water is considered to have 'shared benefits' and can contribute to environmental objectives for priority environmental assets and ecosystem functions, and other environmental values in the Wimmera-Mallee water resource plan area. *Water for Victoria* outlines Victoria's position on achieving shared benefits to meet a maximum amount of uses from limited water resources. Victoria aims to use water to maximise the benefit achieved from environmental water and to meet the objectives of key groups in the community, including Traditional Owners, recreational users, domestic and stock users, and the environment.

Therefore while there is no water that strictly meets the definition of planned environmental water, this does not mean that there is no water available to the environment beyond held environmental water.

Across all water resource plan areas, Victoria manages systems to meet environmental purposes and objectives in three key ways:

1. entitlement water that is held by the VEWH to be taken and used in the system for environmental purposes (held environmental water)
2. mandated passing flow requirements for specified environmental purposes under bulk entitlements, or minimum flows under a management plan that are specified for an environmental purpose (planned environmental water)
3. shared benefit water managed through water system management rules and water that is unallocated in the system. This may include passing flows (those not specified as having an environmental purpose); unregulated river diversion rules (local management plans or rules) that provide security for all users of the resource; or water remaining in the system after consumptive and environmental entitlements are taken out (referred to as 'above cap' water).

Due to the shared nature of this third type of water, including the existence of statutory rights to take water for domestic and stock purposes, there are no specified environmental objectives for such water to achieve an environmental outcome. This water may contribute to environmental outcomes and condition, but in the Wimmera-Mallee water resource plan area, it does not meet all three elements of the Commonwealth definition for planned environmental water.

Some further clarifications on shared benefits water:

- all Basin states allow water users to take water under a basic right, similar to Victoria's section 8 right for domestic and stock purposes, and planned environmental water may still exist in these areas. The distinction for Victoria is that water is not specifically set aside or accounted for to ensure that a discrete quantity of water achieves environmental purposes or outcomes.
- water that remains in the system after consumptive use contributes to environmental outcomes and condition, and also contributes to other uses. Victoria promotes the use of water in the system for a range of uses.
- it is not sufficient to identify instruments that establish limits to consumptive use as rules that protect planned environmental water, given the need to identify the relevant water as having an environmental purpose or meeting environmental outcomes. The Environmental Water Reserve definition in the Victorian Water Act does not specifically identify the water left over after consumptive use as water for the environment. Water is captured in the Environmental Water Reserve only where it is set aside for an environmental purpose. Without specifically identifying the environmental purposes or outcomes to be achieved by water left over in the system, it cannot fall within the scope of section 6 of the Commonwealth Water Act.
- the only passing flows directly identified specifically for environmental purposes in the Wimmera-Mallee water resource plan area are contained in the VEWH's environmental entitlement, which is held environmental water.
- as outlined in *Water for Victoria*, Victoria is focused on achieving shared benefits to meet a maximum amount of uses from limited water resources. Victoria aims to share the benefits of both unallocated and stored water (including system water) to meet the objectives of key groups in the community, including Traditional Owners and Aboriginal Victorians, recreational users, maintaining water fit for domestic and stock use, and meeting environmental outcomes.

12.2.3.1 Above cap water

Above cap water is described in **Part 6.6.1**. Environmental water managers will consider how much above cap water is in the system before requesting release of held environmental water from storage. This includes considering unregulated flows below the storage such as tributary inflows or spills, unregulated flows above the storage, and upcoming weather conditions.

Unregulated flows occur naturally in a waterway, particularly after heavy rainfall or when storages spill. Heavy rainfall resulting in unregulated flows may naturally meet an environmental objective, so delivery of held environmental water is not needed. Held environmental water may

also be used to extend the length of natural unregulated flow. Above cap water can contribute to environmental objectives for priority environmental assets (see **Part 12.3.1**) and priority ecosystem functions (see **Part 12.3.2**) by requiring the use of less held environmental water than would otherwise be needed if the above cap water was not present.

12.2.3.2 System water

System water is all the water that is described in the bulk entitlements which is not for environmental or consumptive use (see **Part 6.6.2**). It is managed through obligations on the instruments, in particular entitlement holders' compliance with the conditions of their entitlements.

The Wimmera-Glenelg headworks system does not have a large amount of system water because the main distributors of water in the system are pipes and channels, as distinct from other areas where the rivers are often used to distribute water.

12.2.3.3 Consumptive water en route

Where possible, environmental water managers work with storage managers to seek environmental outcomes from the delivery of consumptive water. This includes timing delivery of consumptive water en route to provide an environmental benefit, or piggybacking held environmental water on consumptive water to increase the flow for an environmental benefit.

As described above there are not many opportunities in the Wimmera Glenelg system to get environmental benefit from consumptive water en route because the majority of the water used is taken straight from reservoirs and transferred in pipes and channels. However, the MacKenzie river can be used to transfer system water (including consumptive water) from Lake Wartook via Distribution Heads to Taylors Lakes. These deliveries run through reaches 1 and 2 of the MacKenzie River which are high priority reaches and environmental water managers work together with system operators to identify opportunities to use system water to achieve environmental outcomes.

12.2.4 Protection of water that contributes to environmental objectives

While above cap water and system water, including many passing flows in bulk entitlements, are not identified as planned environmental water for the purposes of the Basin Plan, these forms of water are protected under Victoria's entitlement framework. See **Part 6.8**.

They are protected by:

- Limiting the volume of water that may be taken from the system through entitlements such as water access rights, and setting permissible consumptive volumes and the sustainable diversion limit to make sure decision makers do not authorise the take of water above a sustainable volume.
- Establishing clear rules about when a person can and cannot take water from the system, including the time, place and rate of take to ensure passing flows in the system are maintained. This is particularly important in unregulated systems.
- Passing flows being described in bulk and environmental entitlements.

In undeclared systems, if the existing water resource management rules offer insufficient protection, the Minister may declare a water supply protection area under section 27 of the Victorian Water Act to address local risks to a water resource or the environment. The declaration of a water supply protection area requires the development of a management plan to establish additional rules to manage the resources in the declared area to address the local risks.

12.2.5 Shared cultural and social benefits of environmental water

Environmental water can provide benefits beyond the ecological objectives for native fish, vegetation, waterbirds, amphibians and hydrological connectivity. The strategy *Water for Victoria* states that all water management agencies, including catchment management authorities and the Victorian Environmental Water Holder, will consider achieving shared benefits in environmental watering decisions, with the caveat that needs of the environment must not be compromised. Environmental watering in Victoria provides shared benefits through improving the condition of a waterway which benefits other uses of the waterway, for instance cultural outcomes, recreation and amenity. Through considering and planning for shared benefits, water management agencies are able to optimise a limited resource and help meet some objectives of key groups such as Traditional Owners and recreational users (see **Part 11** and **Part 13**).

Traditional Owner values and uses of water and cultural knowledge are increasingly being recognised and included in Victoria's water planning and management frameworks, including regional waterway strategies and sustainable water strategies. Most recently, Chapter 6 of *Water for Victoria* (DELWP, 2016) outlined actions to improve how the water sector recognises and manages for Aboriginal values and involves Traditional Owners in water management, including environmental watering. For details about how this is being done in Wimmera-Mallee, see **Part 11**.

Traditional Owner objectives for water may overlap with environmental water objectives at times, but not in all cases. Consideration of Aboriginal objectives are made in environmental water planning and delivery.

Traditional Owners are increasingly involved in the setting of environmental water objectives through the Victorian environmental water planning process, and through engagement with Victoria's water resource plans, and are expressing a clear desire for stronger involvement in the future. Until now Traditional Owner involvement in environmental water planning has mainly been through consultation on the environmental objectives set in the planning documents: catchment management authorities have consulted on the watering objectives for priority environmental assets at long-term and annual scales (through Environmental Water Management Plans and Seasonal Watering Proposals respectively), and DELWP has consulted on the collated objectives and targets set for the water resource plan area in the long-term watering plan. Opportunities for greater involvement in the environmental watering objectives will continue to be developed for yearly and long-term planning by catchment management authorities, the Victorian Environmental Water Holder and DELWP by working with Traditional Owners.

12.3 Priority environmental assets and ecosystem functions

A wide range of aquatic plants, wildlife and ecosystem processes in the Wimmera-Mallee water resource plan area rely on wetlands and rivers. Ecosystem functions that support these ecological values include geomorphological condition and hydrological connectivity. For the purpose of Basin Plan, a set of priority ecosystem functions have also been identified in the long term watering plan.

The priority environmental assets and ecosystem functions to benefit from environmental water planning and management arrangements are detailed in the Wimmera-Mallee Long-term Watering Plan. This plan also sets out associated environmental watering requirements.

12.3.1 Priority environmental assets

The priority environmental assets for the Wimmera Mallee water resource plan area are water-dependent ecosystems (rivers, wetlands or floodplains) can be found in the table below. The priority environmental assets support ecological values that are significant at Commonwealth and state level, and meet criteria in Schedule 8 of Basin Plan, as outlined in the long-term watering plan. An asset may be a single wetland or waterbody, a wetland complex (e.g. Wimmera-Mallee Pipeline Wetlands), or a river at a geographic location (e.g. Mount William Creek).

Table 51: Priority Environmental Assets in the Wimmera-Mallee water resource plan area

MMCA	WCMA	NCCMA
Yarriambiack Creek	Wimmera River	Davis Sam
Chiprick	Outlet Creek	Corack Lake
Cronomby Tanks	Lake Hindmarsh	Chirrup Swamp
Rikard Glenys Dam	Burnt Creek	Jeffcott Wildlife Reservoir
Coundons Wetland	Mount William Creek	Jesse Swamp
R Ferriers Dam	Lake Albacutya	Creswick Swamp
J Ferrier Wetland	MacKenzie River	
Paul Barclay	Bungalally Creek	
Round Swamp Bushland Reserve	Yarriambiack Creek.	
Broom Tank	Krong Swamp	
Towma (Lake Marlbed)	Crow Swamp	
Lake Danaher Bushland Reserve	Pinedale	
Bull Swamp	Carapugna	
Clinton Shire Dam	Fieldings Dam	
Goulds Reserve	Challambra Swamp	
Barbers Swamp	Schultz/Koschitzke	
Mahoods Corner	Opies Dam	
D Smith	Sawpit Swamp	
Kath Smith Dam	Mutton Swamp	
Homelea	Tarkedia	
Pam Juergens Dam	Harcoans Swamp	
Sharrons Wayside	Wal Wal Swamp	
Part of Gap Reserve		
Roselyn Wetland /Reids Dam		

continued

MMCA	WCMA	NCCMA
Tchum Lakes Lade reserve and Tchum Lakes Swimming Pool		
Greens Wetland (2)		
John Ampt		
Morton Plains Reserve		

The long-term watering plan provides a more comprehensive description of the environmental assets in the Wimmera-Mallee water resource plan area and explains the priority ecosystem functions. Note that the priority environmental assets listed in the long-term watering plan have been corrected since the 2015 publication. The updated list is available in the DELWP website.

Due to its flat topography, there are several assets on the Murray floodplain that extend from the Victorian Murray water resource plan area into the Wimmera-Mallee water resource plan area. These assets are not connected to surface or groundwater within the Wimmera-Mallee water resource plan area, receiving all their source water from the River Murray. These assets are identified as priorities in the Victorian Murray Long-term Watering Plan and will be included under the Northern Victoria Water Resource Plan. The particular assets are:

- Lindsay, Mulcra, Walpolla Islands (The Living Murray Icon site)
- Lindsay-Walpolla Islands (proposed supply measure site[10])
- Cardross Lakes
- Bottle Bend
- Hattah Lakes (The Living Murray Icon site)
- Hattah Lakes North (proposed supply measure site)
- Wemen Liparoo
- Pound Bend
- Carina Bend
- Belsar and Yungera Islands (proposed supply measure site)
- Belsar and Yungera floodplain
- Tata Creek and Boundary Bend
- Murrumbidgee Junction
- Piambie Water Management Unit (including Heywoods Lake)
- Nyah Forest (proposed supply measure site)
- Vinifera Forest (proposed supply measure site)
- Merbein Common
- Round Lake
- Burra Creek (proposed supply measure site)
- Poyner
- Cokum Bushlands Reserve
- Considines

10 Supply measure sites are subject to approval and funding.

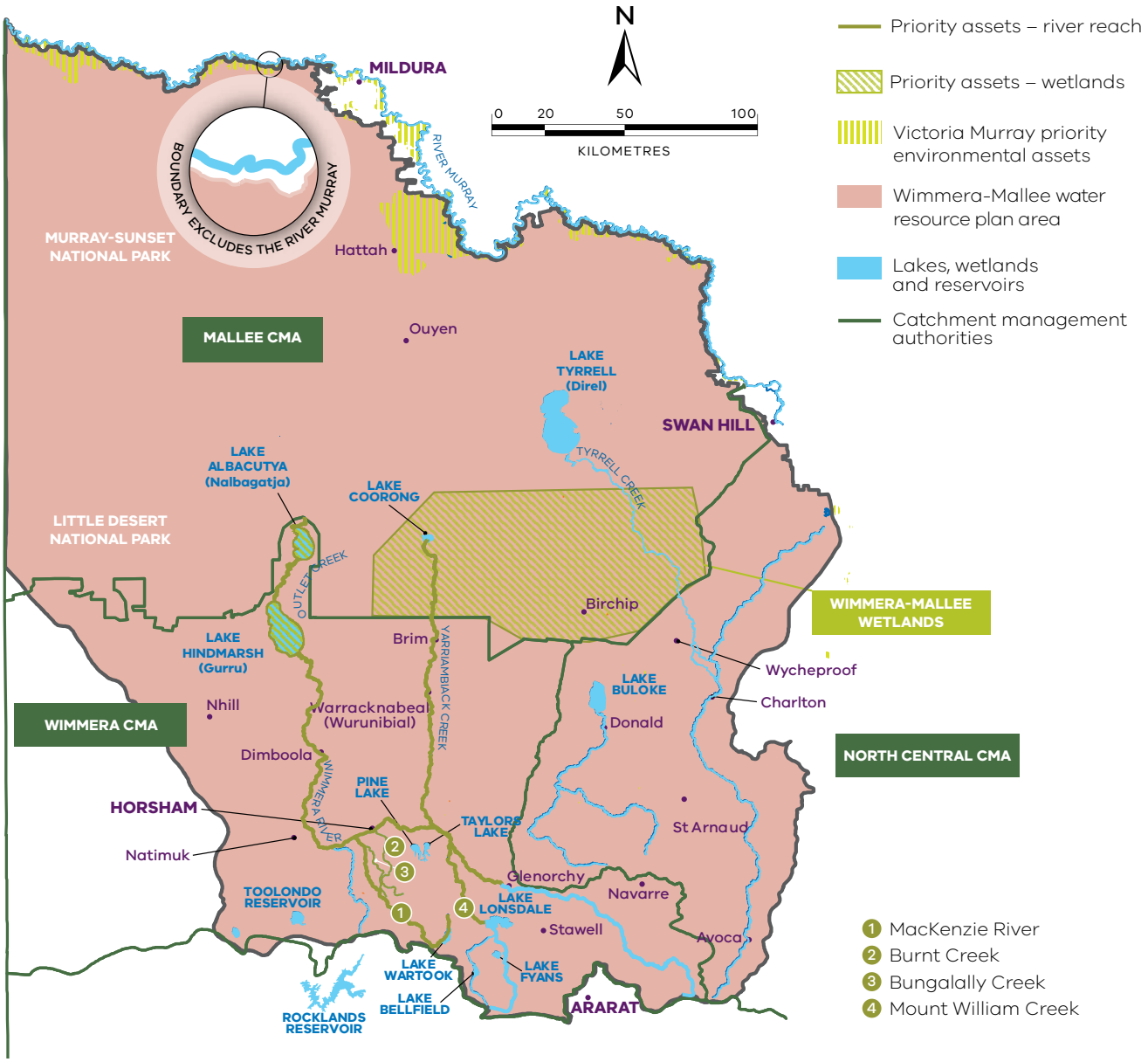

Figure 37: Priority environmental assets in the Wimmera-Mallee water resource plan area

The priority assets and functions of the Wimmera-Mallee water resource plan area support ecological values[11] that are significant at Commonwealth and state levels, and in accordance with Schedule 8 and 9 of the Basin Plan.

The Wimmera River and its tributaries (MacKenzie River, and Mount William, Burnt, Yarriambiack and Bungalally creeks) are home to many significant native fish populations including one of Victoria's few self-sustaining populations of freshwater catfish. The MacKenzie River contains the only stable population of platypus in the Wimmera and also supports good populations of native fish, as well as macroinvertebrates and turtles. Given the diverse habitat and fish species found in the MacKenzie River it acts as a refuge for fish populations, particularly in dry times.

11 Ecological value is the worth attributed to an organism, ecosystem, product, resource or activity, in terms of benefits to the environment.

The lower Wimmera River from Polkemmet Bridge to Outlet Creek at the northern end of Lake Albacutya was declared a heritage river due to its significant social and environmental values (particularly areas with river red gum open forests and woodlands with an intact understorey and waterbird habitat). The Wimmera River has also been declared a wetland of national importance.

The two terminal lakes at the end of the Wimmera River (Lakes Hindmarsh and Albacutya) fill only rarely, during very high flows from upstream. This wet-dry cycle produces an environment where the beds of the lakes are often colonised by vegetation. Filling leads to replacement with aquatic species (such as water milfoil and emergent reeds). When inundated, the central areas of the lakes provide open water habitat for large fish, including Murray cod, freshwater catfish and golden perch, and large numbers of birds such as the Australian pelican, pied cormorant and black. Aquatic vegetation in the lakes provides habitat for smaller fish.

Lake Albacutya was declared a Ramsar wetland of international importance as a near-natural example of a seasonal intermittent freshwater lake supporting vulnerable, endangered or critically endangered species or threatened ecological communities and high numbers of waterbirds. Lake Hindmarsh and Lake Albacutya are wetlands of national importance.

The Wimmera-Mallee Wetlands include 51 dams and wetlands spread across the dry north-western area of Victoria on public and private land, and are sourced from the Wimmera-Mallee Pipeline. They vary widely in wetland types (such as freshwater meadows, open freshwater lakes and freshwater marshes), size and vegetation communities (such as lignum and black box-dominated ecological vegetation classes). As a group, they are home to native waterbird populations including brolga, egret, heron, blue-billed duck, freckled duck, Australian painted snipe and glossy ibis. Other biota present include the vulnerable growling grass frog, turtles and many other species.

Watered on a priority basis from the Wimmera-Mallee Pipeline system, these wetlands act as important refuges and drinking holes throughout dry times in the region.

In the future, however, the priority environmental assets could change to reflect the latest technical information and prioritisation by catchment management authorities with their communities, including Traditional Owners. Some existing assets that currently receive environmental water may not be deemed a priority in the future, or new assets may be identified if they have the potential to be connected to a water source and receive held environmental water. The priority environmental assets will be reviewed and potentially updated further when long-term watering plans are reviewed. The long-term watering plans are due for review in 2020, or when the Wimmera-Mallee Water Resource Plan is accredited or when the Basin Wide Environmental Watering Strategy is updated.

Victoria has identified priority environmental assets as those that can be managed for specific environmental water outcomes, i.e. to meet objectives and targets that are set in the long term watering plans. For this reason, other waterways in the Wimmera-Mallee water resource plan area, such as unregulated rivers that are not connected to regulated water supply systems and cannot receive held environmental water. For this reason, these environmental assets are not identified by Victoria as priority environmental assets for the purposes of Basin Plan. Instead, and as noted at **Part 12.2.1** above, the environmental objectives in non-priority environmental assets, including unregulated systems, are to protect the existing hydrology and conditions (habitat), rather than provide a specific flow to meet an environmental objective or target. This also includes priority complementary actions that the catchment management authority identifies in the regional waterway strategy (refer **Part 12.5.7** below).

12.3.2 Priority ecosystem functions

Ecosystem functions are the fundamental physical, chemical and biological processes that support environmental assets; for example, the transport of nutrients, organic matter and sediment in rivers, wetting and drying cycles, provision for migration and re-colonisation by plants and animals along rivers and across floodplains. Table 52 provides a more detailed description of ecosystem values and functions in the Wimmera-Mallee water resource plan area (DELWP, 2015a).

Table 52: Priority ecosystem functions in the Wimmera-Mallee water resource plan area

Ecosystem function	Function characteristics
Longitudinal hydrological connectivity (between river reaches for fish movement)	Supports the transportation and dilution of nutrients, organic matter and sediment
Provides connections along a watercourse (longitudinal connections)	
Surface water salinity (for growth and reproduction of aquatic vegetation)	Supports the creation and maintenance of vital habitats
Refuges (for native fish species)	Supports the creation and maintenance of vital habitats and populations
Geomorphic habitat	Supports the creation and maintenance of vital habitats

Groundwater-dependent ecosystems (GDEs) are also important environmental features of the Wimmera-Mallee water resource plan area. GDEs rely on groundwater for all or part of their water needs, such as river reaches that gain or lose groundwater, wetlands that rely on shallow aquifers, or terrestrial vegetation that relies on shallow or deeper aquifers (further described in Part 12.7.2).

Management of GDEs in Victoria requires improved knowledge of the distribution, condition and environmental values of GDEs, including information about groundwater and surface water interactions. Actions in the Victorian Waterway Management Strategy are underway to gain further knowledge about high-priority, high-risk GDEs.

12.3.3 Ramsar-listed priority environmental assets

Ramsar sites are recognised for containing representative, rare or unique wetlands, or wetlands that are important for conserving biodiversity. A wetland must satisfy one or more of the criteria for identifying wetlands of international importance to be designated to this list.

The Wimmera-Mallee water resource plan areas supports one Ramsar site, Lake Albacutya. This is a terminal lake in the Wimmera system, and gets water only in exceptionally wet years when Lake Hindmarsh spills and overflows into Outlet Creek which then carries water in to Lake Albacutya.

National guidelines are being developed to provide clear guidance on how Ramsar sites must be managed, under both the Ramsar Convention and Commonwealth Environment Protection and Biodiversity Conservation Act. A key component includes monitoring of a site's ecological character description, which is a baseline of wetland condition at the time of its listing as a wetland of international importance. The ecological character descriptions of all Australia's Ramsar-listed wetlands are at **http://www.environment.gov.au/water/wetlands/publications**.

The Basin Plan requirements for states in regard to Ramsar sites are:

- declared Ramsar wetlands that depend on Basin water resources maintain their ecological character (section 8.05 (2a) of the Basin Plan)
- a declared Ramsar wetland is an environmental asset that requires environmental watering (Schedule 8 Criteria for identifying an environmental asset)
- declared Ramsar wetlands have sufficient water quality to maintain the ecological character of those wetlands (section 9.04 (1) of the Basin Plan)

There are also water quality targets for declared Ramsar wetlands under Schedule 11 to the Basin Plan – Target values for target application zones.

These requirements are fulfilled in Victoria's water quality and salinity management plans (see **Appendix A** for the Wimmera-Mallee Water Quality Management Plan).

Implementation of the Basin Plan contributes to maintaining the ecological character of Ramsar wetlands. Section 5.02 of the Basin Plan is to give effect to international agreements such as the Ramsar Convention; and Section 8.05 further specifies Basin States to protect and restore environment assets by ensuring that declared Ramsar wetlands maintain their ecological character. There are various management interventions other than environmental water that contribute to the ecological character of Ramsar wetlands. It is the responsibility of jurisdictions to maintain the ecological character of Ramsar wetlands through various strategies, investment, partnerships and on-ground actions.

12.4 How does environmental watering happen?

Water for the environment is managed and delivered through the following partnership:

- DELWP oversees legislation, policy and investment for water resources and environmental water across the state
- the water holders – VEWH and CEWH – manage environmental water holdings
- catchment management authorities are designated waterway managers, and with their local communities, set priorities and objectives for waterway health, including environmental water
- water corporations manage storage and delivery of water to meet entitlements, manage licences, and set local management rules for take in unregulated systems
- the above Victorian agencies work with upstream and downstream states to plan and deliver coordinated environmental objectives across state borders.

As the principal managers of environmental water holdings in Victoria, the roles of the VEWH, CEWH, CMAs and water corporations are outlined below.

12.4.1 Department of Environment, Land, Water and Planning

The Department (DELWP) is responsible for overseeing waterway health and environmental water programs in Victoria, including legislation, policy and investment to ensure on-ground outcomes. DELWP secures the protection of held environmental water, planned environmental water and other forms of water that add environmental benefit, but are not exclusively committed to the environment, by ensuring there are caps on surface diversions and where required on groundwater allocations and local management rules to enable sustainable take in unregulated systems.

DELWP prepares long-term watering plans (see **Part 12.5.8**) in accordance with Basin Plan. These documents set out the ecological objectives and targets for priority environmental assets and priority ecosystem functions for each surface water resource plan area.

DELWP invests in staff and projects at CMAs to enable local management and delivery of waterway health and environmental water outcomes, including prioritisation of waterways and objective-setting with local communities. DELWP also invests in staff at the Victorian Environmental Water Holder to manage Victoria's held environmental water. DELWP, including the Arthur Rylah Institute also undertake long-term intervention monitoring of held environmental water in rivers and wetlands under the Victorian Environmental Flows Monitoring and Assessment Program and the Wetlands Monitoring and Assessment Program. This monitoring is vital for reporting on outcomes of environmental water use and will be used significantly for Victoria's first Schedule 12 Matter 8 reporting on environmental outcomes at the asset scale (see **Part 15**).

12.4.2 Victorian Environmental Water Holder

The Victorian Water Act was amended to establish the VEWH on 1 July 2011 as a statutory body responsible for holding and managing water entitlements used for environmental purposes. Bulk entitlements, environmental entitlements and water shares have been assigned to the VEWH. Collectively, these entitlements are called the water holdings.

The objectives of the VEWH set out in the Victorian Water Act are to:

manage the Water Holdings for the purposes of:

a. *maintaining the environmental water reserve in accordance with the environmental water reserve objective*

b. *improving the environmental values of water ecosystems, including their biodiversity, ecological functioning and water quality, and other uses that depend on environmental condition.*

The functions of the VEWH described in section 33DD of the Victorian Water Act are to:

a. *apply and use water in the Water Holdings and otherwise exercise rights in the Water Holdings in accordance with the Water Act*

b. *acquire and purchase rights and entitlements for the Water Holdings and dispose of and otherwise deal in rights and entitlements in the Water Holdings in accordance with the Water Act*

c. *plan for the purposes of paragraphs (a) and (b)*

d. *enter into any agreements for the purposes of paragraphs (a) and (b)*

e. *enter into any agreements for the purposes of the coordination of the exercise of rights under any water right or entitlement held by another person, including the Commonwealth Environmental Water Holder*

f. *enter into any agreements with any person for the provision of works by that person to enable the efficient application or use of water in the Water Holdings.*

The Victorian Water Act also describes the planning and reporting framework within which the VEWH is required to operate. This includes the requirement to develop:

- a four-year corporate plan
- an annual seasonal watering plan
- seasonal watering statements as required
- an annual report (required under the *Financial Management Act 1994*).

The government's expectations of the VEWH are elaborated in the statutory Ministerial rules relating to the Victorian Environmental Water Resource Holder 2014, issued by the Minister for

the Environment. Clause 12.1(c) requires the VEWH to have regard to objectives and requirements of the Basin Plan and any instruments made under it, including this water resource plan.

12.4.3 Commonwealth Environmental Water Holder

The Commonwealth Environmental Water Holder (CEWH) was established under the Commonwealth Water Act. The CEWH must use the Commonwealth Holdings for protecting or restoring the environmental assets of the Murray-Darling Basin to give effect to relevant international agreements. The CEWH is obliged to manage holdings to deliver environmental water objectives set through the Basin Plan's environmental watering plan.

The VEWH works closely with the CEWH in areas where Commonwealth water holdings may be used in Victoria. The VEWH and CEWH have an agreement to collaborate and coordinate their activities.

12.4.4 Catchment management authorities

CMAs are designated waterway managers, and have operational responsibility for delivering and managing environmental water allocations controlled and authorised by the VEWH. This includes development of seasonal watering proposals each year for priority environmental assets, and environmental water management plans, which are the basis of the long-term watering plans.

CMAs are statutory bodies established by the *Catchment and Land Protection Act 1994* (Vic). They also have functions and powers under Part 10 of the Victorian Water Act (see **Part 5.3**).

12.4.5 Rural water corporations

Rural water corporations operate the major water storage and supply infrastructure to provide rural water services such as water supply, irrigation drainage and salinity mitigation, and environmental water.

Rural water corporations are regularly the storage manager or operator and/or resource manager for declared systems. This means they have additional responsibilities for managing the system for all entitlement holders, including water accounting, directing releases, reporting obligations and input/preparation of operating arrangements, metering programs and reviews of entitlements.

12.5 State environmental water planning

12.5.1 Overview

This part outlines how environmental water planning occurs in Victoria, and specifically provides context for section 10.26 of the Basin Plan.

Environmental watering is defined under the Commonwealth Water Act as *the delivery or use of environmental water to achieve environmental watering outcomes*. Environmental water under the Commonwealth Water Act is either held environmental water or planned environmental water. The effect of applying these definitions to Victoria's framework for determining the content of the Wimmera-Mallee Water Resource Plan is:

- environmental watering obligations under the Wimmera-Mallee Water Resource Plan can only apply to held environmental water managed by the VEWH as no planned environmental water exists in the Wimmera-Mallee water resource plan area
- held environmental water only exists in regulated systems, therefore environmental watering is only relevant to those systems

- using other system management arrangements to support protection of the environment does not fall within the scope of *environmental watering* under the Commonwealth Water Act and therefore within the obligation under section 10.26 of the Basin Plan.

The discussion below identifies how Victoria manages meeting environmental watering objectives in addition to using system management and land management frameworks to provide protection and support to the environment.

12.5.2 Integration of state environmental water planning and Basin Plan requirements

The objectives and targets of the Basin Plan have been integrated into Victoria's environmental water planning at the long-term and annual stages. This integration is committed to in the Victorian Waterway Management Strategy, and all environmental water managers in the Wimmera-Mallee water resource plan area must comply with Victorian and Basin Plan environmental water planning under state policy and investment.

Each year, Victoria must also demonstrate through annual Basin Plan reporting (Matter 19 of Schedule 12) how its environmental watering is consistent with the environmental watering plan and the Basin-wide environmental watering strategy, including contributing to the objectives in Part 2 of the environmental watering plan.

Figure 38 illustrates how planning works together at the Basin and state levels.

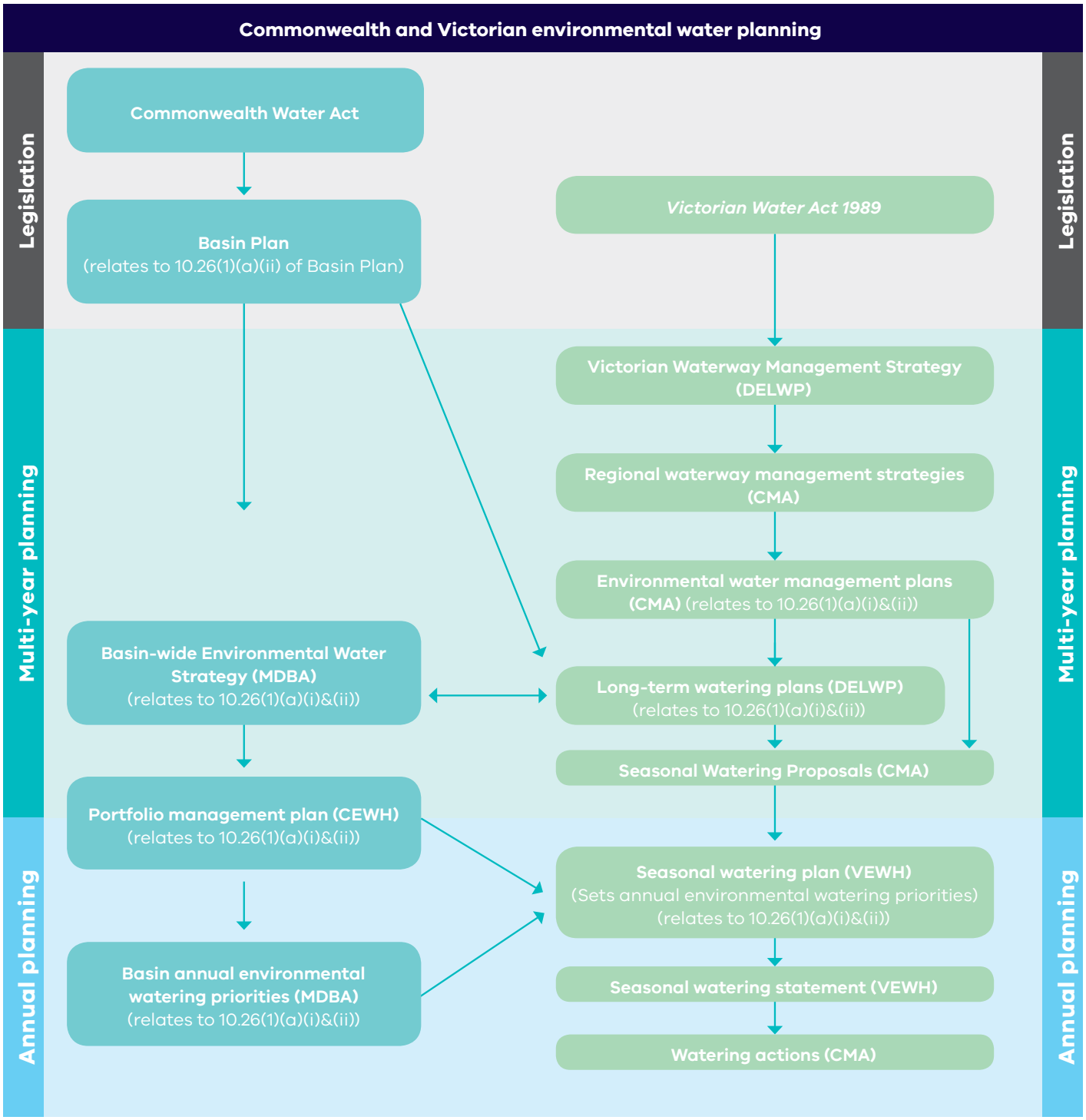

Figure 38: Environmental water planning and management framework in Victoria at Basin, state and regional scales

12.5.3 Basin Plan environmental watering plan

Chapter 8 of the Basin Plan sets out the environmental watering plan for the Basin. The objectives of this framework are stated in section 8.11 of the Basin Plan:

a. *coordinate the planning, prioritisation and use of environmental water on both a long-term and an annual basis; and*

b. *enable adaptive management to be applied to the planning, prioritisation and use of environmental water; and*

c. *facilitate consultation, coordination and cooperative arrangements between the Authority, the Commonwealth Environmental Water Holder and Basin states*

Basin Plan section 8.04 provides that:

The overall environmental objectives for the water-dependent ecosystems of the Murray-Darling Basin are, within the context of a working Murray-Darling Basin:

a. *to protect and restore water-dependent ecosystems of the Murray-Darling Basin; and*

b. *to protect and restore the ecosystem functions of water-dependent ecosystems; and*

c. *to ensure that water-dependent ecosystems are resilient to climate change and other risks and threats.*

For water resource plans, the Basin Plan (section 10.26) requires that:

1. *A water resource plan must provide for environmental watering to occur in a way that:*
   a. *is consistent with:*
      i. the environmental watering plan; and
      ii. the Basin-wide environmental watering strategy; and
   c. *contributes to the achievement of the objectives in Part 2 of Chapter 8.*

12.5.4 Basin-wide environmental watering strategy

The MDBA has published the Basin-wide environmental watering strategy to achieve the environmental objectives of the environmental watering plan. These objectives also inform Victoria's environmental water planning at an asset scale.

The strategy outlines key actions to achieve the objectives of environmental watering in the Basin including:

- harnessing local communities land and water knowledge
- managing all water to benefit the environment where possible, such as cooperating to divert consumptive water deliveries through a wetland en route
- managing in harmony with biological cues (including responses to flow) to restore elements of a more natural flow regime; for example, high river flows or flow release into a wetland at times when it would have occurred naturally (before river regulation), to trigger vegetation, fish or bird reproduction
- coordinating between stakeholders to achieve the best outcomes and target multiple sites with deliveries of water (in and between rivers) where possible
- managing any risks associated with the delivery of environmental water
- applying adaptive management (learning from doing) when planning and prioritising use of environmental water.

The strategy also sets out expected outcomes for native fish, vegetation, waterbirds and hydrological connectivity.

The strategy's actions and expected outcomes are consistent with the requirements of the Victorian Water Act, key state policy, and Victoria's environmental water planning, as detailed in the long-term watering plans.

12.5.5 Annual basin and state watering priorities

Basin states must identify annual priorities for use of environmental water for surface water in each water resource plan area.

Obligations for annual watering priorities are met by Victoria's seasonal watering plan, which is consistent with the Basin Plan's environmental watering plan, long-term watering plans, and the Basin-wide environmental watering strategy.

12.5.6 Victorian Waterway Management Strategy

The Victorian Waterway Management Strategy (DEPI, 2013b) describes the government's statewide objectives and policies for managing waterways. It also outlines the government's policies for maintaining and improving the condition of the state's rivers, estuaries and wetlands to provide environmental, social, cultural and economic value for all Victorians.

The Minister is responsible for overseeing and funding the strategy with the support of DELWP, which issues guidance documents to ensure regional plans are consistent with the state's framework and policies.

The strategy references and makes explicit links to the Basin Plan. Chapter 4 of the strategy sets out the state's policies, principles and processes to be followed by CMAs when preparing regional waterway strategies, building Basin Plan considerations into Victoria's regional waterway strategies.

Water for Victoria policy reiterates actions in the Victorian Waterway Management Strategy, and further emphasises Traditional Owner roles and engagement in waterway management.

The strategy outlines the key environmental water planning documents:

- regional waterway strategies
- long-term watering plans
- environmental water management plans
- seasonal watering proposals
- seasonal watering plans.

12.5.7 Regional waterway strategies

The CMAs use a risk-based approach to identify high-value waterways and priority management activities (DEPI, 2013b). The strategies are required to integrate on-ground works with environmental water management in regulated and unregulated systems, and ensure efficient and effective management of environmental water. For each management unit (i.e. river reach or wetland) these strategies:

- describe the environmental values of waterways
- identify threats to these values
- after consultation, establish management objectives for the waterways
- determine priorities for management
- establish targets – primarily for sub-components of the Index of Stream Condition (e.g. hydrology sub-index average score improves to 7)

- identify activities to achieve targets
- estimate the costs of the activities.

The Wimmera, Mallee and North Central waterway strategies apply to the Wimmera-Mallee water resource plan area.

Intervention actions are prioritised through the waterway strategies. To enable environmental watering outcomes, infrastructure can be used to improve the watering regime, enable the efficient use of the water holdings, and overcome barriers to flora and fauna migration. Other on-ground works, such as reinstating in-stream woody vegetation habitat or fencing out cattle, are also used to improve the biophysical condition. These works are considered 'complementary measures' to environmental watering, and are as vital to environmental outcomes and condition as flows.

12.5.8 Long-term watering plans

Long-term watering plans are a state responsibility under the environmental watering plan. They provide long-term watering objectives for a state's priority environmental assets.

Basin states must prepare a plan for each water resource plan area that contains surface water, and be consistent with the Basin-wide environmental watering strategy.

The long-term watering plan for the Wimmera-Mallee water resource plan area (DELWP, 2015a) is available online.

Appendix 1 of the Wimmera-Mallee Long-term Watering Plan shows how it meets the requirements of the Basin Plan environmental watering plan, including:

- using methods specified for identifying priority environmental assets and ecosystem functions and their water requirements
- having regard to the Basin-wide environmental watering strategy
- not being inconsistent with relevant international agreements.

The Wimmera-Mallee long-term watering plan collated environmental water management plans environmental objectives for priority rivers, wetlands and ecosystem functions, and informs:

- Victoria's annual watering priorities
- the Basin-wide environmental watering strategy and Basin annual watering priorities (**Figure 38**)
- the Wimmera-Mallee Water Resource Plan, particularly environmental watering requirements.

12.5.9 Environmental water management plans

Environmental water management plans (EWMPs) outline how waterway managers will meet long-term ecological objectives and required watering regimes.

Plans are prepared only for waterways that can be watered from environmental water holdings (i.e. can be specifically managed for environmental outcomes using held environmental water). The plans set out:

- long-term ecological flow objectives assets through the use of held environmental water
- water requirements to meet these objectives
- constraints on managing flows
- measures to use available water efficiently
- management arrangements and risks to meeting objectives.

For rivers, the plans draw on watering requirements detailed in environmental flow studies, which are prepared using the best available expert information. Flow studies have been prepared for regulated and some unregulated rivers throughout Victoria, and are periodically updated. The Wimmera-Glenelg Rivers and Dock Lake flow studies have recently been updated.

EWMPs are prepared by CMAs using the best available information. A collaborative process is used involving community members, water holders, Traditional Owners, DELWP, storage managers, subject experts and a scientific expert review panel.

EWMPs provide the detailed analysis used by CMAs to prepare seasonal watering proposals each year. An EWMP has been prepared for the Wimmera River system and the Wimmera-Mallee Pipeline Wetlands. EMWPs for these Wimmera-Mallee priority environmental assets have been collated in developing the Wimmera-Mallee Long-term Watering Plan.

12.5.10 Seasonal watering proposals

CMAs prepare seasonal watering proposals each year using the objectives and flow regimes identified in EWMPs and through annual community consultation, in accordance with guidelines issued by the VEWH. The proposals describe desired watering regimes for different climate-based scenarios and take into account:

- the objectives and flow regimes identified in EWMPs
- the actual watering regimes of waterways in recent years and their current condition
- the likely amount of water available at the start of the year
- scenarios for seasonal conditions and water availability over the coming year
- a risk assessment for any proposed watering events.

CMAs consult with key local stakeholders including storage managers, public land managers, Traditional Owners, and local interest groups such as Environment Victoria, Victorian Recreational Fishing and Field and Game Australia and representatives of the local community (through environmental water advisory groups) when preparing seasonal watering proposals. These proposals form the basis for the statewide seasonal watering plan prepared each year by the VEWH.

Seasonal watering proposals for the Wimmera River and Wimmera-Mallee Pipeline Wetlands are available on the Wimmera CMA website.

12.5.11 Seasonal watering plan

The seasonal watering plan is prepared by the VEWH and previews the potential environmental watering that could be implemented using water available under the water holdings and water held by other environmental water holders. The CMA seasonal watering proposals, together with the MDBA's annual environmental watering priorities and the CEWH's portfolio management priorities, inform the seasonal watering plans.

The objectives of the seasonal watering plan are set out in the Victorian Water Act. The plan aims to achieve the objectives by ensuring that decisions to use the water holdings are based on a systematic, science-based approach to identify environmental values and desired flow regimes. The plan also sets out the operational priorities for using environmental water allocations.

The VEWH's seasonal watering plan is prepared for different water availability scenarios (drought, dry, average and wet). Environmental watering actions are developed for each scenario. The plan informs the real-time operational decisions that are made as the season progresses. Actions identified in the scenarios are converted to firm environmental watering

commitments based on actual conditions and water allocations. The conditions that emerge over the year can be dynamic and are influenced by:

- weather conditions and forecasts
- catchment conditions
- water availability
- river and system operations (such as unregulated flows, catchment inflows, storage levels, other water users' needs and potential delivery constraints)
- ecological or biological factors and triggers (such as plant and animal responses to natural flows or temperature)
- risks associated with environmental watering actions (such as deteriorating water quality).

The VEWH engages with state stakeholder representatives when preparing the state seasonal watering plan.

The current seasonal watering plan is available online.

12.6 How are Basin Plan environmental watering outcomes achieved?

12.6.1 Overview

As already explained the objectives and targets of the Basin Plan have been integrated into Victoria's environmental water planning at the long-term and annual stages. This means the delivery of held environmental water combined with other water such as consumptive, above cap, passing flows and system water meets Basin Plan objectives and targets. Monitoring of environmental watering outcomes informs adaptive management and potential revision of watering objectives in the planning stage. Complementing this are critical complementary measures, also known as complementary measures, that are necessary to achieve an environmental outcomes alongside water delivery.

This integration is committed to in the Victorian Waterway Management Strategy, and all environmental water managers in the Wimmera-Mallee water resource plan area must comply with Victorian and Basin Plan environmental water planning under state policy and investment.

Each year, Victoria must also demonstrate through annual Basin Plan reporting (Matter 19 of Schedule 12) how its environmental watering is consistent with the environmental watering plan and the Basin-wide environmental watering strategy, including contributing to the objectives in Part 2 of the environmental watering plan.

Figure 38 illustrates how planning works together at the Basin and state levels.

The delivery of environmental water outcomes is managed through the state environmental water planning framework outlined in **Part 12.5**. Environmental watering in the Wimmera- Mallee water resource plan area is linked to the Basin Plan long-term environmental objectives to:

- protect and restore water-dependent ecosystems of the Murray-Darling Basin
- protect and restore the ecosystem functions of water-dependent ecosystems
- ensure that water-dependent ecosystems are resilient to climate change and other risks and threats
- ensure that environmental watering is coordinated between managers of planned environmental water, owners and managers of environmental assets and holders of held environmental water.

When the VEWH is preparing the seasonal watering plan (see **Part 12.5.11**) to ensure it can achieve Basin Plan objectives for connectivity, native vegetation, waterbirds and native fish, it is guided by the CMA's seasonal watering proposals (**Part 12.5.10**). These are directed by the

long-term objectives in environmental water management plans and long-term watering plans and influenced by the Basin Annual Environmental Watering Priorities developed by the MDBA.

The VEWH uses trade and carryover to support environmental outcomes (see **Part 12.6.6**) and where possible will aim to piggyback on system water to get the most efficient and effective use from held environmental water, in line with Victorian policy (see **Part 12.6.5**).

12.6.2 Monitoring, evaluation, reporting and adaptive management

Victoria has two main environmental water monitoring programs, the Victorian Environmental Flows Monitoring and Assessment Program, and the Wetland Monitoring and Assessment Program for environmental water. Both programs include monitoring that relates to the objectives and targets outlined in Victoria's long-term watering plans, which have direct links to objectives outlined in Victoria's asset-scale environmental water management plans prepared by Victoria's CMAs, as well as the objectives listed in both the Basin-wide environmental water strategy and in the Murray-Darling Basin Plan in Chapters 5 and 8, Schedules 7 and 8.

Other programs with monitoring relevant to Basin Plan outcomes include the Living Murray program, Victoria's Native Fish Report Card, and Commonwealth Long-Term Intervention Monitoring sites. A range of these monitoring results will be used by Victoria to report on Schedule 12 Matter 8, 'achievement of environmental outcomes at the asset scale'. DELWP will draft a monitoring, evaluation and reporting strategy to outline how Victoria will report on Matter 8.

The Victorian Environmental Flows Monitoring and Assessment Program was established by the Victorian Government in 2005 to monitor and assess ecosystem responses to environmental watering in priority rivers across Victoria. Results from the program help inform decisions for environmental watering by catchment management authorities and Melbourne Water. Over the past 13 years, the information collected through the assessment program has provided valuable data and informed significant changes to the program. The Victorian Environmental Flows Monitoring and Assessment Program is now in its sixth stage of delivery and includes a strong focus on 'intervention' or 'flow event' questions for vegetation and fish. The current stage is funded to 2020.

The Wetland Monitoring and Assessment Program for environmental water is a state-wide monitoring program designed to assess ecological responses of vegetation, waterbirds, frogs and fish to water for the environment delivered in Victorian wetlands. Monitoring for this program started in 2017 and the current stage is funded to 2020.

The broad objectives for both monitoring and assessment programs are to:

- build on current knowledge and conceptual models to improve our understanding of the relationship between the delivery of environmental water and ecological responses in Victorian rivers and wetlands
- determine whether current ecological objectives for environmental watering are being met
- inform the management of environmental water
- communicate the ecological outcomes of environmental water delivery to stakeholders
- contribute to Victoria's reporting requirements for the Basin Plan.

The results and learning from the Victorian Environmental Flows Monitoring and Assessment Program and Wetland Monitoring and Assessment Program for environmental water are fed into decisions and management of Victoria's waterways. Results from monitoring at each site are communicated immediately after surveys to the CMAs' environmental water reserve managers. Managers can then adjust their planning for the delivery of environmental water as necessary. This cycle is shown in **Figure 39**.

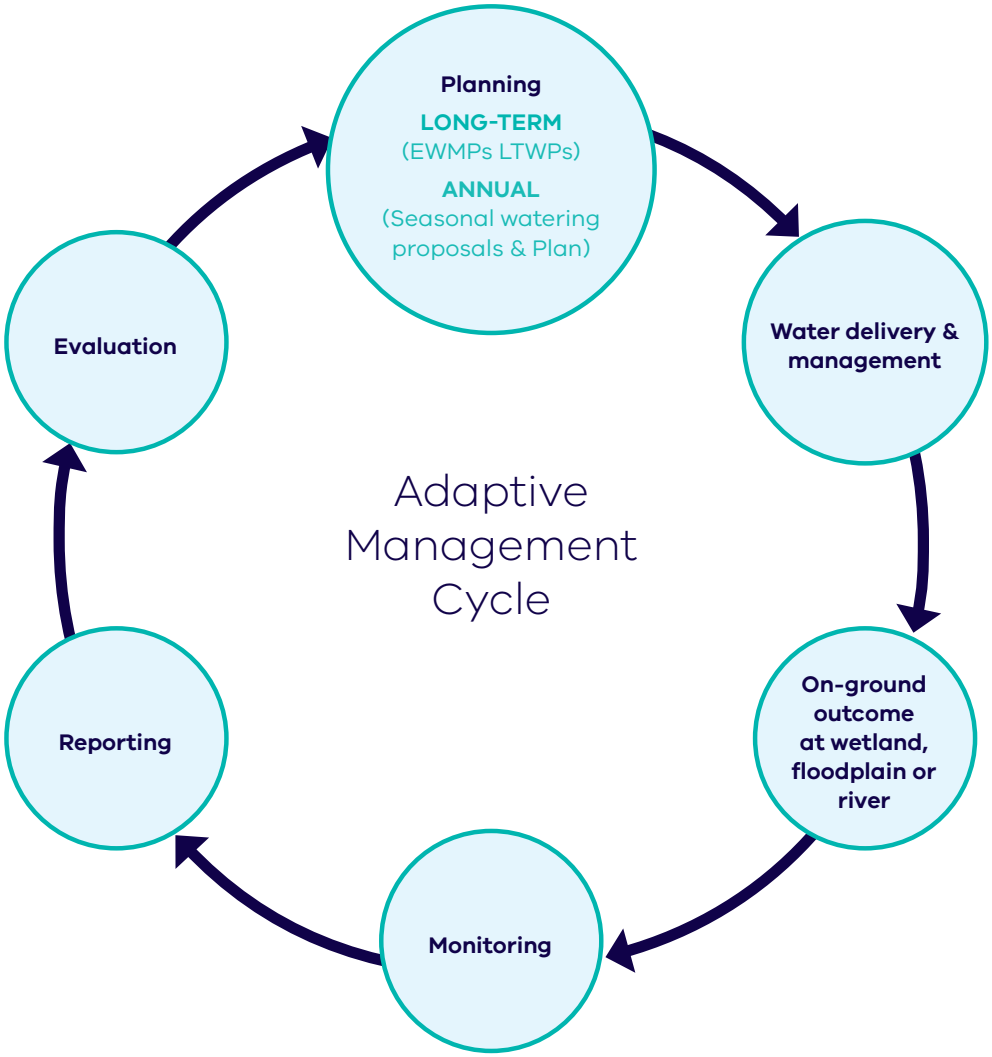

Figure 39: Adaptive management cycle

12.6.3 Critical complementary measures - also known as complementary measures

Environmental water is only one component of the activities necessary to achieve the long-term watering plan's ecological objectives and targets. Critical complementary measures, are vital to support priority environmental assets and priority ecological functions and meet environmental watering objectives. These measures include among other things invasive species management and enhancing fish passage through instream obstructions. Victoria is currently developing a Critical Measures (Complementary Measures) Business Case to prioritise activities based on cost, critical waterway management actions and risks to meeting environmental watering objectives.

12.6.4 Coordination

Coordination of environmental watering in the surface water system in the Wimmera-Mallee water resource plan area is done through cooperative arrangements between the VEWH, CEWH and the storage manager.

The Victorian Environmental Water Holder leads environmental water planning and coordination for Victorian waterways at a water resource plan area scale, in close consultation with catchment management authorities as the local site managers. The Victorian environmental watering program involves a range of people and organisations. Relationships between local communities, waterway managers, storage managers, environmental water holders and land managers form the foundation of the program. Many public authorities collaborate to deliver the program. These authorities are referred to as program partners.

Delivery of the Commonwealth's water is undertaken in by the Commonwealth Environmental Water Holder in line with their supply-by agreement. The Commonwealth collaborate with the VEWH and storage manager and catchment management authorities to ensure it is used in line with regional priorities.

12.6.5 Operational arrangements

The planning outlined in **Part 12.5** supports the on-ground delivery of held environmental water.

The VEWH issues seasonal watering statements to the catchment management authorities which authorises the use of environmental water holdings. The CMAs have operational management responsibilities for providing the watering regimes determined by the planning processes. Seasonal watering statements issued to the Wimmera, Mallee and Glenelg Hopkins CMAs are available online at **http://www.vewh.vic.gov.au/news-and-publications/seasonal-wateringstatements**.

Catchment management authorities coordinate with storage and land managers to deliver the proposed watering regimes over the year. In practice, local watering decisions are made jointly because the environmental water holder, the storage manager and the land manager, work together to identify opportunities to use system water to support the delivery of environmental objectives.

The VEWH monitors changes to the operational context over the year and revises or issue new seasonal watering statements to maximise environmental outcomes. Management arrangements need to be tailored to the institutional boundaries of the CMAs and the physical boundaries of waterways to be supplied by particular water holdings because these determine basic accountabilities.

The complexity of decisions increases with the number of:

- governments involved in the decision
- water holders involved in the decision
- waterways that can be watered
- waterway managers

Management actions through the year may vary from the seasonal watering plan for unexpected reasons, like changes to water availability. Every effort is made to inform people that may be affected, including the local community.

12.6.6 Tools for managing environmental water

Environmental water managers use trade and carryover to efficiently and effectively manage environmental water. This is in line with Victorian policy for use of environmental water in the Victorian Waterway Management Strategy (DEPI, 2013) and Water for Victoria.

There is not a large amount of trade which occurs in the western region, however allocation trades can occur between entitlement holders in the Wimmera-Glenelg supply system with the permission of the Minister for Water or their delegate. Applications to trade by environmental water holders are subject to the same rules as all other allocation trades. The VEWH's framework

for deciding whether to carry over water is also published in its water allocation trading strategy (VEWH, 2018a).

The delivery of environmental water requires either a bulk entitlement, environmental entitlement or water-use registration, and in Victoria these are held by the Victorian Environmental Water Holder. The Commonwealth Environmental Water Holder holds a supply-by agreement and water is delivered under the Grampians Wimmera Mallee Water's bulk entitlement.

The VEWH's environmental entitlements provides it with a right to a share of water in storage and enables it to:

- Divert water from a waterway, channel or pipeline– e.g. to water an off-stream wetland
- Use water in-stream – i.e. to deliver in-river and approved overbank environmental benefits

Environmental water managers' carryover decisions are made to maximise benefit to the environment:

- to build a reserve for priority watering actions in future years, for example to meet critical environmental needs if conditions are dry or to deliver a large watering
- to enable early season watering the following year, before the full seasonal allocations for that year are available
- because there is more than enough water available for high-priority watering actions in the current year

Carryover and trade provide greater flexibility to manage water availability between seasons, for example, by trading water when better outcomes can be achieved from the funds generated by trade compared with outcomes then could be achieved from surplus water.

10.26(1)

a. The Victorian Environmental Water Holder (VEWH) must, in the performance of its functions and the exercise of its powers, ensure that environmental watering occurs in a way that is consistent with the environmental watering plan and the Basin-wide environmental watering strategy and contributes to the achievement of the objectives in Part 2 of Chapter 8 of the Basin Plan. This does not prevent the VEWH from causing additional environmental watering to occur to meet local and Basin Plan environmental watering objectives.

b. In performance of its functions and the exercise of its powers, the VEWH must consider the relevant Long-Term Watering Plan for the water resource plan area.

c. The Department must develop the Long-Term Watering Plan for the relevant surface water plan area in accordance with the Basin Plan and consider both regulated and unregulated surface water systems.

12.6.7 Managing risks to environmental water delivery

Effective management of environmental water requires identification and management of any risks. The Victorian Waterway Management Strategy outlines state principles for managing risk associated with environmental watering.

These include that:

- risks involved with environmental watering will be identified and managed commensurate with the level of risk and environmental outcome sought
- risk management in environmental watering will consider the range of scenarios in which there may be risks

- the role of each relevant body involved in planning, delivery and facilitating delivery of environmental water will be clearly specified and verified to make sure there is due diligence and the best available information is used to manage any risks to third parties

Victoria has existing annual and longer-term processes in place for managing risks. The system operators also assess risk prior to delivering an environmental water event.

- Annual: Specific risks related to environmental watering are identified and assessed in site-based seasonal watering proposals developed annually by catchment management authorities and documented in the VEWH Seasonal Watering Plan. These proposals draw upon the risks outlined in individual environmental water management plans and identify specific actions to mitigate these risks. The categories of risk covered include reputation, compliance, environmental, human, costs, time and non-achievement of objectives. These risks may be specific to that year or require ongoing or long-term management
- Long term: CMAs across Victoria collaborating with communities and agencies identify key risks that may impact on the ability to achieve environmental watering objectives or that may arise in environmental water management plans. Management measures are also identified.

The long-term watering plan outlines the types of long-term risks and strategies for management. For more detail see Chapter 9 of the long-term watering plans.

12.7 Sustainable use and management for priority environmental watering

Part 4 of Chapter 10 of the Basin Plan requires that consideration be given as to whether the Wimmera-Mallee Water Resource Plan should include rules to ensure that:

- operation of the water resource plan does not compromise the meeting of environmental watering requirements of priority environmental assets and priority ecosystem functions (10.17 of the Basin Plan)
- operation of the water resource plan does not compromise the meeting of environmental watering requirements of priority environmental assets and priority ecosystem functions that depend on groundwater (10.18 of the Basin Plan)
- operation of the water resource plan does not compromise the meeting of environmental watering requirements for groundwater that has a significant hydrological connection to surface water (10.19 of the Basin Plan)
- there is no structural damage to an aquifer arising from take within the SDL and hydraulic relationships and properties between groundwater systems and within groundwater systems are maintained (10.20 of the Basin Plan)
- elevated levels of salinity and other types of water quality degradation within a groundwater SDL resource unit are prevented (10.21 of the Basin Plan).

In responding to Basin Plan requirements, the MDBA has asked Victoria to consider whether the water resource plan operates in any way to compromise the environmental watering of priority environmental assets or priority ecosystem functions. Victoria's approach to developing water resource plans was to ensure that the plans complement the existing framework for water resource management under the Victorian Water Act.

In this case, when considering whether rules are necessary to support environmental watering, the following matters were considered:

- environmental watering primarily occurs through held environmental water (as outlined above)
- the VEWH holds water to meet environmental watering requirements regarding priority environmental assets and priority ecosystem functions
- the VEWH is treated the same way as all other entitlement holders in the system

- water is managed to ensure, as far as practicable, equitable access to the resource in accordance with the terms and conditions of the particular right or entitlement a person has to access that water
- nothing in the water resource plan impacts on the operation of a right or entitlement (water access right) that exists in Victoria.

In Victoria, all take and use licences are subject to various standard terms and conditions. Included in the standard conditions are rules relating to the time, place and rate of take under that licence. These rules are applied to all individual entitlements (except bulk entitlements that contain rules for the management of the system) at the point of issuing the licence. They are imposed to support reliability of all entitlements in the system (including those held by VEWH).

Further, section 40 of the Victorian Water Act lists the matters that the Minister must have regard to when considering an application for a bulk water entitlement or take and use licence, including:

40 Matters to be taken into account

1. *In considering an application under section 36(1), the Minister must have regard to the following matters:*
    a. …
    b. *the existing and projected availability of water in the area; (ba) the permissible consumptive volume, if any, for the area;*
    c. *the existing and projected quality of water in the area;*
    d. *any adverse effect that the allocation or use of water under the entitlement is likely to have on –*
        i. existing authorised uses of water; or
        ii. a waterway or an aquifer; or
        iii. the drainage regime within the meaning of section 12(1); or
        iv. the maintenance of the environmental water reserve in accordance with the environmental water reserve objective;
    g. the need to protect the environment, including the riverine and riparian environment;
    k. if appropriate, the proper management of the waterway and its surrounds or of the aquifer;
2. *In considering an application under section 36(1), the Minister must give effect to an approved management plan for any relevant water supply protection area.*

Part 6 describes how these requirements are applied within the Victorian water entitlement framework.

It should be noted that Victoria will not duplicate in the water resource plan the resource management arrangements that exist in take and use licences, bulk entitlements and storage management rules.

Therefore, in considering whether rules should be implemented through the Wimmera-Mallee Water Resource Plan it was considered appropriate to apply rules only in the following circumstances:

- to address risks of not meeting the relevant environmental watering requirements (as per sections 10.17, 10.18. and 10.19); if the risk was low, no rules will be applied

- to address risks of structural damage to an aquifer; if the risk is low, no rules will be applied (as per section 10.20)
- to address risks of elevated salinity; if the risk is low, no rules will be applied (as per section 10.21). Assessments for these areas are presented below.

Further information regarding entitlements can be found at **Part 6** of this report.

12.7.1 Surface water

As identified above, the use of held environmental water by the VEWH to meet environmental watering requirements is supported by system management arrangements (see **Part 6**) and conditions placed on all entitlement holders.

Bulk and environmental entitlements and take and use licences may include provisions that:

- require passing flows to be provided at harvesting points
- regulate the rate that water can be taken
- determine how much water is available to be allocated at any time.

These provisions enable the Minister to ensure the volume of water taken under the SDLs meets the need for sustainable management of water resources and control the negative impacts on the environmentally sustainable level of take.

On the basis of the information outlined above, Victoria does not consider it necessary to include rules in the Wimmera-Mallee Water Resource Plan to ensure that environmental watering requirements of priority environmental assets and priority ecosystem functions are met under section 10.17 of the Basin Plan.

12.7.2 Groundwater

The Basin Plan requires that water resource plans be prepared having regard to whether rules are required to ensure that environmental watering requirements are met for groundwater-dependent priority environmental assets and ecosystem functions and where there is a hydraulic connection between groundwater and surface water.

There are water features in the Wimmera and Avoca parts of the Wimmera-Mallee water resource plan area which receive groundwater discharge from the water table (which is explained below) however due to the high salinity of the groundwater these resources are highly unlikely to be developed and therefore there is no likely threat to surface water features from development of these resources which would require rules in the water resource plan.

Goundwater dependent ecosystems in the Wimmera-Mallee water resource plan area occur where the water table in the Parilla Sands aquifer is shallow. The Parilla Sands aquifer is typically of high natural salinity, in places exceeding 35,000 mg/L TDS and for this reason groundwater dependent ecosystems are generally saline. Due to its salinity, development of groundwater resources in the Parilla Sand aquifer is low and risks from development are is managed within Victoria's water entitlement framework (see **Part 6**) and no additional rules are required.

The Wimmera Wetlands Asset Strategy (2011) identified potential groundwater dependent ecosystems in the Wimmera section of the Wimmera-Mallee water resource plan area as the Wimmera River and shallow lakes west of the river. The primary groundwater-dependent wetland assets in the Wimmera River floodplain are deep pools where saline groundwater from the Parilla Sands aquifer enters during low flow conditions, which may result in anoxic or toxic environments. The semi-permanent Natimuk–Douglas saline wetland system is mainly in the West Wimmera GMA, however it extends into the Wimmera-Mallee water resource plan area where the Douglas depression extends north of Natimuk. As the name suggests, groundwater discharge to these lakes is saline.

The major aquifer for extraction is the Murray Group Limestone aquifer, which underlies and is separated from the shallow Parilla Sands aquifer by the Bookpurnong Clay aquitard layer approximately 10 or more metres thick composed of mainly clay with some silt and coal. The Murray Group Limestone aquifer is isolated from the adjoining and underlying Renmark formation by the Geera Clay aquitard and Ettrick formations. The regional groundwater flow in the Murray Group Limestone aquifer is also to the west and north-west, away from the Wimmera River. For these reasons the groundwater–surface water connectivity of the Wimmera River is classified as very low, manifesting over long time scales (i.e. more than 50 years) (SKM, 2012).

In the Mallee area of the Wimmera-Mallee water resource plan area, there are no major rivers or significant surface water features that receive groundwater discharge from the water table aquifer, so there is a low risk of impacts on key ecosystem function. The Mallee Wetland Strategy (Mallee CMA, 2006) identified saline lakes such as Lake Tyrrell and riverine wetlands at risk from rising saline groundwater levels. However, these have not been identified as priority environmental assets for the purpose of the Basin Plan. Furthermore, given the low level of surface water regulation and development in the unregulated areas where these saline wetlands are located and the low potential to develop groundwater resources due to the salinity of the aquifer, there is no feasible way to manage this risk.

Terminal lakes of the Wimmera River are a series of large lakes and connecting creeks including Lake Hindmarsh, Lake Albacutya, Outlet Creek and Ross Lakes that are primarily filled by flooding flows from the Wimmera River during exceptionally wet conditions. The lakes have significant social, economic and environmental qualities. Lake Albacutya is recognised as a Ramsar site as it is a wetland of international significance. Lake Hindmarsh is recognised as a nationally important wetland and is Victoria's largest freshwater lake. Rare and threatened bird and vegetation species thrive in periods when these waterways contain water. Fish and yabby populations also boom during these times. The lakes are home to significant Indigenous and non-Indigenous cultural heritage and provide major recreational values.

Determination of the Wimmera River Terminal Wetlands' site-specific flow indicators focused on the two terminal lakes, Hindmarsh and Albacutya. The Lake Albacutya ecological character description identifies the hydrological cycle as arguably the most important process defining the ecological character of Lake Albacutya, with floods of both short and long duration playing a role in supporting flora and fauna (Cibilic & White 2010). Hydrology plays a crucial role in a number of ecological processes, including: maintaining health and stimulating recruitment of river red gums; stimulating waterbird arrival and breeding; replenishing groundwater and diluting saline groundwater; resetting succession of terrestrial lakebed vegetation; and contributing to nutrient cycling by driving succesional phases (Cibilic & White 2010). The hydrological cycle is likely to be equally important to environmental values of Lake Hindmarsh.

The CSIRO and SKM (2010) report states there are no key environmental assets identified as groundwater-dependent and sensitive to groundwater extraction that are associated with the Wimmera-Mallee Highlands SDL resource unit.

The Ministerial Guidelines for Groundwater Licensing and the Protection of Groundwater-dependent Ecosystems (Minister for Water, 2015a) requires the licensing authority to assess the risks to groundwater-dependent ecosystems associated with the issue or transfer of licences. Risks identified through this process need to be managed through licensing conditions.

The following outlines how the use of groundwater will not compromise the environmental watering requirements of the regulated surface water systems:

- Wimmera-Mallee: Sedimentary Plains SDL resource unit – no significant usable groundwater resources in this system are connected to the regulated surface water system.
- Wimmera-Mallee: deep SDL resource unit – there is no connection between groundwater and the regulated surface water system.

- Wimmera-Mallee: Highlands SDL resource unit – there may be limited local connection between groundwater and surface water but given the small volume available for use and the large area it could be taken from, it is not expected to have a significant effect on environmental watering requirements.

In the Murrayville GMA area, groundwater levels in the areas of pumping have historically been 10-50m below natural surface, which is similar to the depth of the water table in the overlying Parilla Sands aquifer. Development of the confined Murray Group Limestone aquifer has led to some long-term decline which has been considered in developing the local management plan for this area and in the considerations under the South Australian-Victorian Border Groundwaters Agreement. The agreement and the local management plan set management limits to declining levels of 0.65m/year. Groundwater level trends in the Murray Group Limestone aquifer are declining less than this trend rate (BARGC, 2017).

In Victoria the mechanisms for structural damage due to declining groundwater levels was considered in the development of the Yarram Water Supply Protection Area Groundwater Management plan, where declines of one metre a year have been observed due to off-shore gas and oil production since the 1970s (see **http://www.srw.com.au/files/Technical_reports/Yarram_Groundwater_ Management_Plan.pdf**).

The most significant risk from structural damage identified in this study is related to the potential for subsidence at the coast due to dewatering and resultant inelastic deformation of clay layers.

From long-term monitoring of groundwater levels in the overlying Parilla Sands aquifer and underlying Renmark group aquifer, water levels in these aquifers are stable on either side of the border (Barnett, 2006) and more recent review of observation bores in the Murrayville GMA remain consistent with these observations. The latest data can be accessed from the Victorian Water Information Management System. With the Parilla water levels remaining stable, saturation of the Bookpurnong Clay layers are considered stable, ensuring the Bookpurnong Clay aquitard remains saturated. Regardless the potential change due to any elastic or inelastic subsidence in layers greater than 50m below the surface would tend to be small at the regional scale in the Murrayville area, difficult to detect, and the risk of structural damage is considered low.

In considering this evidence, the risk to the productive base and impact on the structural integrity of the aquifer, and the overlying and underlying aquifers and aquitards in the Murrayville GMA is considered low and is managed under the existing arrangements in the Victorian Groundwater management framework and the South Australian-Victorian Border Groundwaters Agreement.

Except for this development in the Murrayville GMA, there is no significant development of groundwater and while water levels outside of this GMA may fluctuate by small amounts, predominantly in response to climate and recharge, there are no regional scale impacts on water levels from groundwater use.

On this basis, Victoria considers there are no structural risks to the aquifers because the amount of take under the SDLs will not cause significant aquifer drawdown and therefore structural risk to the aquifers. There are considered to be no risks of structural damage in the fractured rock aquifers of the Highlands' groundwater system due to the very small licensed volumes primarily in shallow unconfined alluvial aquifers.

On the basis of the above, it was not considered necessary to include additional rules under sections 10.18, 10.19 and 10.20 of the Basin Plan.

12.7.3 Salinity and other types of water quality degradation

Much of the Wimmera-Mallee water resource plan area contains saline shallow groundwater. The saline wetlands in the north of the water resource plan area are caused by the presence of shallow saline groundwater, no rainfall recharge and high evapotranspiration rate. Additionally, both groundwater and surface water quality is very poor. For these, the Ministerial Guidelines are also sufficient; however, the demand is non-existent.

The excised area is part of the West Wimmera GMA (see **Part 2.2** for information about the groundwater boundaries) and is managed by Grampians Wimmera Mallee Water to a local management plan, which sets a permissible consumptive volume of 55,659 ML. About 95 per cent of this volume has been allocated. Most development is around Neuarpur, which is outside the Basin.

The Murrayville Local Management Plan considers the potential for impacts on water quality and notes that the considerable depth of the aquifer, the upward pressure of the aquifer and the overlying aquitard mean that the Murray group limestone aquifer (also known as the tertiary limestone aquifer is relatively protected from most vertical processes that could have the potential to affect groundwater quality in the area.

Downward leakage from the saline Parilla Sands aquifer via rusted or collapsed bore casings to the relatively fresh limestone aquifer remains a potential threat and the groundwater resource may be threatened by the presence of failed or failing groundwater bores, particularly where the Murray Group Limestone is overlain by the saline Upper Tertiary Parilla Sands aquifer. The older bores drilled into the limestone aquifer area are likely to deteriorate as the steel casing corrodes, allowing water from the saline Parilla Sands aquifer to enter the fresher Limestone aquifer and cause contamination. Proper capping and decommissioning of old bores is important to protect water quality of the Murray Group Limestone aquifer. While decommissioning of failed and redundant bores is the responsibility of landholders, GWMWater will assist where possible.

It is not considered necessary to include rules relating to the establishment and maintenance of a register of bores because this is already part of the Victorian framework. DELWP administers a bore registration network and the Victorian Water Register maintains records of all works licences including those relevant to the construction of a bore.

12.7.4 Addressing risks

Section 10.22 of the Basin Plan requires consideration as to whether rules are necessary in the Wimmera-Mallee Water Resource Plan to address risks identified in the Risk Assessment. **Part 7** sets out the current and future risks to the condition and continued availability of water resources. The full Risk Assessment Report is contained at **Appendix B**.

The risk assessment examined risks for matters identified under Chapter 10, Part 4 of the Basin Plan.

Priority environmental assets and ecosystem functions are identified in Victoria's long-term watering plans and were assessed under the separate risk category: "structural form of surface water resources based on categories that reflect priority assets, namely wetlands and rivers".

The risks to the assets and the ecosystem function that underpins them was assessed in terms of loss or decline in:

- longitudinal connectivity – barriers to fish passage and other barriers such as vegetation connectivity
- lateral connectivity – in-stream physical habitat such as sedimentation, erosion, loss of large wood.

Causes of risk identified to priority environmental assets and priority ecosystems functions dependent on surface water were:

- climate change
- extreme drought
- failure to continue to invest in best practice land use initiatives
- pests and weeds.

12.7.5 Groundwater-related risks

The following groundwater-related risks were assessed:

- groundwater requirements for priority environmental assets and ecosystem functions (section 10.18 of the Basin Plan)
- groundwater and surface water connections (section 10.19 of the Basin Plan)
- productive base of groundwater and its management (section 10.20 of the Basin Plan)
- environmental outcomes related to groundwater (sections 10.21 and 10.22(b) of the Basin Plan).

Risks to the productive base of groundwater systems (section 10.20 of the Basin Plan) were assessed in terms of the ability of the aquifer to provide water for environmental and consumptive purposes in the context of damage to the structural form of the aquifer arising from take across environmental or consumptive users. No medium or high-level risks were associated with changes to the structural form.

In respect to the matters relevant to sections 10.18, 10.19 and 10.21 of the Basin Plan, these assets were assessed under risk categories in terms of the availability of groundwater for environmental purposes from the following aquifers:

- Basin Margin Deep
- Basin Margin Shallow
- Upland Layered Valley
- Uplands.

Climate change was identified as a potential medium or higher-level risk to meeting environmental watering requirements.

Mitigation measures and strategies have been identified in the Risk Assessment for all medium and high risks. It is not considered appropriate to impose rules to address risks in the Wimmera-Mallee relating to climate change. Instead, the appropriate approach to managing climate change risks is through Victoria's water resource management framework that includes:

- the periodic review of regional catchment strategies required by the *Catchment and Land Protection Act 1994*
- regional sustainable water strategies required by the Victorian Water Act
- long-term water resource assessments required by the Victorian Water Act
- regional waterway strategies required by the Victorian Water Act
- planning duties of the VEWH required by the Victorian Water Act.

10.22(a) To comply with this Part, each section of Part 4 of Chapter 10 of the Basin Plan was considered in the context of Victorian water resource management arrangements. Consideration was given to the following:

a. environmental watering requirements and objectives in regulated surface water systems

b. the location of connections between surface water and groundwater in relation to priority environmental assets and priority ecosystem functions in regulated surface water systems

c. the impact of groundwater use on priority environment assets and priority ecosystem functions

d. existing water resource management arrangements underpinning Victoria's entitlement regime.

Analysis of the above identified that no rules were necessary in response to the matters identified in sections 10.17 to 10.21 of the Basin Plan.

There is nothing in the Wimmera-Mallee Water Resource Plan that will compromise the meeting of environmental watering objectives in the Wimmera-Mallee water resource plan area.

Note: The above response is informed by the explanatory material outlined in Column 5 for **Part 4** of the Wimmera-Mallee Index Table. Material in Column 5 of the Wimmera-Mallee Index Table does not form part of the accredit text.

10.22(b) No rules have been identified to address climate change risks identified in response to section 10.41(1) of the Basin Plan. No other medium to high risks were identified relevant to Part 4 of Chapter 10 of the Basin Plan. Strategies to address climate change risks have been identified in the Wimmera-Mallee Risk Assessment Report at **Appendix B** to the Wimmera-Mallee Comprehensive Report. Rules have not been included in the Wimmera-Mallee Water Resource Plan as there are no rules considered relevant to address the risks identified as the strategies identified in the Wimmera-Mallee Risk Assessment Report at **Appendix B** to the Wimmera-Mallee Comprehensive Report are considered most appropriate.

All risks identified in the risk assessment are set out in **Table 11** for the Wimmera-Mallee (surface water) water resource plan area and **Table 13** for the Wimmera-Mallee (groundwater) water resource plan area. No rules were considered necessary to address any low risks identified in the risk assessment.

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13. Recreational values

Part 13. Recreational values

13.1 Recreational values in the Murray-Darling Basin Plan

The Basin Plan cites a number of considerations regarding recreational values of water including:

Schedule 1 – Basin water resources and the context for their use

- *Item 26: The water resources of the Murray-Darling Basin are used in agriculture, non-agricultural industry, meeting critical human water needs and normal domestic requirements, for recreational and cultural purposes, and in maintaining freshwater ecosystems.*
- *Item 32: The resources are also used for water sports, wider recreational activities, to attract visitors to particular regions, and for visual amenity.*
- *Item 39: An estimated 430,000 people use Basin water resources for more than 5 million recreational fishing trips a year, with a most likely direct expenditure estimate of $1.35 billion (DPI, 2011). Recreation and tourism use of Basin water resources is generally non-consumptive, but depends on a degree of ecological health. Ramsar-listed wetlands are significant tourist destinations.*

The objectives and outcomes in the Basin Plan include:

- *5.02 (a) Communities with sufficient and reliable water supplies that are fit for a range of intended purposes, including domestic, recreational and cultural use*

Water quality management plans prepared as part of meeting the Basin Plan also require consideration of recreational values:

- *9.07 The water quality objective for recreational water quality is to achieve a low risk to human health from water quality threats posed by exposure through ingestion, inhalation or contact during recreational use of Basin water resources.*
- *9.18 The water quality targets for water used for recreational purposes are that the values for cyanobacteria cell counts or biovolume meet the guideline values set out in Chapter 6 of the Guidelines for Managing Risks in Recreational Water.*

13.2 Summary of risks to recreational values

Victoria's strategic plan for how the state uses its water resources, *Water for Victoria*, defines recreational benefits or recreational values as:

> *The objectives and benefits that recreational users and community members associate with the use of water, reservoirs and waterways for recreational activities. These objectives and benefits include wellbeing and enjoyment, derived from social interaction, physical activity and relaxation associated with activities including sporting events, fishing, water-skiing and rowing, camping, walking and gathering with friends and family. It also includes flow-on economic benefits to local communities from visitors to regional areas to make the most of these opportunities.*

Recreational/social values were included in the risk assessment undertaken during the initial development of the Wimmera-Mallee Water Resource Plan. Risks to recreational/social values were assessed in terms of water availability and condition across the following categories.

- Availability:
  - recreation water entitlement – Wimmera-Mallee (surface water) water resource plan area only
  - social and recreational values not provided for by a recreation water entitlement
- Condition – based on State Environment Protection Policy beneficial use categories of:
  - primary contact recreation (e.g. swimming)
  - secondary contact recreation (e.g. boating)
  - aesthetic enjoyment.

The assessment found that the associated causes listed in **Table 53** and **Table 54** pose a medium or higher risk to recreational water values in terms of the continuing availability of the resource and/or its condition.

Table 53: Identified medium or higher risks to the availability and condition of surface water for recreational/social values

Cause	Availability		Condition		
	Recreational bulk entitlement	Social and recreation values not provided by a recreation bulk entitlement	Primary contact	Secondary contact	Aesthetic enjoyment
Climate change		x	x	x	x
Major asset failure	x				
Extreme drought	x		x	x	
Increase in farm dams	x				
Land use changes	x				
Failure to continue to invest in improved land management practices			x	x	x
Earth resource development			x		
Pests and weeds			x	x	x

Table 54: Identified medium or higher risks to the availability and condition of groundwater for recreational/social values

Cause	Availability		Condition		
	Recreational bulk entitlement	Social and recreation values not provided by a recreation bulk entitlement	Primary contact	Secondary Contact	Aesthetic enjoyment
Climate change		x			

13.2.1 Addressing risks to water resources for recreational needs

Victoria is preparing for a warmer, drier future with less water available and more extreme events. Dry conditions regularly affect the north and west of the state. In dry conditions and in drought, less water is available for all uses and recreational uses of our waterways are limited. Yet it is at these times that the presence of water and recreational opportunities provide relief for people and can become even more important for communities. When water becomes scarce, community concerns can increase.

In regulated systems, water is captured and held for entitlement holders in storages, and moved to where it is needed via rivers and channels. In these systems, water may be able to be moved in a way that provides recreational benefits without affecting existing entitlement holders. This cannot be guaranteed, especially in dry times. In unregulated systems, there is less control on how water moves. This means that recreation is significantly impacted in dry conditions.

The water entitlements and planning frameworks ensure the needs of cities and towns are met, and that there is supply for agriculture, industry and the environment. As part of the recreational water initiatives in *Water for Victoria*, Victoria will continue to work within this framework to find ways to meet recreational objectives.

While there are many activities in and around waterways that people can enjoy regardless of water levels, some activities such as boating and fishing require a minimum water level or a consistent presence of water. There will be times when not enough water is available to support all recreational activities at all locations. This is likely to happen more often with climate change.

There are already limits to activities such as boating on some water storages to maintain safety and security of supply. Victoria needs to manage access to water storages according to risk, particularly storages used for drinking water supply, which will continue to be managed within the requirements of the Victorian *Safe Drinking Water Act 2003*.

The Basin Plan requires states to identify strategies to address medium or higher risks. These strategies are detailed in the Risk Assessment (**Appendix B**).

13.3 The benefits of recreational water

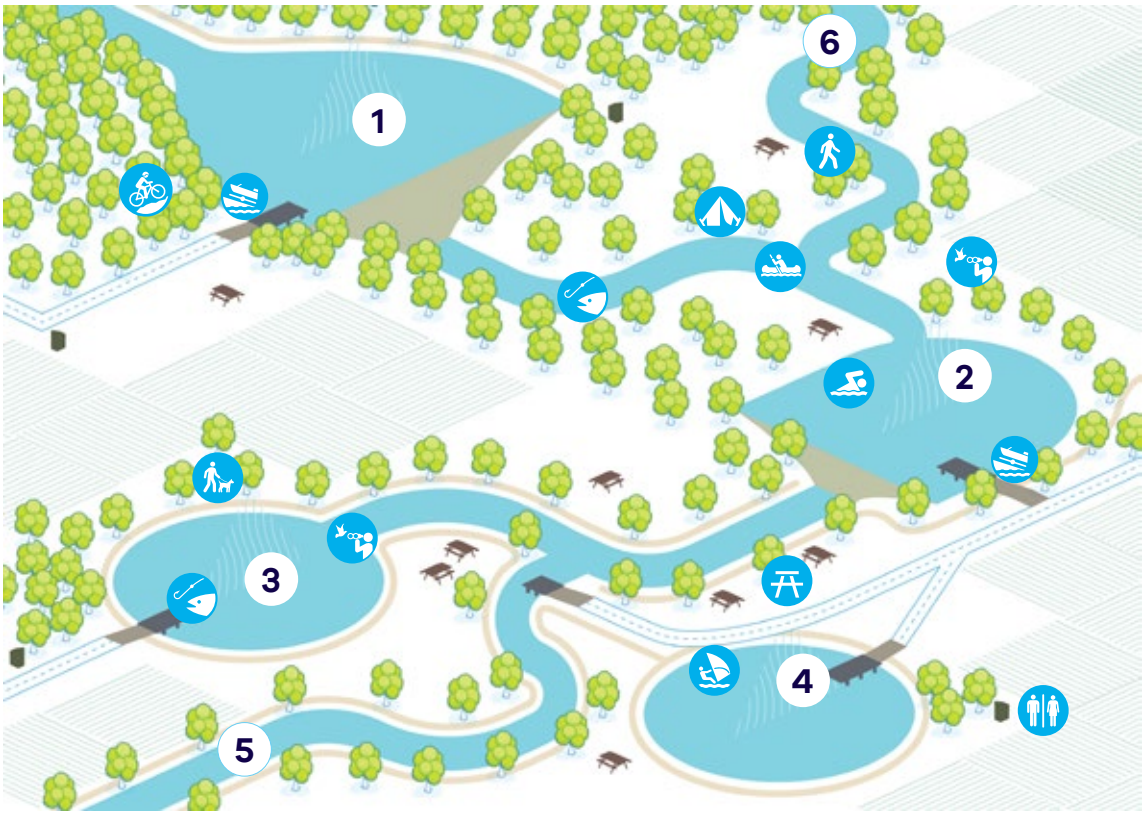
Victoria's rivers, streams, lakes and wetlands provide places for recreation and connection to nature, which is important for the health, wellbeing and social fabric of Victorian communities, as well as regional tourism and jobs. Victorians and visitors appreciate and seek recreational benefits through fishing, swimming, waterskiing, rowing, camping, walking, birdwatching, sporting events, social gatherings and other activities on or near waterways.

Waterways have recreational values that depend on the type of activities possible, the environmental health of the waterway, water quality, accessibility, facilities and safety.

Prime recreational sites in regional areas provide opportunities for tourism and hospitality. They draw visitors from cities and towns, interstate and overseas. In small rural towns, a local waterway or waterbody can be the lifeblood of a community, attracting and retaining people in the area through improved amenity, social and recreational opportunities, and providing an income for local businesses.

Recreational users benefit from Victoria's water management system – some water storages already support a variety of water-related activities that visitors enjoy. Environmental water management and works to improve the condition of our waterways and wetlands also support recreational fishing, camping, walking and other social activities at these sites. **Figure 40** shows the water management opportunities for recreational values at various types of water assets in a typical regional water system.

During the Millennium Drought, recreational activities such as boating, fishing and swimming were severely affected by low lake and water storage levels and low river flows. Many water storages and lakes were dry and some have recovered only in the past few years.



1

Source storage

Harvest unregulated inflows

Critical for supplying downstream entitlement holders' water demands

Ability to manage water to support recreational values very limited

2

Transfer storage

Provide temporary storage during season to enable water supply for entitlement holders

Possible management of through-flows to support recreational values

3

End point lake or wetland

Water cannot be returned for consumption elsewhere

Can receive supply that supports recreational values, where available

4

Disconnected lake or wetland

No existing connection to water grid

Infrastructure investment required to supply water for recreational use

5

Regulated river

Recreational benefits from water supply and environmental flows

Some ability to manage flows to support recreational values

6

Unregulated stream

Sustainable limits on taking water support recreation

Limited active management options to support recreational values

Figure 40: Water management opportunities for recreational values

13.4 Community feedback on the draft Wimmera-Mallee Water Resource Plan

Recreational values and benefits need to be more clearly articulated, according to community feedback on the draft Wimmera-Mallee Water Resource Plan. This Part addressing recreational values in the region is one response to that feedback. Others are an improved description of current management arrangements, future directions under *Water for Victoria* and ways the community can get involved in achieving recreational outcomes through water management in the region.

The purpose of this Part is to:

- articulate recreational values and associated benefits of these values to the community in the Wimmera-Mallee water resource plan area, and the management practices that deliver these values
- outline the steps Victoria is taking to better recognise recreational values in the state's existing water management framework through the delivery of *Water for Victoria*
- discuss the risks to achieving improved outcomes for recreational values which emerged from the risk assessment conducted as part of the requirements of the Murray-Darling Basin Plan
- inform the community about how they can continue to engage with government in upcoming processes that will consider recreational values.

13.5 Recreational values in the Wimmera-Mallee water resource plan area

Rivers, weir pools, storages and lakes throughout the Wimmera-Mallee water resource plan area provide a broad range of social and economic benefits. Water in rivers and creeks provides amenity and recreation opportunities for local communities and supports tourism. These were recently quantified through a study of the socio-economic values of recreational and environmental water in the Wimmera-Mallee (see summary in the box below).

Waterways in the Wimmera system continue to hold significant recreational and cultural values for Traditional Owners and their Nations in the region.

Events held on the waterways include waterskiing at the annual Kanamaroo Festival, the Horsham Triathlon, the Dimboola Regatta and Head of the Wimmera rowing event, the Barengi Gadjin Land Council Aboriginal Corporation bark canoe and earth oven event and fishing competitions in Horsham, Jeparit and Dimboola.

Water storages in the region are highly valued for recreation as are the 11 nominated recreational lakes which can receive water under the Grampians Wimmera Mallee Water (GWMWater) recreational entitlement. Headworks storages with recreational facilities include Bellfield, Fyans, Lonsdale, Taylors, Green and Wartook lakes and Moora Moora, Toolondo and Rocklands reservoirs. Other waterbodies also provide recreational values to the area but are not nominated recreational lakes.

Additional opportunities to provide recreational outcomes are being pursued through investment in projects to support drought resilience (see case study below).

Case study: Investing in water projects to help protect sport and recreation in dry times

As part of a $10 million Drought Support Fund announced in November 2015 for the most drought-affected areas in north-west Victoria, the Victorian Government made $2.98 million available for community sport and recreation projects.

This provided grants for local councils, sporting clubs, recreation facility managers and schools to find better solutions for water access and supply. It also funded projects to increase certainty of recreational opportunities at lakes and weirs through drought periods.

The projects are helping to reduce the severe impacts of low rainfall on sporting and recreational activities that rely on water.

There are three recreational water projects, all of which are in the Wimmera-Mallee water resource plan area:

- Donald Weir Pool – investigations and works to provide water supply at a weir pool on the Richardson River at Donald (now complete).
- Taylors Lake – improved access and recreational facilities at this water storage, which is a priority recreational lake for the area.
- Green Lake near Sea Lake – studies and business case for a solution to address seepage issues preventing delivery of recreational water to this site (now complete). Works to address seepage issues are scheduled to begin in 2018.

Measuring the social and economic value of recreational and environmental water

A socio-economic study was completed recently into the value of recreational and environmental water in part of the Wimmera-Mallee water resource plan area. The study was conducted by the Wimmera Development Association, the Wimmera Catchment Management Authority, GWMWater and the Wimmera Southern Mallee councils. It involved working with local government and community groups to catalogue and quantify the various social and economic benefits that recreational and environmental water in rivers, pools and lakes provide to towns in the Wimmera Southern Mallee. Surveys and data were collected from the following locations where individuals and groups enjoy lakes, rivers and weir pools for recreational activity:

Shire	Water body
Buloke Shire	Tchum Lake Lake Watchem Wooroonook Lake Donald Caravan Park Lake (Folletti Lake)
Horsham Rural City	Wimmera River at Horsham Taylors Lake Green Lake
Hindmarsh Shire	Wimmera River at Dimboola Wimmera River at Jeparit Lake Hindmarsh Nhill Lake
Northern Grampians Shire	Walkers Lake Lake Fyans Lake Bellfield Lake Wartook Lake Lonsdale
West Wimmera Shire	Lake Charlegrark Lake Wallace Glenelg River at Harrow
Yarriambiack Shire	Beulah weir pool Brim weir pool Yarriambiack Creek at Warracknabeal Lake Lascelles Lake Marma

Measuring the social and economic value of recreational and environmental water continued.

Key findings from the report estimated that in 2017:

- more than 437,000 people visited the surveyed waterways
- more than 196,000 visitor nights are attributed to recreational and environmental waterbodies
- a high rate of active and passive local participation was reported at these sites
- visitors included residents of Wimmera Southern Mallee (43 per cent), other Victorian country (31 per cent) and Melbourne (11 per cent)
- the total regional economic contribution was estimated at $27.5 million.

Local communities reported that the Wimmera Southern Mallee's recreational water facilities make an extremely important contribution to the social fabric of the region's towns, provide a critical outlet for physical and mental relaxation, enhance the amenity of towns and rural areas, and improve the health of residents and visitors to the region.

Physical health benefits analysed in the assessment were derived from the prevention of chronic diseases (such as breast cancer, coronary heart disease, diabetes, bowel cancer and stroke). Mental health benefits are derived from the prevention of anxiety and depression.

Estimated benefits for 2016–17 were:

- physical health $7.95 million
- mental health $600,000
- total $8.5 million.

The study's second stage, to be conducted in 2017, will go into more depth to understand the health benefits of the region's waterways. It will also assess some waterways not previously included, such as Lake Toolondo.

Read the full report at **http://www.wcma.vic.gov.au/docs/default-source/riversdocs/report--wsm-socio-economic-value-of-recreational-and-environmental-water-2017.pdf?sfvrsn=2**.

13.6 Providing for recreational values

Much has been done in the Wimmera-Mallee water resource plan area to improve access to water for recreation. It is the only region in Victoria with a dedicated recreational water entitlement – part of GWMWater's bulk entitlement. There was a recreational water entitlement before the new Wimmera-Mallee Pipeline.

GWMWater was appointed storage manager in October 2010 for the bulk entitlements and environmental entitlements granted for the Wimmera-Glenelg headworks system. GWMWater is therefore required to provide opportunities for recreation in the reservoirs and rivers across the region where it is compatible with other system management objectives.

Storage manager objectives in relation to recreational water

9. Recreation: To provide opportunities for recreation activities in the Wimmera-Glenelg headworks system where that is compatible with other objectives.

10. Floods: To manage floods in the Wimmera-Glenelg headworks system to conserve water and manage impacts on communities, including the supply of water to recreational lakes where this is compatible with the environmental objectives.

Case study: Community, land manager and government work together to achieve recreational outcomes

Historically, Lake Marma at Murtoa in western Victoria provided water supply to the Murtoa township. In 2010, the Wimmera-Mallee domestic and stock pipeline was constructed and Lake Marma was no longer required for water supply to the town. However, the lake remained a significant recreational asset for walking, fishing and boating.

Lake Marma was selected to receive water under GWMWater's recreational water entitlement following a prioritisation process with the Wimmera community. Building on this, the Lake Marma Committee of Management worked with local user and community groups to develop a management plan for the lake, and obtained funding from state and local government and the community for its implementation.

Local groups, such as the Progress Association, RSL, Murtoa Lions, tennis and angling clubs, provided financial and in-kind contributions. Through this initiative, Lake Marma is now an even more important recreational setting and regional tourism attraction for Murtoa.

13.7 Recreation in storages supplying the Wimmera-Mallee Pipeline system

Storages for the pipelined supply system are available for a range of recreational uses. The primary objective of managing flows into and out of these storages is the efficient capture, storage and delivery of water supplies to entitlement holders (with a formal right to water supply), especially during dry periods. In some cases it is possible to manage the timing of releases to achieve social benefits, such as recreation at times of popular use, as well as environmental outcomes. This will depend on the conditions each year including overall storage levels, storage management rules and entitlement holders' demands for water. For example, Taylors Lake is an important storage in the pipelined Wimmera-Mallee system and will provide more reliable recreational opportunities than other storages, particularly in dry years. It is being developed for recreation for the Horsham area, and more investment will be sought to improve facilities.

The more efficient delivery of water via the pipeline means that not all the storages from the former channelled system need to be used. Storages no longer needed for water supply or distribution include Dock Lake, Green Lake (near Horsham), Pine Lake and Lake Batyo Catyo. Water will not be diverted into and stored in these lakes to supply water to towns and farms.

Weirs no longer needed to divert water for supply or distribution include Jeparit, Banyena, Sheepwash, Swedes Creek Diversion and Trudgeons. These weirs have been removed through consultation with the Wimmera Catchment Management Authority and local landholders or washed away during flood events, except Jeparit Weir, which is being managed by Hindmarsh Shire Council.

13.7.1 Managing the recreational water entitlement

The Wimmera-Mallee has a unique entitlement to supply water for recreation in priority lakes and weir pools throughout the area as part of GWMWater's Wimmera and Glenelg rivers bulk entitlement. This entitlement is held by GWMWater in storage for use at priority lakes and weir pools supplied from resources within the Wimmera-Mallee water resource plan area. In addition, Supply System 5 and the Northern Mallee Pipeline supply two priority lakes with water sourced from the River Murray.

Recreational waterbodies that can be supplied by the entitlement are shown in **Figure 41**.

Figure 41: Recreational lakes and weirs supplied by the Wimmera-Mallee Pipeline

Each year GWMWater must decide how to distribute water available under its recreational entitlement to individual lakes and prepare a Recreation Lakes Water Supply Plan. The plan must specify the principles and rules for supply to the recreation lakes including:

- a list of the recreation lakes nominated to receive supply and their location
- the priority for supply to each of the recreation lakes for a range of water allocations
- the timing and method for supplying the recreation lakes
- the cost of supplying the recreation lakes including the cost of any additional infrastructure required
- the persons or agencies responsible for paying the cost of infrastructure and supply.

GWMWater must also:

- make available a copy of the Recreation Lakes Water Supply Plan to any person on request
- inform the local community of the volume of water to be supplied to each recreation lake under the plan.

A recreational water users advisory group, comprising community representatives from throughout the supply area, advises GWMWater about how to use this entitlement each year (see GWMWater website for more details).

The volume of water available for recreation is subject to a seasonal allocation specified in the bulk entitlement. Recreational lakes and weirs will be filled when water is available under the entitlement and as needed, primarily during off-peak months when greater delivery capacity is available within the pipeline system. If these arrangements need to change, GWMWater will consult the advisory group.

Table 55: Recreational lakes and weirs supplied by the Wimmera-Mallee Pipeline

Lake	Basin volume (ML)	Foreshore management	Waterway manager (under *Marine Safety Act 2000*)
Beulah Weir Pool	140	Beulah Weir Pool Committee of Management	Yarriambiack Shire Council
Brim Weir Pool	120	Brim Weir Pool Committee of Management	Yarriambiack Shire Council
Donald Caravan Park Lake	50	Buloke Shire Council	State boating rules apply
Green Lake, Sea Lake	547	Green Lake Committee of Management	Buloke Shire Council
Lake Lascelles, Hopetoun	440	Lake Lascelles Committee of Management	Lake Lascelles Committee of Management
Lake Marma, Murtoa	170	Public Park and Gardens Reserve Committee of Management	Lake Marma Public Park and Gardens Reserve Committee of Management
Tchum Lake, Birchip	730	Tchum Lake Aquatic Club	Tchum Lake Aquatic Club
Walkers Lake, Avon Plains	900	Northern Grampians Shire Council	State boating rules apply

continued

Lake	Basin volume (ML)	Foreshore management	Waterway manager (under *Marine Safety Act 2000*)
Warracknabeal Weir Pool	210	Yarriambiack Shire Council	Yarriambiack Shire Council
Watchem Lake	259	Watchem Lake Committee of Management	State boating rules apply
Wooroonook Lake	700	Wooroonook Committee of Management	Buloke Shire Council

13.8 Providing shared benefits for recreation

Victoria's water sector works with communities and other agencies to explore opportunities to maximise shared or complementary benefits of all water uses, without compromising the needs of the environment, agriculture, towns and businesses. By sharing benefits from the storage, delivery and use of water, limited resources are optimised to best meet objectives of key groups in the community. As there are few specific entitlements for recreation, management of other water may also provide benefits for recreation. Water corporations consider shared benefits in storage management and river operation decisions, and catchment management authorities (CMAs) and the Victorian Environmental Water Holder (VEWH) consider shared benefits in environmental watering decisions.

These agencies also report annually on outcomes achieved through shared benefits, including seeking community feedback on recreational benefits experienced after environmental water delivery to sites.

13.8.1 Environmental water providing shared recreational benefits

While the primary objective of environmental water is to protect the environment, healthy rivers and wetlands make cities and towns more liveable and support the physical and mental wellbeing of communities. They provide places for people to play, relax and connect with nature and sustain Aboriginal communities who have a continuing connection to Country. Due to these factors, the planning and delivery of environmental entitlements considers recreational benefits, where the environmental outcome will not be compromised.

When planning for the use of environmental entitlements, environmental water managers consider how environmental water use, or the timing of that use, can support or enhance community and recreational activities. Community members and recreational group representatives provide feedback on the potential shared benefits achieved through delivery of environmental entitlements.

Where possible, environmental entitlement deliveries are managed to maximise the benefit to major recreational events, for example by adjusting the timing of flows to maximise water levels and water quality, while still delivering environmental outcomes. This has been undertaken on the Wimmera River for a variety of events, such as the Horsham, Dimboola and Jeparit fishing competitions, waterskiing at the Kanamaroo Festival (see case study below), the Dimboola Regatta and Head of the Wimmera rowing event and the Horsham triathlon.

Case study: Improving water quality and river levels to rescue festival highlight

A key attraction of Horsham's annual Kanamaroo Festival is a waterskiing display on the Wimmera River. High water levels are needed in the Horsham weir pool to safely host the event. In the lead-up to the 2014 festival, the outlook was not good. Winter rainfall had been well below average and the region was experiencing its driest spring in decades. The Wimmera River's water quality was poor with the Wimmera Catchment Management Authority planning to release a series of freshening flows to avoid fish and plant deaths. The Wimmera CMA agreed to store the environmental water in the Horsham weir pool to keep water levels high enough to accommodate waterskiing and to delay delivery of the spring freshes down the river until after the event. The benefit for the river was that the freshes could be delivered as sharper peaks, making them more effective at improving water quality.

13.9 Sidelined waterbodies provide other benefits

Multiple waterbodies within the Wimmera-Mallee water resource plan area are no longer required for water supply purposes following construction of the Wimmera-Mallee Pipeline, but have recreational benefits to the broader community. These waterbodies may also provide options for flood relief in certain circumstances. GWMWater may operate its reservoirs (including some lakes and off-stream storages) to provide possible flood mitigation, and preferably in accordance with an agreed set of operating conditions. GWMWater may respond to a request during a flood event and/or an agreement with the local catchment management authority (the floodplain authority).

13.9.1 Pine and Dock lakes

Pine and Dock lakes are off-stream reservoirs with small local catchments. These reservoirs were used to supply irrigation water to the Horsham Irrigation Area before the completion of the Wimmera-Mallee Pipeline. They are no longer required for water supply purposes and because of this, the current entitlement arrangements do not allow harvesting of water into these reservoirs under normal circumstances. However, they are still owned and managed by GWMWater, remain connected to the system and could be considered to store water in extreme flooding events but they can provide only minor flood mitigation.

Dock Lake may also receive some water via Green Lake, which does have harvesting rights should Green Lake be at a suitable level.

13.9.2 Rich-Avon weir pool

GWMWater uses unregulated flows in the Richardson River to maintain the Rich-Avon weir pool in accordance with the Wimmera and Glenelg rivers environmental entitlement. Through this entitlement, the weir continues to provide environmental and recreational benefits to the community.

13.9.3 Lake Batyo Catyo

Lake Batyo Catyo is no longer required for water supply purposes. The current entitlement arrangements do not allow harvesting of water into these reservoirs under normal circumstances. With the removal of Lake Batyo Catyo from the Avon-Richardson system, the nearby Walkers Lake was connected to the Wimmera-Mallee Pipeline. This lake receives a recreational water entitlement.

Lake Batyo Catyo is now managed by the Northern Grampians Shire Council but some of the old GWMWater assets remain. Through these assets, water may be diverted into the storage in a flood emergency.

13.10 Costs associated with recreational water management

Water for Victoria recognises the importance of maintaining affordable water services, noting that investment in infrastructure to provide services to homes and businesses, deliver environmental protection and recreational benefits, and adapt to climate change, will create pressure on costs. This will be balanced by downward pressure on costs as the water sector continues to deliver efficiency through shared services and smarter procurement, innovative technologies and processes, greater interconnection of water resources and reduced red tape.

The money water corporations spend to provide recreational infrastructure and facilities should be met by the people who benefit. Some water corporations recover costs of land and recreation management functions relating to water storages via fees paid by urban water customers. The Essential Services Commission is responsible for approving the price proposals of water corporations, consistent with policy set by government and pricing processes for other water users.

In the Wimmera region, GWMWater has established charges for water storage and delivery. Taking into account the broader public benefit of the recreational water entitlement and the high cost of water delivery, GWMWater sought water customer agreement to contribute to a subsidised rate for charges applicable to water used for recreation. The Essential Services Commission approved the proposal. GWMWater now collects the recreation contribution charge from its customers. This offsets the cost of delivering recreational water, which reduces charges for water delivery to priority recreational lakes and weirs, and to recreational and sporting clubs in the region. See GWMWater's website for more information.

13.11 Recognising recreational values

The importance of recreational values to the community was recognised in *Water for Victoria*, which notes the following objective for recreational water:

Water for Victoria will support the wellbeing of rural and regional communities who enjoy the recreational benefits our regional waterways provide. We will consider these values in the way we manage water.

Water for Victoria acknowledges that to date, incorporation of recreational values in water planning has been inconsistent and community engagement on water and waterway management activities has not always had recreation in mind. It commits the water sector to improving its understanding of these values by including communities in conversations about water and waterway planning and requires the water sector to collaborate with recreational water users, including the community, while still supplying water to entitlement holders and meeting environmental water and waterway health objectives.

Water for Victoria Action 7.1 – Include recreational values in water and waterway planning

- The government will explicitly incorporate recreational values in statewide and regional water planning processes.
- Water corporations, catchment management authorities and the Victorian Environmental Water Holder will plan for and provide water services that explicitly consider recreational values within our existing frameworks and with awareness of the realities of dry conditions and climate change.
- Water corporations, catchment management authorities and the Victorian Environmental Water Holder will engage with the community to identify and prioritise opportunities to deliver recreational outcomes. They will seek input from recreational users and regional and rural community members. They will report back on what is agreed and what has been done.

Water for Victoria also acknowledges that people may have new ideas about how to meet their recreational objectives that cannot be achieved in the day-to-day management of water and waterways. For example, recreational users could buy entitlements to improve the certainty of having water for recreation or by completing works such as removing rubbish to improve enjoyment of activities, or developing tourism strategies to attract visitors. But they may not know how to progress their ideas or who can help them.

Many agencies can help, including the water sector (see **Table 56**), but sometimes it is difficult for community members to know where to start. The water sector has a lot of knowledge it can share to help people find ways to meet their recreational goals. Water corporations share information about water levels and availability to help tourism operators plan events or fisheries agencies make decisions about where to stock fish.

Table 56: Roles and responsibilities for recreational proposals at waterways

Role	Who
Driver of recreational objectives for waterways	• local community members • recreational clubs • peak recreational bodies • land managers, e.g. Parks Victoria
Approvals for works on land or waterway	• catchment management authorities • Department of Environment, Land, Water and Planning • land managers
Information about water availability, quality, supply and trade	• water corporations • catchment management authorities
Information about water and waterway management, infrastructure and access	• rural water corporations • urban water corporations • catchment management authorities • Victorian Environmental Water Holder

continued

Role	Who
Potential investors in recreational objectives	• local community members • land managers • recreational clubs • peak recreational bodies • private investors • local government • Regional Development Victoria • Visit Victoria • catchment management authorities

Land managers for waterways can help communities contact the right agencies to discuss their ideas or proposals. The government expects its agencies to work collaboratively to explore these requests and communicate outcomes of efforts made.

Water corporations can lead discussions about water storages. Land managers include committees of management for Crown land, local government, Parks Victoria, and the Department of Environment, Land, Water and Planning. The land manager may be a water corporation responsible for a water storage location, or a catchment management authority responsible for managing Crown land.

Buying water or building facilities, such as toilet blocks or water infrastructure, can require significant funds. Recreational groups and communities can pay but this is not always possible. The people benefiting from investment in recreation should cover the costs. These users may be diverse depending on the site and activities. Users could be local people or businesses; visitors from other regions, interstate or internationally; and recreational club members. Sites of high social and economic regional importance may benefit people across an entire region.

There are existing ways of recovering costs from people who benefit from recreational services, such as fees charged for fishing licences, camping, boat ramp access and boating registration. These can support recreational objectives at waterways. The availability of funds will depend on criteria for investment and funding priorities. Land managers may have their own ways of recovering costs spent on activities for recreational use of the waterways they manage. Collaboration across government agencies is essential to enable access to investment opportunities and increase the likelihood of achieving recreational objectives.

Water for Victoria Action 7.2 – Help communities understand how to achieve their recreational objectives

- Public land managers will help recreational users connect with the right people including local government, tourism boards and potential investing bodies to progress actions relating to visitor experience at valued waterways. For water storages, water corporations are the right organisation to lead this.
- The water sector will share knowledge, user-friendly information and expertise with community members, land managers and potential investors to help achieve recreational objectives.
- The water sector will share information about community recreational objectives relating to waterways with organisations seeking to prioritise investment in regional development, recreation, community wellbeing and tourism objectives.

Water corporations can provide infrastructure and facilities at water storages that are priority sites for recreational users. First, water corporations need to understand the recreational objectives for these sites and the benefits for communities. Objectives may range from providing a site for recreational enjoyment or creating a site of regional economic significance through tourism.

Water corporations can draw on the expertise of other government agencies including local government, Regional Development Victoria and Visit Victoria, or peak bodies such as Victorian Recreational Fishing or Field and Game Australia, to develop proposals for water storages. Collaboration is essential to bring together this expertise and agree on responsibilities for action. Some water corporations already do this as part of management plans for land and recreation at priority water storages.

13.12 Opportunities for community involvement in water decision making that affects recreational opportunities

13.12.1 Sustainable water strategies

Sustainable water strategies identify and manage threats to the supply and quality of the state's water resources, and identify the potential to improve waterway health. The process provides a mechanism for methodical and thoughtful engagement to set priorities and directions in the regions. In 2011, Victoria released the Western Region Sustainable Water Strategy that encompasses the water resources considered in the Wimmera-Mallee water resource plan area.

The Victorian Water Act requires the strategies to be comprehensively reviewed at least every 10 years. The first of the strategies to be developed, the Central Region Sustainable Water Strategy, commenced a review in late 2016.

Water for Victoria introduced a requirement to undertake an assessment of the sustainable water strategies after five years. The five-yearly assessments will identify any key trends and issues to be taken up for the 10-year reviews, and will inform the methodology of long-term water resource assessments. An assessment of the Western Region Sustainable Water Strategy commenced in late 2017 and will be completed in mid to late 2018.

Water for Victoria outlines a possible timetable for new sustainable water strategies to be developed. This would commence with southern Victoria in late 2019 and aligning a new northern Victorian strategy with the Murray-Darling Basin Review in 2026. Any new sustainable water strategy will include an appropriate range of climate change scenarios, a consultative

committee with participation of Traditional Owners and ensure the strategies consider opportunities for achieving shared benefits for Aboriginal and recreational values of water.

13.12.2 Review of Wimmera-Mallee storage management rules

The bulk and environmental entitlement holders in the Wimmera-Mallee system are required, in consultation with DELWP to request the storage manager before 31 March 2019 to review the operation of the Wimmera-Mallee system. The review will assess the system's performance against the storage management objectives contained in the storage manager instrument of appointment. This will include a review of the principles related to recreational water management through the recreational water entitlement.

Water for Victoria also requires DELWP to ensure a strong and responsive water entitlement system that seeks shared benefits with recreational users.

Water for Victoria Action 8.1 – Ensure a strong and responsive water entitlement system

The Department of Environment, Land, Water and Planning will work with water corporations and the Victorian Environmental Water Holder to review and streamline regulatory instruments to improve transparency, and clarify roles and responsibilities to reduce red tape and improve water literacy. The first phase of this work is to:

- clarify roles and responsibilities set out in bulk entitlements and associated instruments for the management of water systems, and ensure consistency, transparency and accountability to water users and the community
- rationalise and simplify existing regulatory instruments
- investigate opportunities to increase community involvement in system management arrangements and achieve shared benefits for Traditional Owners and recreational users.

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14. Managing water quality and salinity

Part 14. Managing water quality and salinity

The Wimmera-Mallee Water Resource Plan and Wimmera-Mallee Water Quality Management Plan, at **Appendix A**, explain how water quality is managed in the Wimmera-Mallee. This Part summarises the Basin Plan approach to water quality management, and the Wimmera-Mallee Water Quality Management Plan. The requirements of the Basin Plan are met through the detailed information provided in the Wimmera-Mallee Water Quality Management Plan.

14.1 Water quality through the Basin Plan

The Basin Plan states (at section 5.04):

i. *the objective in relation to water quality and salinity is to maintain appropriate water quality, including salinity levels, for environmental, social, cultural and economic activity in the Murray-Darling Basin; and*

ii. *the outcome in relation to water quality and salinity is that Basin water resources remain fit for purpose.*

The Basin Plan seeks to achieve these primarily through:

- *Basin states' preparation of an assessment of risk to availability and condition for each water resource plan area; development and implementation of strategies to address each medium to high risk identified; and consideration of risks in the preparation of a water resource plan for each water resource plan area (10.40-10.43).*
- *specifying in Chapter 9:*
  - *water quality objectives for Basin water resources (9.03-9.09)*
  - *causes of water quality in the Basin (9.02)*
  - *water quality targets for: 1) water resource plans, 2) managing flows, and 3) long-term salinity planning (9.10-9.14).*
- *having regard to targets for managing water flows by the Murray-Darling Basin Authority, Basin Officials Committee, Basin states when managing flows, the Commonwealth Environmental Water Holder and holders of held environmental water and managers of planned environmental water (9.14); and*
- *application of long-term salinity targets in performing long-term salinity planning and management by the Murray-Darling Basin Authority, Basin Officials Committee and agencies of Basin states (9.19).*
- *Basin states' preparation and implementation of Water Quality Management Plans in accordance with requirements set out in clauses 10.29-10.35 having regard to a number of elements of Chapter 9.*

14.1.1 Wimmera-Mallee Water Resource Plan Risk Assessment

Victoria has prepared the Wimmera-Mallee Water Resource Plan Risk Assessment (see **Appendix B**), considering risks to condition and availability of water in the water resource plan area. Consideration was given to scenarios that could affect water resources, including the risks that changes to condition could have on different beneficial uses. Risks were considered in the development of this water resource plan.

14.1.2 Having regard to targets for managing water flows

Victorian water managers and the Victorian Environmental Water Holder have regard to the following targets for managing flows in performing their duties and reporting on their actions annually through the Basin Plan reporting requirements:

- dissolved oxygen: to maintain dissolved oxygen at a target value of at least 50% saturation; and
- recreation water: the targets for recreational water quality in section 9.18 of the Basin Plan.

The Basin Plan also presents targets for salinity that should be given regard in managing water flows. These targets, presented at section 9.14 (5)(c), are not applicable to the waters of the Wimmera-Mallee water resource plan area.

14.1.3 Applying targets for long-term salinity planning and management

Victoria applies the targets for long-term salinity planning to catchment strategies and salinity action plans. The end-of-valley targets that apply to the Wimmera-Mallee are the:

- Wimmera River at Horsham (gauging site 415200):
  - median concentration: 1,380 (EC or µs/cm)
  - 80th percentile concentration: 1,720 EC or µs/cm)
  - mean salt load 31,000 tonnes per year
- Avoca River at Quambatook (gauging site 408203):
  - median concentration: 2,096 (EC or µs/cm)

14.2 Wimmera-Mallee Water Quality Management Plan

The Wimmera-Mallee WQMP has been developed in a manner consistent with the Basin Plan requirements of sections 10.29–10.35. It is also consistent with WQMPs developed by each of the Basin states across the Murray-Darling Basin. When viewed together, these plans will present a picture of water quality issues across the Murray-Darling Basin, and key measures being undertaken to address them.

This WQMP was developed using significant investigations from the Wimmera-Mallee Water Resource Plan Risk Assessment and technical papers that involved review of key documents, plans and strategies, in consultation with Victoria's most informed practitioners and stakeholders in the region.

14.3 Water quality degradation

10.30 Surface water

The causes of water quality degradation in the water resource plan area are listed and discussed in **Table 3** of the Water Quality Management Plan at **Appendix A** to the Wimmera-Mallee Comprehensive Report.

Groundwater

No causes, or likely causes, of groundwater water quality degradation have been identified as there is no degradation of water quality in the Wimmera-Mallee (groundwater) water resource plan area.

The Basin Plan requires Basin states to identify the causes of water quality degradation. The WQMP identifies a breadth of causes of surface water quality degradation, while identifying that there is no broad-scale water quality degradation of the region's groundwater resources. Causes of surface water quality degradation can be summarised as:

- salinisation of surface waters is occurring through interception of naturally saline groundwater through rises in groundwater levels, and cutting in of surface water beds
- cleared areas of the catchment contribute elevated suspended sediments and nutrients
- dissolved oxygen outside natural ranges, and cyanobacteria (blue-green algae) are also water quality issues in the area.

Water quality degradation processes occurring at more local scales were also identified and are listed in the WQMP.

14.4 Water quality management

10.31 Surface water

Part 4.3.2 of the Water Quality Management Plan at **Appendix A** to the Wimmera-Mallee Comprehensive Report identifies risks related to the condition (quality) of water resources and explains why measures addressing the risk have or have not been included in the water resource plan.

Groundwater

Part 5.3.2 of the Water Quality Management Plan at **Appendix A** to the Wimmera-Mallee Comprehensive Report identifies risks related to the condition (quality) of water resources and explains why measures addressing the risk have or have not been included in the water resource plan.

The WQMP describes Victoria's water quality management framework and identifies two measures for specification under the Basin Plan.

These measures were identified as key for the implementation of water quality management actions or are already elements of the framework of water quality management in the Basin.

Table 57: Water quality measures and relevant Basin Plan water quality objectives

Water quality objective	Contributing measures (for surface water and groundwater)		
	Measure 1: Implementation of State Environment Protection Policies (or equivalent) for water	**Measure 2: Implementing Wimmera-Mallee Long-term Watering Plan**	**Measure 3: Implementing the South Australian-Victorian Border Groundwaters Agreement**
Freshwater-dependent ecosystems	✓	✓	NA
Raw water for treatment for human consumption	✓	✓	Where relevant aquifers used locally
Irrigation water	NA	NA	There is no distributed groundwater for irrigation
Recreational water	✓	✓	NA
Maintaining good levels of water quality	✓	✓	✓
Salt export	NA	NA	NA

10.33(1) Measures to be undertaken that contribute to the achievement of the objectives set out in sections 9.04 to 9.08 of the Basin Plan are set out in **Part 4.4.1** and **Part 4.4.2** of the Water Quality Management Plan at **Appendix A** to the Wimmera-Mallee Comprehensive Report.

14.5 Measure 1: Implementation of State Environment Protection Policies or equivalent (surface water and groundwater)

Victoria's water quality protection framework was first established by the *Environment Protection Act 1970* (the EP Act). The EP Act was updated in 2017 and states that the objective of the Environment Protection Authority (EPA) is to protect human health and the environment by reducing the harmful effects of pollution and waste.

The EP Act establishes the powers, duties and functions of the Environment Protection Authority. These include the administration of the EP Act and any regulations and orders made according to it, administering State Environment Protection Policies (SEPPs) and industrial waste management policies, issuing works approvals, licences, permits, pollution abatement notices and implementing National Environment Protection Measures.

The EP Act has a basic philosophy of preventing pollution and environmental damage by setting environmental quality objectives and establishing programs to meet them in State Environment Protection Policies. These policies aim to safeguard the environmental values and human activities (beneficial uses) that need protection from the effect of pollution and waste in the State of Victoria.

State Environment Protection Policy (Waters) 2018 is the instrument that formally defines the beneficial uses and environmental quality (water quality) objectives for the whole of Victoria,

including the Wimmera-Mallee water resource plan area. The SEPP (Waters) identifies legally enforceable rules for decision makers and obligations on industry to protect our water environments.

Obligations in the SEPP (Waters) include the requirements for the management of risks to beneficial uses, for example how municipal councils must manage their assets, and how water corporations and other industries manage waste and wastewater. Obligations to protect groundwater beneficial uses are also listed.

The SEPP (Waters) is also used to inform a range of strategies and plans that are prepared at varying scales.

14.6 Measure 2: Implementation of the Wimmera-Mallee Long-term Watering Plan objective to maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation (surface water only)

Victoria has prepared long-term watering plans (LTWPs) for each of its three surface water resource plan areas in accordance with Chapter 8 of the Basin Plan and consistent with the Basin Environmental Water Plan. The Wimmera-Mallee Long-term Watering Plan (LTWP) 2015 identifies maintaining salinity levels, including in the Wimmera River, as an objective.

Salinity levels that allow growth and reproduction of aquatic vegetation have been identified as one of four priority ecosystem functions in the Wimmera-Mallee water resource plan area, and maintaining appropriate salinity levels is among 13 objectives of the LTWP. For the Wimmera River, meeting the end-of-valley target at Horsham Weir 100 per cent of the time has been identified as a key target. It is expected that this will be achieved through low flow watering to prevent water quality decline and freshes to flush pools of water.

14.7 Measure 3: Implementing the South Australian-Victorian Border Groundwaters Agreement (groundwater only)

The Border Groundwaters Agreement between the South Australian and Victorian governments aims to cooperatively manage the groundwater resources along the states' border. The agreement provides that the available groundwater shall be shared equitably between the two states. The agreement allows for a permissible annual volume (PAV) to be extracted for each aquifer in a zone in the designated area. The PAV is the maximum licensed extraction volume that is permitted in each aquifer in a zone. It provides for a groundwater rate of drawdown that must not be exceeded in a zone and allows for a permissible distance from the border to be prescribed within this area in each state.

The agreement's Review Committee must agree to any proposed licensed withdrawals of groundwater or bore construction (excluding domestic and stock bores) and a permissible salinity level can be specified for each zone to safeguard groundwater quality in order to safeguard water quality. This has not yet been set for any zone.

14.8 Victorian water quality management framework complementing the achievements of the measures

Victoria has a range of actions, tools and strategies that complement the specified measures to achieve water quality outcomes. Many of these are part of Victoria's adaptive framework for catchment and water management.

These actions are set out against the Basin Plan objectives that they support:

Table 58: Complementary management actions to support water quality outcomes

Water quality objective for	Complementary management actions to support water quality outcomes
Water-dependent ecosystems	Implementation of the Lake Albacutya Ramsar Site Strategic Management Plan (DSE, 2003) Implementation of Mallee Regional Catchment Strategy Implementation of Wimmera Regional Catchment Strategy Implementation of North Central Catchment Strategy Implementation of SEPP (Waters) Implementation of the Victorian Waterway Management Strategy Implementation of the Wimmera Waterway Strategy Implementation of the North Central Waterway Strategy Implementation of the Victorian environmental watering program
Raw water treatment for human consumption	Compliance with the *Safe Drinking Water Act 2003* and associated regulations Achievement of storage management objectives (Minister for Water, 2010) and implementation of storage management rules (GWMWater, 2016) Implementation of the measures identified in "Water-dependent ecosystems" above
Recreational water quality	Achievement of storage management objectives (Minister for Water, 2010) and implementation of storage management rules (GWMWater, 2016) Implementation of statewide coordination plan for blue-green algae management as per the *Blue-Green Algae Circular* (DELWP, 2016a)
Maintaining good levels of water quality	Measures listed in Table 57 above

Further information on Victoria's future approaches to, and priorities for, water management are described in the Wimmera-Mallee Water Resource Plan Risk Assessment and *Water for Victoria*.

14.9 Measures for groundwater

There are two measures to contribute to the achievement of water quality objectives for the Wimmera-Mallee groundwater water resource plan area specified in this Water Resource Plan. These are measures 1 and 3 as outlined above. No degradation of groundwater in the Wimmera-Mallee water resource plan area has been identified. Victoria has local management plans operating for local scale planning rather than at the water resource plan scale.

14.10 Supporting development of measures through identified water quality targets

10.32(1) Surface water

The water quality target values for the Wimmera-Mallee water resource plan area are set out in **Table 7** and **Table 8** of the Water Quality Management Plan at **Appendix A** to the Wimmera-Mallee Comprehensive Report. The water quality target values for Ramsar sites in the Wimmera-Mallee water resource plan area are the targets set out in the Basin Plan.

Groundwater

No water quality targets have been identified for groundwater resources in the Wimmera-Mallee (groundwater) water resource plan area.

WQMPs also include water resource plan targets to inform the development of measures (measures are not required to be designed to achieve the targets). The Basin Plan puts forward water resource plan targets for freshwater-dependent ecosystems, irrigation and recreation, and Basin states can use these targets or adopt alternative targets if they meet certain criteria.

14.10.1 Water resource plan targets for the Wimmera-Mallee WQMP

Targets for freshwater-dependent ecosystems

10.32(2)(a) The water quality target values identified are those referred to in **Table 7** and **Table 8** of **Appendix A** to the Wimmera-Mallee Comprehensive Report.

The targets of the Basin Plan for freshwater-dependent ecosystems were developed having regard to the procedures set out in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC), as were the development of Victoria's environmental quality objectives for rivers and streams, contained within SEPP (Waters). For the purposes of 10.32 of the Basin Plan, Victoria identifies alternative targets for the Wimmera-Mallee water resource plan area for, fresh water-dependent ecosystems.

Targets for recreational waters

10.32(2)(c) The water quality target values are those set out in **Table 7** and **Table 8** of **Appendix A** to the Wimmera-Mallee Comprehensive Report.

The Wimmera-Mallee WQMP identifies the Basin Plan's targets for recreational waters. As above, for the purposes of 10.32 of the Basin Plan, Victoria identifies alternative targets for the Wimmera-Mallee water resource plan area for recreational water.

Targets for irrigation waters

There is no irrigation water distributed by an irrigation infrastructure operator in the Wimmera-Mallee water resource plan area, and no irrigation water targets have been identified.

Having regard to targets

Further detail on how Victoria had regard to these targets in the development of the measures is described in **Appendix A**.

14.11 Water quality target values for groundwater

No water quality targets have been identified for groundwater resources in the Wimmera-Mallee (groundwater) water resource plan area, the reasons for this are described below and in **Appendix A**.

Fresh water-dependent ecosystems

Water quality targets do not apply as groundwater in the Wimmera-Mallee is mostly saline (>3000 EC) and therefore is not classified as freshwater for the purposes of freshwater dependent ecosystems.

Irrigation water

Water quality targets do not apply as no groundwater is distributed by an irrigation infrastructure operator for irrigation.

Recreational water

Water quality targets for recreational water do not apply to groundwater, this is because as groundwater is not used in places for recreation and does not support the growth of blue-green algae unless exposed through surface ponds, where it becomes classified as surface water.

14.12 Impact of water quality management on another state

Surface water within the Wimmera-Mallee water resource plan area is essentially internally draining. Flows from the Wimmera and Avoca rivers have no impact on water resources in another state. The only hydrological connectivity with Basin water resources in another state is groundwater along the South Australian–Victorian border and management of this area is supported by the South Australian-Victorian Border Groundwaters Agreement described in Measure 3.

The South Australian Department of Environment, Water and Natural Resources was consulted on water quality management in the Wimmera-Mallee water resource plan area and was comfortable with Victoria's approach.

15. Measuring and monitoring

Part 15. Measuring and monitoring

The Basin Plan requires the Wimmera-Mallee Water Resource Plan to provide information about how Victoria measures and monitors water resources and what is done to ensure the measurements are maintained.

15.1 Basin Plan requirements

The Basin Plan requires the Wimmera-Mallee Water Resource Plan to include information about:

- the best estimate of the total long-term annual average quantity of water taken that is measured
- how the quantity measured was calculated
- the proportion of that quantity that is measured in accordance with agreed metering standards
- the best estimate of the total long-term annual average quantity of water taken that is not measured and how that quantity was calculated
- actions and timeframes for actions for maintaining and, if practicable, improving:
  - the proportion of take that is measured
  - the standard to which the take is measured
- monitoring of water resources to fulfil the reporting obligations under Section 13.14 of the Basin Plan.

15.2 Measuring and estimating volumes of take

Part 10 of Chapter 10 of the Basin Plan relates to the monitoring and measuring of water resources. It focuses on identifying the volume of water taken that is either measured or estimated in the relevant water resource plan area.

In Victoria, water corporations measure and monitor water taken by users who have entitlements. In the Wimmera-Mallee water resource plan area this is water taken under a bulk entitlement, environmental entitlement or take and use licences. Where water is taken under a statutory right (basic rights) or by way of interception (commercial plantations), Victoria makes its best estimate in accordance with the methods outlined in the Methods Report (see **Appendix C**).

15.3 Victorian Water Accounts

The annual Victorian Water Accounts provide detailed information about water availability and use. The first accounts were produced for 2003–04 and have been produced every year since.

Surface water accounts are produced for each of Victoria's 29 river basins, the definitions of which are based on the river basin boundaries designated by the former Australian Water Resources Council.

Groundwater accounts, applying rigorous accounting standards and practices, are produced for each of Victoria's groundwater basins. The boundaries of these basins do not align with the Wimmera-Mallee water resource plan area.

15.3.1 Surface water accounts

Surface water data in the water accounts generally aligns well with river basin boundaries. The only instance where this is not the case is where water is diverted from a waterway in one river basin and used in another. For the purposes of the basin water accounts, water is accounted for at the point of diversion from the waterway and not the point of use.

The surface water accounts present the catchment water balance for each basin. The water balance is made up of:

- change in the volume of water stored in the basin
- inflows to the basin
- diversions from the basin
- losses
- water passed at the basin outlet.

Information for the surface water accounts is obtained from:

- the Victorian Water Register
- data from water corporations, the Victorian Environmental Water Holder, Department of Environment, Land, Water and Planning, major users of water and the MDBA
- water consumption and recycled water data collected from water corporations by the Essential Services Commission
- hydrological information from selected streamflow monitoring sites
- climate information from selected rainfall and evaporation monitoring sites provided by the Bureau of Meteorology and water corporations
- estimated relationships between water use and climate or hydrological data, which is produced by water supply system modelling.

Details of the methodology used to quantify each component of the water balance are described in the Victorian Water Accounts (see for example, Victorian Water Accounts 2014–15 (DELWP, 2016c)). Accounts are prepared for the Wimmera (including Avon) and Avoca basins. No surface water balance is prepared for the Mallee Basin because all surface water supplies used in this area are sourced from outside the basin.

15.3.2 Groundwater accounts

Accounts are presented for each groundwater catchment. Boundaries of these catchments are determined by hydrogeological features and differ from surface water catchments. The groundwater accounts present data about:

- licensed groundwater volumes and use
- urban groundwater use, which is a sub-category of licensed use
- estimated number and groundwater use from domestic and stock bores.

Information for the groundwater accounts is obtained from:

- the Victorian Water Register
- responses to requests for data to water corporations, DELWP and major users of groundwater
- hydrogeological information from selected groundwater monitoring sites
- estimated relationships between water use and hydrological data, which is produced by water supply system modelling
- water corporation groundwater statements and annual reports.

The Wimmera-Mallee groundwater basin includes the area covered by the Wimmera-Mallee Water Resource Plan but incorporates groundwater data in the West Wimmera Groundwater Management Area and the South Australia–Victoria border zone. These areas are not included in the Wimmera-Mallee water resource plan area for the purpose of SDL calculations (see **Part 8**).

15.3.3 Estimating evapotranspiration

Evapotranspiration estimates are provided as supplementary information in the accounts. Data used in the accounts are estimated by the SoilFlux model as the sum of transpiration by plants, evaporation from soil and open water surfaces, and evaporation from the wet surfaces of plants soon after rainfall.

SoilFlux is a one-dimensional water balance model. It requires many approximations and assumptions, which limit its accuracy. Major assumptions and limitations of this method include:

- not accounting for water applied by irrigation
- not allowing for changes in water storage (i.e. rises and falls in the water table and soil moisture) or lateral flow
- using land use information from 2009, which has been condensed from the Victorian Land Use Information System into 10 representative land use types, for water balance modelling
- using one kilometre gridded data for land use, geology, depth to groundwater and rainfall.

15.3.4 Victorian Water Register

The Victorian Water Act requires records of all water entitlements to be recorded by the Victorian Water Register, which contains detailed water accounts. The register is the central source of information about surface and groundwater, and contains information on:

- bulk and environmental entitlements
- water shares (not applicable in the Wimmera-Mallee water resource plan area)
- water-use registrations (not applicable in the Wimmera-Mallee water resource plan area)
- take and use licences
- works licences.

The register records details about:

- ownership
- changes in ownership
- entitlement characteristics including maximum volume
- allocations to entitlements (where relevant)
- use
- carryover.

The register's water entitlement records are reconciled quarterly and finalised at the end of each financial year.

15.4 Collecting data for the accounts

15.4.1 Bulk entitlements

Each holder of a bulk or environmental entitlement must prepare and implement a metering plan that is designed to collect the data necessary to determine that the holder has complied with entitlement conditions. Entitlement holders are required to report on the volume of water taken at each offtake point. The metering plans must be prepared in accordance with the Minister's Guidelines for the Development of Bulk Entitlement Metering Programs (DSE, 2009a),

including meeting the relevant national standards.

Entitlement holders are also required to keep records collected from the metering program and provide reports to the Minister on request. Water corporations report on their take and use of water in their annual reports, which are tabled in Parliament. They are also required to include details of any non-compliance in these annual reports.

For example, GWMWater's audited annual report provides detailed reporting about water consumption, including compliance with the requirements of its bulk water entitlements (GWMWater, 2018).

15.4.2 Environmental entitlements

The Ministerial rules relating to the Victorian Environmental Water Holder (*Government Gazette*, 2014) require the VEWH to report each year on:

- the rights and entitlements in the water holdings at the end of the year
- water allocations made available
- changes in the water holdings
- the use of carryover
- water trading activity.

The VEWH annual report, which is also tabled in Parliament, contains comprehensive information about the use of environmental holdings in response to these requirements (see for example, the Victorian Environmental Water Holder Annual Report 2017-18 (VEWH, 2018b)).

15.4.3 Take and use licences

Victoria's metering policy for non-urban water supplies (Minister for Water, 2014c) includes:

Where a delegate issues, renews or approves the transfer of a licence to take water in a non-urban situation, the following conditions apply:

a. *All new licences where the water taken under the licence is to be used for irrigation or commercial purposes must be metered.*

b. *Existing licensed extraction sites must be metered if the licensed volume is –*

   i. *10 ML or greater, for surface water, or*

   ii. *20 ML or greater, for groundwater.*

c. *The obligations in paragraph (a) and (b) do not apply if, in the view of the delegated authority, a meter would be impractical or can be exempted according to the following criteria:*

   i. *Cost of metering can be shown to significantly outweigh the benefits*

   ii. *Resource management objectives can still be achieved without impacting negatively on the resource, the environment or other users*

   iii. *An exemption exists according to the Victorian Water Act.*

In these cases, the delegate must:

- *Document clearly the reasons for its view, and*
- *Identify a substitute method for estimating the volume of water taken to meet state and federal water accounting and reporting requirements.*

The above requirements do not preclude a delegate from requiring more extensive metering.

This policy is implemented through the *Minister's Policies for Managing Take and Use Licences* (Minister for Water, 2014b). These policies require details of all take and use licences to be recorded on the Victorian Water Register. Metered use is also recorded on the register.

Water corporations that provide non-urban supplies must prepare and implement metering action plans that comply with the Victorian implementation plan for the national metering standards for non-urban water meters (see clause 7.4 of the Statement of Obligations (Minister for Water, 2015b)).

15.4.4 Farm dams

No affordable method is available to measure the volume of water diverted from farm dams. There is no practicable way of metering (the mainly stock) use from these dams. The volume of water harvested by small dams is included in the Victorian Water Accounts. The estimated volume is based on the total volume of small catchment dams in a basin obtained from DELWP's sustainable diversions limits project in 2002 and flow-stressed ranking procedure project in 2005, and computer-based simulation modelling of the impact of small catchment dams on mean annual streamflow.

The estimated total water harvested by (or total impact of) small catchment dams in a basin is represented in the water balance as two separate components:

1. The estimated volume that owners extract from dams to supply their needs is accounted for as a diversion in the surface water balance. The volume extracted is based on the estimated capacity and assumed use of small catchment dams in a basin (dams are categorised as being for domestic and stock or commercial and irrigation purposes based on their estimated size).
2. The estimated volume of evaporation from small catchment dams is accounted for as a loss in the surface water balance. This volume is determined to be the difference between the estimated total water harvested (or total impact of) small catchment dams and the estimated volume extracted for use.

The method used to estimate the number and capacity of dams uses outputs from aerial photography. This dataset was wholly based on the MDBA waterbodies data prepared by Geoscience Australia in 2010 using aerial imagery from approximately 2004–05. This presented the best available information. The estimates of the number and volumes of the dams are imprecise and significant assumptions are required to convert estimates of take from the estimated volumes of the dams. These estimates are not sufficiently precise to provide accountable volumes of take.

15.4.5 Basic rights

15.4.5.1 Section 8 rights

The Victorian Water Accounts do not include estimates of the volume of water taken under the section 8 rights provisions of the Victorian Water Act, known as basic rights in the Basin Plan. The most significant use under this category is by stock drinking from unfenced waterways. There is no practicable way of estimating the volume taken and, given the relatively small volumes likely to be involved, no attempt has been made to estimate this volume.

Similarly, the use of groundwater from domestic and stock bores is not known with any precision. Records are kept of the works licences required to construct a domestic and stock bore. However, these bores are not metered and there is no record of which bores are actively used.

The number of domestic and stock bores includes all bores on the groundwater management database that are not licensed bores and that are less than 30 years old. The volume of domestic and stock use is estimated by assuming each bore uses 2 ML per year (DELWP 2016f).

15.4.5.2 Section 8A rights

The Victorian Water Accounts do not include estimates of the volume of water taken under the section 8A rights provisions of the Victorian Water Act, known as basic rights in the Basin Plan. These rights for Traditional Owners to take water under section 8A are outlined in more detail in **Part 6.2.2**. At the time of producing this report there are no circumstances of Traditional Owner groups exercising this right in the Wimmera-Mallee water resource plan area. However, this may change as a result of the implementation of the Aboriginal Water policy outlined in *Water for Victoria*. An estimate has been used for determining permitted and actual take as described in **Appendix C**.

15.5 Information related to take

The Basin Plan requires the best estimate of the total long-term annual average quantity of surface water taken that is measured and not measured in the Wimmera-Mallee Water resource plan area.

10.44(a) Surface water

In respect of the relevant class of water access right available in the Wimmera-Mallee (surface water) water resource plan area, the best estimate long-term annual average quantity of water taken that is measured is

a. bulk entitlement for take from regulated rivers and from watercourses 66,874 ML; and

b. take and use licences for take from watercourses 4,928 ML.

Groundwater

In respect of take by take and use licence in the Wimmera-Mallee (groundwater) water resource plan area, the best estimate for the long-term annual average quantity of water taken that is measured 68,880ML.

10.44(b) Surface water

In respect of the relevant water access rights, the long term annual average quantity of water taken in the Wimmera-Mallee (surface water) water resource plan area that is not measured:

a. take and use licence for take by runoff dams and registration licences for take by runoff dams 13,100 ML

b. basic rights for take by runoff dam 11,000 ML

c. basic rights for take from regulated rivers and from watercourses that are not regulated rivers 1,135 ML.

Groundwater

In respect of take under basic rights in the Wimmera-Mallee (groundwater) water resource plan area, the best estimate of the take that is not measured is 1,280 ML.

10.44(c) The quantities identified under sections 10.44(a) and 10.44(b) of the Basin Plan were calculated in accordance with the methods for determining the baseline diversion limit as prescribed by the Basin Plan.

15.6 Improving measuring

Stream gauges are maintained by water corporations and DELWP according to national standards. Meters are installed and maintained by water corporations according to national standards. Non-urban metering is being progressively upgraded consistent with the national metering standards for non-urban water meters.

The Victorian Government has made the following commitments in *Water for Victoria* (actions 8.4 and 8.11) to improve water use information (DELWP 2016d):

- *monitor and report on the impact of water use on other users and the environment, and report on significant uses of water in the annual Victorian Water Accounts*
- *periodically review the long-term risks to Victoria's water resources through mechanisms such as long-term water resource assessments and sustainable water strategies*
- *work with water corporations and catchment management authorities to:*
  - *continue to invest in ongoing statewide surface water and groundwater monitoring networks*
  - *improve the quality and accuracy of monitoring data through investment in infrastructure upgrades and new technologies to receive more timely data*
  - *strengthen water resource assessments and modelling by including up-to-date information on catchment characteristics to better understand water availability, use and climate change.*

These actions are ongoing and will be reported through *Water for Victoria* implementation progress reports.

10.45(1) Victoria has committed to the following measures under *Water for Victoria* for maintaining and, where practicable, improving the proportion of take that is measured in the water resource plan area, and the standard to which take is measured by:

a. Implementation Plan under the Basin Compliance Compact to improve metering against the National Standard for metering in accordance with the approved exemptions published in under Action 3.1 (including Actions 3.2-3.5) and supported by Actions VIC 3.1-3.7

b. maintenance of stream gauges by water corporations and DELWP according to national standards

c. installation and maintenance of meters by water corporations according to national standards

d. upgrades to non-urban metering according to the *National Metering Standards for Non-Urban Water Meters*

e. continued investment in ongoing Statewide surface water and groundwater monitoring networks

f. investment in infrastructure upgrades and new technologies to improve the quality, accuracy and timeliness of monitoring data; and

g. investigation into the introduction of a reasonable use limit for domestic and stock rights to improve monitoring and reporting of the quantity of water used under these rights.

10.45(2) These measures will be implemented over the next 10 years.

15.7 Monitoring water resources

In relation to reporting obligations under section 13.14 of the Basin Plan, Schedule 12 lists 21 matters that states, the MDBA, Commonwealth Environmental Water Holder and the relevant Commonwealth department must report on, annually or five yearly. From this list, Basin states are required to report on 13 of the matters, and monitoring of water resources is relevant to eight of these (matters 4, 8, 9, 10, 12, 14, 18 and 19).

15.7.1 Current Monitoring to meet Basin Plan requirements

Table 59 shows the undertaken to meet the accreditation requirements of the Basin Plan. Four core matters require monitoring of water resources in order to report against them:

- Matter 8 – Achievement of environmental outcomes at an asset scale
- Matter 9 – Identification of environmental water and monitoring of its use
- Matter 12 – Progress towards water quality targets
- Matter 19 – Compliance with water resource plans.

10.46 **Table 59: Monitoring of water resources of the Wimmera-Mallee water resource plan area that will enable Victoria to fulfil its reporting obligations under section 13.14.**

Matter	Relevant indicators	What will be reported	Monitoring to fulfil reporting obligations
8	Asset-scale indicators will be developed by Basin states following the development of objectives and targets for long-term watering plans and annual priorities using the Environmental Management Framework	Report on achievement of environmental outcomes at an asset scale as per indicators in the long-term watering plan	Victoria undertakes the following monitoring to evaluate its long-term watering plan targets: • ecological monitoring of rivers through the Victorian Environmental Flows Monitoring and Assessment Program (VEFMAP) and the Native Fish Report Card • ecological monitoring of wetlands through the Wetlands Monitoring and Assessment program for environmental flows (WetMAP) • Victoria's Regional Water Monitoring Partnerships program (water quality and hydrology) • CMA monitoring related to long-term watering plan objectives. To report against Matter 8, Victoria will also use data from the following Commonwealth funded programs: • Murray-Darling Basin Fish Survey (MDBFS)
9	9.1 Volume of water that was available for the identification and accounting of held environmental water (HEW)	Volume of HEW entitlements by SDL resource unit Carryover and forfeiture of HEW by SDL resource unit Volume of HEW used by SDL resource unit	Monitored through the Victorian Water Register which records all water allocated in Victoria.

continued

Matter	Relevant indicators	What will be reported	Monitoring to fulfil reporting obligations
	9.2 Volume of planned environmental water that was available	There is no planned environmental water in the Wimmera-Mallee water resource plan area	N/A
	9.3 Purpose and consequences of environmental water use	This indicator has been excluded	Monitoring of the use of held environmental water is managed through the Victorian Water Register. Monitoring of the impact of use of held environmental water is managed through monitoring done for Matter 8 outlined above.
12	12.1 Implementation of measures identified in water quality management (WQM) plans (Basin Plan s.10.33)	A summary of the implementation of measures set out in the WQM plan in each water resource plan area	Monitoring to be undertaken is detailed in **Part 6** of the Water Quality Management Plan
	12.3 The number and severity of blue-green algae and blackwater events	An analysis of the frequency, duration and extent of blue-green algae and blackwater events	Blue-green algae monitoring to be undertaken by GWMWater as part of the Major Storages Operational Monitoring Program. Victoria does not currently monitor blue-green algae for recreational water quality unless notified of a possible problem (reactionary monitoring only.)
19	The MDBA does not propose reporting beyond the Statements of Assurance as agreed in the Implementation Agreement	Statement of Assurance	The monitoring outlined above will contribute to reporting on compliance with the Wimmera-Mallee Water Resource Plan. The Victorian Water Register will provide the relevant information relating to permitted and actual take. Monitoring to be undertaken is that required to measure compliance against the tasks under the Statement of Assurance.

10.46 The remaining four matters will be informed by the monitoring conducted for the purposes of the matters listed in **Table 59**. These four matters relate to:

a. Matter 4 - the effectiveness of the management of risks to Basin water resources (informed by monitoring of Matters 8, 9 and 12)

b. Matter 10 - implementation of the environmental management framework (informed by Matter 8)

c. Matter 14 - the implementation of the water quality and salinity management plan including to the extent to which regard is had to the targets in Chapter 9 of the Basin Plan when making flow management decisions (informed by Matter 12)

d. Matter 18 - the efficiency and the effectiveness of the operation of water resource plans, including in providing a robust framework under a changing climate (informed by Matters 8, 9, 12 and 19).

In Victoria the VEWH reports on its environmental watering in its annual publication, *Reflections*. The publication outlines the following:

- Carryover and trade that occurred during the year
- Volume of water delivered by region and by site
- Environmental outcomes resulting from the water delivered.

The VEWH undertakes monitoring, investigations and research projects that test assumptions and address knowledge gaps to improve on-ground adaptive management of environmental water. The VEWH's investment generally focuses on short-term projects with a defined question of interest, for example projects to improve understanding of the volume, magnitude or timing of flows that will improve outcomes achievable with the environmental water that is available. The VEWH's investment aims to be complementary to the investments in longer-term and broader-scale monitoring made by partner agencies such as DELWP (VEFMAP, WETMAP), MDBA (Environmental Water Knowledge and Research project) and CEWH (Long-Term Intervention Monitoring project). The VEWH also invests in small-scale complementary works and measures to improve outcomes achievable with environmental water.

In contributing to Victoria's Basin Plan obligations, each year VEWH reports on water use and alignment of outcomes with MDBA annual watering priorities. The results of monitoring and investigations supported by VEWH and its partner organisations contribute to building a comprehensive picture of the ecological benefits of environmental watering and inform reporting towards Basin Plan outcomes.

VEWH's publications can be found its website at: **http://www.vewh.vic.gov.au/news-and-publications/publications**

15.7.2 Proposed improvements to monitoring

To further support reporting against Matter 8 of Schedule 12 of the Basin Plan Victoria is currently working on the development of:

- an approach for monitoring the hydrological, physical or ecological response to environmental watering (WetMap);
- Aboriginal Waterways Assessment tool which is a methodology under development that can assess the cultural health of waterways and the outcomes of environmental watering.

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Glossary

*Definitions in italics have been sourced from Commonwealth documents such as the Commonwealth Water Act, the Murray-Darling Basin Plan and the *Handbook for Practitioners: Water Resource Plan Requirements* issued by the Murray-Darling Basin Authority

Aboriginal Victorians	An Aboriginal Victorian is a person of Aboriginal descent who identifies as an Aboriginal and is accepted as such by the Victorian Aboriginal community in which he or she lives.
above cap water	The water available above limits on consumptive volumes of surface water and groundwater. It includes unregulated flows which cannot be kept in storage.
adaptive management	In the Murray-Darling Basin Plan, adaptive management is taken to include the following steps: (a) setting clear objectives (b) linking knowledge (including local knowledge), management, evaluation and feedback over a period of time (c) identifying and testing uncertainties (d) using management as a tool to learn about the relevant system and change its management (e) improving knowledge (f) having regard to the social, economic and technical aspects of management.
algal bloom	A rapid increase in the population of algae that can occur in waterways, often caused by excess nutrients (particularly phosphorus and nitrogen).

continued

allocation	An allocation is: (a) water that is actually available to use or trade in any given year, including new allocations and carryover (b) the water that is actually in the dam in any given year is allocated against the relevant bulk entitlement and environmental entitlement (or water share where these have been issued). The seasonal allocation is the percentage of volume available under current resource conditions, as determined by the resource manager. For example, in a dry year a 50% allocation of a 100 ML bulk entitlement would allow for 50 ML of water available to use or trade. A 100% allocation that the full volume is available. The resource manager uses seasonal determination instead of allocation when allocating water to entitlements. Seasonal determination is the term used in bulk entitlements and the Victorian Water Act in relation to water shares. Note: there are no water shares in the Wimmera-Mallee water resource plan area.
annual actual take	In the Murray-Darling Basin Plan annual actual take has the meaning given in section 6.10.
annual environmental watering priorities	In the Murray-Darling Basin Plan annual environmental watering priorities has the meaning given in section 8.23.
annual permitted take	In the Murray-Darling Basin Plan annual permitted take has the meaning given in section 6.10.
ANZECC Guidelines	*The Australian and New Zealand Guidelines for Fresh and Marine Water Quality* published by the Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand in 2000.
aquifer	An underground layer of rock or sediment that holds water and allows water to flow through it.
aquitard	An underground layer of clay, silt or rock with low permeability which restricts the movement of groundwater between aquifers.
assets	Assets are resources that provide benefit. This includes, for example, infrastructure such as treatment plants, pipes and pumps, water assets such as dams, bores and wetlands, and community assets such as sporting facilities, public gardens and street trees. Natural assets are assets of the natural environment, for example waterways and vegetation, also known as natural capital.
Australian Drinking Water Guidelines	Published by the National Health and Medical Research Council and the Natural Resource Management Ministerial Council in 2011.

continued

Australian height datum	In 1971 the mean sea level for 1966–68 was assigned the value of zero on the Australian height datum at 30 tide gauges around the coast of the Australian continent. The resulting datum surface, with minor modifications in two metropolitan areas, was termed the Australian height datum and was adopted by the National Mapping Council of Australia as the datum to which all vertical control for mapping is to be referred. Elevations quoted using this datum are normally followed with the acronym 'AHD'.
Australian National Committee on Large Dams	A voluntary association of organisations and individual professionals with an interest in dams in Australia.
Authority	An authority in relation to a bulk entitlement holder under the Victorian Water Act, includes a water corporation, the Minister for Environment and Climate Change, and a power generation company.
barriers	Artificial instream structures, such as dams, weirs, causeways and culverts that restrict the migration and movement of fish or other biota and can interrupt transport of organic material and sediment.
baseline	Conditions regarded as a reference point for the purpose of comparison.
baseline diversion limit	In the Murray-Darling Basin Plan the baseline limit of take from a SDL resource unit is: (a) for a surface water SDL resource unit – the quantity of water calculated in accordance with column 2 of the table in Schedule 3 for that SDL resource unit; and (b) for a groundwater SDL resource unit – the quantity of water specified in column 3 of the table in Schedule 4 for that SDL resource unit.
basic right	In the Murray-Darling Basin Plan a basic right means any of the following: (a) a right under state water management law to take water for domestic or stock purposes (b) a harvestable right under the *Water Management Act* 2000 (New South Wales) (c) a Native Title right.
Basin (river basin)	The area of land into which a river and its tributaries drain. In the Victorian Water Accounts, river basins are consistent with those defined by the Australian Water Resources Council. The exception is the Murray Basin which, for the purposes of this report, includes the Upper Murray Basin as defined by AWRC and areas in Victoria supplied from the River Murray downstream of Lake Hume.
Basin annual environmental watering priorities	In the Murray-Darling Basin Plan the basin annual environmental watering priorities has the meaning given in section 8.27.

continued

Basin Plan	The Basin Plan 2012 made under the Commonwealth Water Act that was registered on the Federal Register of Legislative Instruments on 23 January 2017 with reference F2017C00078.
Basin state	For the purposes of the Basin Plan, the Basin states are defined in the Commonwealth Water Act as New South Wales, Victoria, Queensland, South Australia and the Australian Capital Territory.
Basin water resources	Under the Commonwealth Water Act, Basin water resources are within or beneath the Murray-Darling Basin, but do not include water resources within or beneath the Basin that are prescribed by the regulations, or groundwater that forms part of the Great Artesian Basin.
Basin-wide environmental watering strategy	In the Murray-Darling Basin Plan the Basin-wide environmental watering strategy has the meaning given in section 8.13.
beneficial use	The use to which water resources are applied including environmental, consumptive, Aboriginal and social.
best available information and methods	Those methods expertly judged to be the most appropriate and technically sound for the purpose. These judgements may be informed by peer review. If there is no available knowledge or analysis, it is expected that water planning agencies will use their own expertise to reach a position or seek expert advice from reputable sources.
biodiversity	The numbers and variety of plants, animals and other living beings, including microorganisms, across our land, rivers and oceans. It includes the diversity of their genetic information, the habitats and ecosystems in which they live and their connections with other life forms.
blackwater	Occurs when accumulations of organic matter, such as leaves, twigs and nutrients, decays in wetlands or waterways after being washed in by a flood, drawing oxygen from the water. The water turns to a black colour and can have a very low level of dissolved oxygen, which can cause stress to fish, crayfish and other animals.
bore	Usually a hole constructed by a licensed driller to reach groundwater. Bores can also include a well or artificial excavation. Any person who wants to drill a bore must have a works licence.
brackish water	Water that is saltier than freshwater, but not as salty as seawater. It may result from the mixing of seawater with freshwater, as in estuaries.

continued

bulk entitlement	The right to water held by the Authorities defined in section 34 of the Victorian Water Act. A bulk entitlement sets the volume of water from a river or storage to which an Authority is entitled, and may include the rate at which it may be taken and the reliability of the entitlement. Bulk entitlements also define a right to use and supply water in a waterway, water in storage works of a water corporation, and groundwater. A bulk entitlement sets out the volume of water that can be taken or stored under specific conditions or specifications, up to a maximum volume. Water corporations and other specified bodies defined in the Victorian Water Act can hold bulk entitlements, as a source bulk entitlement (an entitlement to harvest water directly from a water source) or a delivery bulk entitlement (an entitlement to be supplied water from another water corporation's dam or within a system regulated by the works of another corporation). Bulk entitlements can be traded temporarily or permanently.
bulk entitlement conversion order	The statutory instrument used to issue a bulk entitlement under the provisions of section 47 of the Victorian Water Act where the entitlement holder had a long standing legal right to water in a waterway.
bulk entitlement holder	Water corporations, the Victorian Environmental Water Holder and other bodies specified in the Victorian Water Act, such as electricity generation companies, can hold a bulk entitlement. Bulk entitlement holders have to meet conditions and obligations set out under the Act and in their bulk entitlements.
bundled entitlement	A take and use licence that allows the take and use of water.
cap	An upper limit for the diversion of water from a waterway, catchment, basin or aquifer.
Cap (the Cap on diversions)	A limit, implemented in 1997, on the volume of surface water that can be diverted from rivers for consumptive use. Under the Basin Plan, the Cap will be replaced by long-term average sustainable diversion limits.
carryover	An authorisation by the Minister for Water that allows irrigators to manage their water entitlement more flexibly by taking a portion of water unused in one season in the next water season.
catchment	The region from which all rainfall flows, other than that removed by evaporation, into waterways and then to the sea or terminal lake.
catchment dam	A pond, lake or basin, whether natural or artificial, for the storage, regulation and control of water in an area of land where runoff from rainfall goes into one river system.

continued

catchment management authorities (CMAs)	Statutory bodies established under the *Catchment and Land Protection Act 1994*. CMAs have responsibilities under both that Act and the Victorian Water Act for river health; regional and catchment planning and coordination; and waterway, floodplain, salinity and water quality management.
cause	An event that can lead to a threat.
climate change	An extended period (typically decades or longer) where there is a statistically significant change to the expected characteristics (averages and/or variability) of a region's climate.
commercial plantation	In the Murray-Darling Basin Plan a commercial plantation means an area of land on which perennial woody plants are planted primarily for commercial purposes (other than the production of food). Some examples of commercial purposes are the production of timber, woodchip, oil or biofuel, or the commercial exploitation of the carbon sequestration capacity of the plants.
Commonwealth Water Act	Means the *Water Act 2007* (Commonwealth). The legislation that established the Murray-Darling Basin Authority to manage the Basin's water resources and prepare the Basin Plan. It also established the Commonwealth Environmental Water Holder to manage the Commonwealth's environmental water, charged the Australian Competition and Consumer Commission to develop and enforce water charges and water market rules, and gave the Bureau of Meteorology powers to collect and publish water information.
community	Includes individuals, public and private landholders, community groups and business owners.
condition of water resource	Includes the water quality and the health of water-dependent ecosystems and condition of the physical habitats.
connectivity	Connections between natural habitats, such as a river channel and adjacent wetland areas. Connectivity is a measure or indicator of whether a waterbody (river, wetland, floodplain) has water connections or flow connections to another body.
consequence	The impact of a threat on a beneficial use of water.
consistent	Agreeing or accordant; compatible; not self-opposed or self-contradictory.
constraints	Anything that affects the delivery of environmental water. It can include physical aspects such as low-lying bridges or river channel capacity, but can also include operational aspects such as river rules or operating practices that impact on when and how much water can be delivered.
consumption	Water that is provided for all human uses; that is, non-environmental water.
consumptive entitlement	A water entitlement that permits the holder to use the water taken under the entitlement for the purposes of consumption.

continued

consumptive use	Use of water for irrigation, industry, urban, domestic and stock use, or for other private consumptive purposes.
Country	Aboriginal culture revolves around relationships to the land and water. For Traditional Owners, Country is a part of who they are, just as they are a part of it.
critical human water needs	Under the Commonwealth Water Act, the minimum volume of water required to meet core requirements of communities dependent on Basin water resources. The definition also includes non-human requirements that, if not met, would cause prohibitively high social, economic or national security costs. In Victoria, as a matter of practise, this means the volume of water required to supply Stage 4 restricted demand in urban areas, supply domestic and stock needs and operate the distribution system to deliver that water.
Crown land	Land that is owned by the Crown. Often referred to as public land (although not all public land is actually Crown land).
declared water system	A water system that has been declared in accordance with section 6A of the Victorian Water Act. In these water systems, the old water rights and take and use licences have been converted into unbundled entitlements (water shares and associated products). Current declared water systems are: Broken, Bullarook, Campaspe, Goulburn, Loddon, Murray and Ovens, which were all declared in July 2007, and the Werribee and Thomson/Macalister (July 2008). This is no declared water system in the Wimmera-Mallee water resource plan area.
delivery bulk entitlement	Provides a set volume of water each year to the entitlement holder, subject to defined rules for restricting supply during periods of water shortages.
delivery system/ network	The infrastructure or river system that enables water to get to entitlement holders. This means an irrigation area, or for a river reach for private diverters, a catchment or aquifer.
dissolved oxygen	The oxygen dissolved in water and freely available for use by aquatic organisms. It is vital for the survival of fish, invertebrates, bacteria, and underwater plants.
distribution system operating water	Water used to operate the irrigation distribution system from river off-take to the farm gate, including evaporation, seepage, leakage, outfalls and meter error (see also system operating water).
diversions	The removal of water from a waterway; for example, via a pump.
domestic and stock	Water used in households and for pets, other animals, fire prevention, and for irrigating a kitchen garden.
drought response plans	Used by urban water corporations to manage water shortages, including implementation of water restrictions.
Drought Support Fund	A $10 million cross-government initiative to provide support to drought-affected farmers.

continued

ecological objective	Under the Basin Plan an ecological objective means an objective for the protection, and if necessary restoration, of a priority environmental asset or ecosystem function.
ecological target	Under the Basin Plan an ecological target means a target that must be met in order to achieve an ecological objective.
ecosystem	A dynamic complex of plant, animal, fungal and microorganism communities and the associated non-living environment interacting as an ecological unit.
efficiency measure	These measures provide more water for the environment by making water delivery systems for irrigation more efficient. This can include replacing or upgrading on-farm irrigation, or lining channels to reduce water losses within an irrigation network.
electrical conductivity	Expressed in microsiemens per centimetre (µS/cm). Water and soil salinity levels are measured by passing an electric current between the two electrodes of a salinity meter. Electrical current (EC) is influenced by the concentration and composition of dissolved salts. Salts increase the ability of a solution to conduct an electric current, so a high EC indicates a high salinity level. Freshwater above 800 EC becomes marginal for drinking, above 1,600 EC it is brackish, and above 4,800 EC it is saline.
entitlement (or water entitlement)	Authorisation to take water issued in accordance with the Victorian Water Act. It includes bulk entitlements, environmental entitlements, water shares, and surface water and groundwater licences (also known as take and use licences). In Victoria, a take and use licence is a right to take water and which may be limited by conditions. Different entitlements are necessary depending on where and how water is taken, and what it is used for. The most common types of entitlements for individuals are water shares, and take and use licences. These are included in the definition of water access right in the Commonwealth Water Act.
environment	Surroundings in which an organisation operates including air, water, land, natural resources, flora, fauna, humans and their interdependence.
environmental asset (in the context of the 'asset-based approach')	A spatially defined, biophysical component of the environment (for example, a river reach, an estuary or an individual wetland or wetland complex) that has particular values associated with it.
environmental contribution	Funds collected by water corporations under the *Water Industry Act 1994* to promote the sustainable management of water or address adverse water-related environmental impacts.

continued

environmental entitlement	A right to take water granted to the Victorian Environmental Water Holder to maintain an environmental water reserve or to improve the environmental values and health of the water ecosystems and other users depending on the condition of the environment. The *Water (Resource Management) Act 2005* amended the Victorian Water Act and created the foundation for water to be set aside to maintain environmental values of rivers and streams. The Minister for Water issues environmental entitlements under the Act so that water can be managed to meet environmental needs including fish-spawning or maintaining critical habitats during drought.
environmental flow	Any river flow pattern provided with the intention of maintaining or improving river health. In practice in Victoria this means the streamflow required to maintain appropriate environmental conditions in a waterway.
environmental flow studies	The study of the flow requirements of a particular basin's river and wetland systems used to inform policy decisions on the management and allocation of water resources.
environmental manager	The government agency, such as the Department of Environment, Land, Water and Planning or catchment management authority, responsible for environmental outcomes for a relevant waterway.
environmental water	Water to support environmental values and ecological processes.
environmental water requirements	The volume of water needed to meet an ecological or environmental objective.
environmental water reserve	The share of water resources set aside to maintain the environmental values of a water system and other water services that depend on the environmental condition of the system.
environmental watering plan	A plan to restore and sustain the wetlands and other environmental assets of the Murray-Darling Basin and to protect biodiversity dependent on the Basin's water resources.
environmental watering requirements	Under the Basin Plan, environmental watering requirements means the environmental watering requirements of a priority environmental asset or priority ecosystem function, as the case may be, identified using the methods set out in Part 5 of Chapter 8.
environmentally sustainable level of take	Defined by section 4 of the Commonwealth Water Act as the level at which water can be taken from a water resource which, if exceeded, would compromise: (a) key environmental assets of the water resource, or (b) key ecosystem functions of the water resource, or (c) the productive base of the water resource, or (d) key environmental outcomes for the water resource.

continued

estimate	To form an approximate judgement or opinion regarding the value, volume, size, weight, etc. of; calculate approximately. The key requirements for an estimate to be made are that it needs to be done by a competent and experienced person; it needs to be capable of being estimated and needs to be reasonable; and it needs to be revised from time to time in the light of available information.
evaporation	The process by which water changes from a liquid to a gas or vapour.
evapotranspiration	The sum of transpiration by plants, evaporation from soil and open water surfaces, and evaporation from the wet surfaces of plants soon after rainfall.
extraction licence	Better referred to as a works licence, or a works operating licence.
farm dam	An on-farm water storage managed by the landowner or occupier.
fit-for-purpose (water quality)	Water of a quality that is appropriate for its intended use.
floodplain	Low-lying land next to a river or stream with unique ecosystems dependent on overflow from flooding.
floodplain harvesting	The taking of water from a floodplain, including after it leaves a watercourse during a flood.
flow	Movement of water – the rate of water discharged from a source, given in volume with respect to time.
flow regime	The range of flows experienced by a waterway throughout the seasons and years, which may include base flows, low flows, high flows, overbank flow and cease to flow (drying) events.
form of take	In the Murray-Darling Basin Plan form of take means any of the following: (a) take from a watercourse (b) take from a regulated river (c) take by floodplain harvesting (d) take by runoff dams (e) net take by commercial plantations (f) take from groundwater (g) take under basic rights.
Gariwerd	The Aboriginal peoples' place name for the Grampians.
gigalitre	One thousand megalitres or one billion (1,000,000,000) litres.
greywater	Household water that has not been contaminated by toilet discharge, and can be reused for non-drinking purposes. Typically includes water from bathtubs, dishwashing machines and clothes washing machines.

continued

groundwater	Water occurring naturally below ground level (in an aquifer or otherwise).
groundwater basin	A groundwater basin is made up of one or more groundwater catchments within a geological basin. The basin may extend offshore or across state boundaries. In some cases, a basin may be broken into one or more sub-basins to reflect administrative management boundaries.
groundwater catchment	A groundwater catchment is an area containing a connected groundwater resource(s), bringing together the input (recharge) areas, use (demand) areas and discharge areas.
groundwater-dependent ecosystem	Natural ecosystems that require access to groundwater to meet all or some of their water requirements in order to maintain their ecological processes.
groundwater entitlement limit	The total volume of water which can be allocated in an aquifer under licences. May be defined by a permissible consumptive volume (PCV) declared by the Minister for Water.
Groundwater Management Area (GMA)	An area where groundwater resources of a suitable quality for irrigation, commercial or domestic and stock use have been developed (or have the potential to be developed) and warrant careful management. It has a defined boundary, depth limits and a permissible consumptive volume.
groundwater management plan	A groundwater management plan is developed by rural water corporations consistent with guidelines specified by the Minister for Water, and signed off by the Minister. A groundwater management plan is for an area with a permissible consumptive volume and includes appropriate tools for management such as trading rules, triggers for restrictions and monitoring requirements.
groundwater management unit	A discrete area – either a groundwater management area, a water supply protection area or an unincorporated area – identifying an aquifer or group of aquifers.
groundwater resource	In the Murray-Darling Basin Plan a groundwater resource means a Basin water resource consisting of: (a) groundwater; or (b) an aquifer (whether or not it has water in it).
groundwater SDL resource unit	In the Murray-Darling Basin Plan a groundwater SDL resource unit has the meaning given in section 6.03.
Guidelines for Managing Risks in Recreational Water	*The Guidelines for Managing Risks in Recreational Water* published by the National Health and Medical Research Council in 2008.
habitat	The natural home or environment of an animal, plant, or other organism.

continued

have regard to	Discussed in the note in section 1.07 of the Basin Plan: A number of provisions of the Basin Plan require decision makers to "have regard to" certain matters when performing functions and making decisions. The phrase "have regard to" and similar phrases are intended to be interpreted consistent with case law, as it develops from time to time and as applied with appropriate regard to the circumstances. This note is intended to reflect the case law and not to limit its application or development. When a decision maker is required to "have regard to" particular matters, it is expected that the decision maker will give those matters proper, genuine and realistic consideration, even if not ultimately bound to act in accordance with those matters. A requirement to "have regard to" a particular matter or matters does not mean that the decision maker cannot have regard to other relevant matters.
headworks	Large dams, weirs and associated works used for the harvest and supply of water.
hectare	10,000 square metres or approximately 2.47 acres
held environmental water	Defined by section 4 of the Commonwealth Water Act as water available under: (a) a water access right, or (b) a water delivery right, or (c) an irrigation right for the purposes of achieving environmental outcomes (including water that is specified in a water access right to be for environmental use).
heritage river	A river protected in Victoria for its special features under the *Heritage Rivers Act 1992*.
high-reliability water share	An entitlement to a defined share of water as governed by the water-sharing rules. Water shares are classed by their reliability, which is defined by how often full seasonal allocations are expected to be available. Allocations are made to high-reliability water shares before low-reliability shares.
historical climate conditions	The climatic conditions for the period July 1895 to June 2009 represented by the best available records of hydrological and meteorological information for that period.
hydrogeological assessment	An assessment of the groundwater resource that has to be done before a new licence is issued or a transfer of a licence is approved.
hydrological modelling	Simplified, conceptual representations of a part of the hydrologic cycle, used primarily for prediction of water behaviour within catchments and associated water supply systems.
hydrological regime	Changes with time in the rates of flow of rivers and in the levels and volumes of water in rivers, lakes, reservoirs and wetlands. The hydrologic regime is closely related to seasonal changes in climate.

continued

hydrology	The scientific study of water and its movement, distribution and quality.
Indigenous uses	In the Murray-Darling Basin Plan Indigenous uses has the meaning given in section 10.52.
Indigenous values	In the Murray-Darling Basin Plan Indigenous uses values has the meaning given in section 10.52.
inflows	Water flowing into a storage or waterway.
instream	The component of a river within the river channel, including pools, riffles, woody debris, the river bank and benches.
integrated catchment management	The coordinated management of land, water and biodiversity resources based on catchment areas. It incorporates environmental, social, cultural and economic considerations. This approach seeks to ensure the long-term viability of natural resource systems and human needs across current and future generations.
integrated water management	A collaborative approach to planning that brings together all elements of the water cycle including sewage management, water supply, stormwater management and water treatment, considering environmental, economic and social benefits.
interception activity	Defined by section 4 of the Commonwealth Water Act as the interception of surface water or groundwater that would otherwise flow, directly or indirectly, into a watercourse, lake, wetland, aquifer, dam or reservoir that is a Basin water resource
irrigation area	A geographic area with defined boundaries where water is distributed using pipes and channels operated by a water corporation.
irrigation district	An area declared under the Victorian Water Act that is supplied with water by channels and pipelines used mainly for irrigation purposes.
levee	An embankment that is built in order to prevent a river from overflowing.
licensing authority	Administers diversion of water from unregulated waterways and extraction of groundwater on behalf of the Minister for Water. Also known as a water corporation and referred to in the Victorian Water Act as an 'Authority'.
likelihood	The combination of the probability of a cause occurring and the susceptibility of the threat to that cause.
listed threatened ecological community	In the Murray-Darling Basin Plan listed threatened ecological community has the meaning given in section 528 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).
listed threatened species	In the Murray-Darling Basin Plan Listed threatened species has the meaning given in section 528 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).

continued

local management plan or local management rules	A local management plan or local management rules have been made for many areas with a permissible consumptive volume. They refer to appropriate tools such as trading rules, triggers for restrictions and monitoring requirements. Local management plans or rules are developed and adopted by rural water corporations.
local reduction volume, for an SDL resource unit	In the Basin Plan local reduction volume, for an SDL resource unit means: (a) the quantity of water identified in column 2 of Schedule 2 as the local reduction volume for the unit; or (b) if no quantity is identified – zero.
long-term annual diversion limit	Item 7 of section 22 of the Commonwealth Water Act provides the following definition for the long-term annual diversion limit: For the water resources, or particular parts of the water resources, of each water resource plan area, the long term annual average quantities of water that may, on a temporary basis, be taken year by year from the water resources, or particular parts of the water resources, in addition to the long-term average sustainable diversion limit for those water resources or that particular part. The average is the temporary diversion provision for those water resources or that particular part. The sum of: (a) the long-term average sustainable diversion limit; and (b) the temporary diversion provision.
long-term average sustainable diversion limit	Defined by section 23 of the Commonwealth Water Act: (1) A long-term average sustainable diversion limit for the Basin water resources, for the water resources of a particular water resource plan area or for a particular part of those water resources must reflect an environmentally sustainable level of take. (2) A long-term average sustainable diversion limit for the Basin water resources, for the water resources of a particular water resource plan area or for a particular part of those water resources may be specified: (a) as a particular quantity of water per year, or (b) as a formula or other method that may be used to calculate a quantity of water per year, or (c) in any other way that the Authority (ie the MDBA) determines to be appropriate.
long-term watering plan	In the Murray-Darling Basin Plan long-term watering plan has the meaning given in section 8.18 of the Commonwealth Water Act.

continued

low flow	Flows that provide a continuous flow over the bottom of the channel, but do not fill the channel to any great depth. The term is most often used in relation to baseflows that occur over the drier periods of the year that are sustained for some period (weeks to months), due to short bursts of rain.
lowland	Lowland rivers and streams are slow flowing and found in relatively flat areas.
low-reliability water share	A water share with a relatively low reliability of supply. In northern Victoria, these shares are allocated from the available water once there is enough water to meet higher-reliability water shares in the current year, and, with minimum inflows, to meet higher-reliability water shares in the following year.
macroinvertebrate	An animal without a backbone that is large enough to be seen without magnification.
major storages	In the Murray-Darling Basin Plan major storage has the meaning given in clause 2 of the Murray-Darling Basin Agreement that is: "Lake Victoria, the Menindee Lakes Storage and the storages formed by Dartmouth Dam and Hume Dam."
megalitre (ML)	One million (1,000,000) litres.
Millennium Drought	The drought in Victoria from 1997 to 2009.
modelling	Application of a mathematical process or simulation framework (such as a mathematical or econometric model) to describe various phenomena and to analyse the effects of changes in some characteristics on others.
Murray Lower Darling Rivers Indigenous Nations (MLDRIN)	A confederation of 24 Indigenous Australian nations in the southern part of the Basin, comprising representatives of the Barapa Barapa, Barkindji, Dhudhuroa, Dja Dja Wurrung, Latji Latji, Maraura, Mutti Mutti, Nari Nari, Ngarrindjeri, Ngintait, Nyeri Nyeri, Tatti Tatti, Taungurung, Wadi Wadi, Wamba Wamba, Waywurru, Wegi Wegi, Wergaia, Wiradjuri, Wolgalu, Wotjobaluk, Yaitmathang, Yita Yita and Yorta Yorta peoples.
Murray-Darling Basin cap	The climatically adjusted limit on surface water diversions in the Murray-Darling Basin, agreed by a Ministerial Council under the Murray-Darling Basin Agreement.
Nephelometric Turbidity Unit	A measure of turbidity in water
net take	In the Murray-Darling Basin Plan, in the context of a commercial plantation, net take is the difference between the take by a commercial plantation and the take by the vegetation existing at the plantation site before the plantation commenced.
overbank flows	Flows that spill over the channel on to the floodplain.

continued

passing flow	Flows that a water corporation must allow to pass at a dam or weir before it can take any water for consumptive use. Passing flow requirements are specified as obligations in bulk entitlements, and entitlement holders must report on their compliance with these requirements.
pathogens	Disease-causing microorganisms, such as bacteria, fungi and viruses, found commonly in sewage, hospital waste, runoff water from farms, and in water used for swimming.
per cent full	The volume of water in storage as a percentage of the accessible storage capacity. Note that the percentage full may exceed 100, for example due to floods.
permanent trade	Permanent transfer of a bulk entitlement, water share or licence.
permissible consumptive volume (PCV)	The total volume of water that can be taken in a specified water system. A permissible consumptive volume, or PCV, is declared by the Minister by Order published in the *Victoria Government Gazette*. PCVs can apply to surface water, groundwater or both.

continued

planned environmental water	Section 6 of the Commonwealth Water Act states: (1) For the purposes of this Act, planned environmental water is water that: (a) is committed by: (i) the Basin Plan or a water resource plan for a water resource plan area; or (ii) a plan made under a State water management law; or (iii) any other instrument made under a law of a State; to either or both of the following purposes: (iv) achieving environmental outcomes; (v) other environmental purposes that are specified in the plan or the instrument; and (b) cannot, to the extent to which it is committed by that instrument to that purpose or those purposes, be taken or used for any other purpose. (2) For the purposes of this Act, planned environmental water is water that: (a) is preserved, by a law of a State or an instrument made under a law of a State, for the purposes of achieving environmental outcomes by any other means (for example, by means of the setting of water flow or pressure targets or establishing zones within which water may not be taken from a water resource); and (b) cannot, to the extent to which it is preserved by that instrument for that purpose or those purposes, be taken or used for any other purpose. (3) The water may be committed to, or preserved for, the purpose or purposes referred to in paragraph (1)(a) or (2)(a) either generally or only at specified times or in specified circumstances. (4) Without limiting paragraph (1)(b) or (2)(b), the requirements of paragraph (1)(b) or (2)(b) are taken to have been met even if the water is taken or used for another purpose in emergency circumstances in accordance with: (a) the instrument referred to in that paragraph; or (b) the law under which the instrument is made; or (c) another law.
point source	Any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack.
potable	Water of suitable quality for drinking.
pre-release	Controlled releases from a storage made on the expectation that forecast inflows will replenish the volume released. Pre-releases are used to control the rate of discharge and to provide some space in the dam to capture floodwaters.

continued

priority ecosystem function	In the Murray-Darling Basin Plan priority ecosystem function has the meaning given in section 8.50.
priority environmental asset	In the Murray-Darling Basin Plan priority environmental asset has the meaning given in section 8.49.
private right	The Victorian Water Act allows individuals to take water for domestic and stock purposes from a range of surface water and groundwater sources without a licence in specified circumstances. These domestic and stock rights are defined under section 8(1) and section 8(4)(c) of the Act.
probability	The chance that a cause will occur.
qualification of rights	The Minister for Water has the power (under section 33AAA of the Victorian Water Act) to qualify rights to water temporarily to maintain essential supplies where the Minister has declared that a water shortage exists in an area or water system. Where the water shortage is due to a long-term change to water availability, a permanent qualification of rights may be declared under section 33AAB of the Act but only following a long-term water resources assessment which finds the long-term water availability will have a disproportionate effect on water allocated for consumptive purposes or the Environmental Water Reserve.
rainwater	Water that has fallen as rain or has been collected from rainfall.
Ramsar Convention	Defined by section 4 of the Commonwealth Water Act as the Convention on Wetlands of International Importance, especially as Waterfowl Habitat done at Ramsar, Iran, on 2 February 1971.
Ramsar site	Wetlands of international importance, designated under the Ramsar Convention.
Ramsar wetlands	Wetlands of international importance, designated under the Ramsar Convention.
raw water	In the Murray-Darling Basin Plan raw water is water in its natural state prior to any treatment.
reach	A length of stream, typically 20 to 30 km, which is relatively homogenous with regard to the hydrology, physical form, water quality and aquatic life.
REALM model	A computer-based water supply system model used by DELWP in the allocation of Victoria's water resources. It is an abbreviation of REsource ALlocation Model.
recharge (groundwater)	The process where water moves downward from surface water to groundwater due to rainfall infiltration or seepage/ leakage.
reconfiguration or decommissioning work	Under the Murray-Darling Basin Plan reconfiguration or decommissioning work has the meaning given in section 12.29.

continued

recovery of environmental water	Under the Murray-Darling Basin Plan recovery of environmental water means the acquisition of a water access right for the purpose of achieving an environmental outcome.
recreational benefits or recreational values	The objectives and benefits that recreational users and community members associate with the use of water, reservoirs and waterways for recreational activities. These objectives and benefits include wellbeing and enjoyment, derived from social interaction, physical activity and relaxation associated with activities including sporting events, fishing, water skiing and rowing, camping, walking and gathering with friends and family. It also includes flow-on economic benefits to local communities from visitors to regional areas to make the most of these opportunities.
recreational fishing	Fishing of aquatic animals (mainly fish) for pleasure or competition.
recreational users	Victorians and other visitors that use Victorian waters for fishing, water skiing, rowing, camping, walking, bird watching, sporting events, social gatherings and other activities on or near waterways.
recreational water	Water allocated in a regulated water system for recreational purposes.
recycled water	Water (derived from sewerage systems or industry processes) that is treated to a standard appropriate for its intended use.
refuge	Areas where plants and animals can take refuge, during times of climatic or biological stress and which support the individuals that will recolonise the surrounding landscape when conditions improve. Refuges provide conditions suitable for survival of species that may be declining elsewhere.
registration licence	A registration licence is an ongoing entitlement to take and use water from a catchment dam, spring or soak. Registration licences were issued between 1 July 2002 and 30 June 2003 based on historical use of water. Registration licences are not tradeable.
regulated flows/ systems	Systems where the flow of the river is regulated through the operation of large dams or weirs.
regulated river	A river containing structures such as dams or major diversion weirs which control the flow of water in the river for licensed diverters or users in an irrigation district.
regulated system	Systems where the flow of the river is regulated through the operation of large dams or weirs.
reliability	Water shares are classed according to their reliability, which is defined by the frequency with which full seasonal allocations are expected to be available. Most water shares are classified as high-reliability or low-reliability water shares.
reservoir	Natural or artificial dam or lake used for the storage and regulation of water.

continued

resource manager	The Minister for Water may appoint a resource manager to allocate water on regulated river systems in accordance with Victorian water-sharing rules. A resource manager makes seasonal determinations for regulated water systems based on water availability and water-sharing rules. The resource manager is usually the water corporation responsible for that area.
restrict	In relation to trade, includes refuse, prevent, deter, delay or impose a condition or a barrier on, and restriction has a corresponding meaning.
reticulated supply	The network of pipelines or channels used to deliver water to end users.
return flows	The portion of water that 'returns' to the river (or water supply) system after a watering event.
riparian	Refers to land or vegetation that adjoins a river, creek, estuary, lake or wetland.
risk	The product of the likelihood and consequence. For the purpose of the risk assessment conducted when developing the water resource plan, it is the combination of the impact of a cause on a threat and the impact of a threat on a beneficial use.
river	Large stream of water flowing to the sea, a lake, a marsh or another river.
river basin	The land into which a river and its tributaries drain. See also 'basin'.
River Murray system	The River Murray system extends from Hume Dam, at Albury, New South Wales, downstream to the Coorong, Lower Lakes and Murray Mouth in South Australia. It includes connected anabranches, creeks and major tributaries such as the Murrumbidgee, Edward-Wakool, Kiewa, Ovens, Goulburn, Broken, Campaspe, Loddon, Avoca and the lower Darling River (south of Menindee Lakes). The system is highly regulated and requires complex river management operations.
river operating water	Water used to operate regulated rivers (in accordance with bulk entitlements) and deliver water to off-take points for distribution systems, including evaporation, seepage and water to provide passing flows for riparian rights and maintain environmental and other assets.
runoff	Precipitation or rainfall that flows from a catchment into streams, lakes, rivers or reservoirs.
runoff dam	In the Murray-Darling Bain Plan a runoff dam means a dam or reservoir that collects surface water flowing over land. In New South Wales, a runoff dam may also collect water from a first- or second-order stream.
salinity	The total volume of water-soluble salts present in the soil or a stream.

continued

salt interception scheme	Large-scale groundwater pumping and drainage projects that intercept saline groundwater inflowing to rivers, and dispose of the saline waters by evaporation and aquifer storage at more distant locations.
scenario	When performing the risk assessment, a range of possible future situations that affect whether a cause is realised was developed and applied. The criteria adopted include: a plausible scenario that produces the highest risk (e.g. extreme drought); and an extrapolation of past trends (e.g. farm dams, land use); or scenarios that are adopted in recognised literature (e.g. median climate change).
SDL resource unit	In the Murray-Darling Basin Plan the SDL resource unit means the water resources, or particular parts of the water resources, of a water resource plan area that is either a surface water SDL resource unit or groundwater SDL resource unit.
seasonal allocation	Volume of water available to an entitlement holder for a water year, as determined by the relevant water corporation and often expressed as a percentage of the entitlement volume. Sometimes shortened to 'allocation'.
seasonal determination	The percentage of water share volume available under current resource conditions determined by the resource manager for unbundled systems. Since 1 July 2012 the resource manager has used seasonal determination instead of the previously used 'seasonal allocation'. This is to distinguish between water available under current resource conditions and that which the water customers have available because of carryover.
section 40 assessment	Section 40 of the Victorian Water Act contains a list of matters that must be taken into account when a new licence is applied for or a licence transfer is being considered. For example, section 40 matters include consideration of other people's rights and the environment. Section 53 also sets out matters to be taken into account.
sensitivity	The strength of the relationship between a threat and a beneficial use.
sewage	The waterborne wastes of a community.
sewerage	The system of pipes and plants that collect, remove, treat and dispose of liquid urban waste.
shared benefits	Water that is managed primarily to meet the needs of the entitlement holder but provides other benefits through decision making that deliberately targets other outcomes.

continued

significant hydrological connection	Hydrological connectivity is the physical ability for water to move between locations, and includes the effect of the losses and constraints on flow along the way. A significant hydrological connection is one that is of consequence to the matter to be addressed through a specific requirement. Hydrological connectivity may occur in a number of ways, including: • longitudinally along rivers and laterally between rivers and their floodplains (and associated wetlands) and anabranches • laterally and longitudinally with connected rivers • between surface water and groundwater, or between groundwater systems • by way of infrastructure that connects water resources. For the purposes of Chapter 10 of the Basin Plan, such a connection will be considered significant if the connection is of consequence to the effective management of Basin water resources and is relevant to the requirements of Chapter 10.
small catchment dam	A farm dam that is filled from its own catchment and not located on a waterway. This includes dams used for domestic and stock purposes which are not required to be licensed and dams used for commercial and irrigation use, which are now required to be registered (under the Victorian Water Act).
source bulk entitlement	A type of bulk entitlement held by water corporations to provide a share of inflows, storage capacity (if applicable) and releases.
South Australia/ Victoria Designated Area	Area extending 20 km either side of the border between South Australia and Victoria, as set out under the *Groundwater (Border Agreement) Act 1985*, established for the cooperative management and equitable sharing of groundwater resources between the states.
Statement of Obligations	Statements made under section 41 of the *Water Industry Act 1994* that specify the obligations of Victoria's water corporations in relation to the performance of their functions and the exercise of their powers.
storage losses	Water lost from storages through evaporation, seepage and spills.
storage manager	The water corporation that manages water storage. A storage manager may be appointed under section 122ZK of the Victorian Water Act where water in the storage is shared between entitlement holders.
stormwater	Runoff from urban areas. The net increase in runoff from urban development due to water not being able to seep into the ground because of impervious surfaces, such as roofs and roads.
stream	A body of water flowing in a bed, river or brook.
streamflow management plan	Prepared for a water supply protection area to manage the surface water resources of the area.
supply by agreement	An agreement made under section 124(7) of the Victorian Water Act between a water corporation and a person to supply water from the works of the water corporation.

continued

surface water	Under section 4 of the Commonwealth Water Act this includes: (a) water in a watercourse, lake or wetland, and (b) any water flowing over or lying on land: (i) after having precipitated naturally, or (ii) after having risen to the surface naturally from underground.
surface water resource	A Basin water resource consisting of: (a) surface water; or (b) a watercourse, lake or wetland (whether or not it has water in it).
surface water SDL resource unit	In the Murray-Darling Basin Plan Surface water SDL resource unit has the meaning given in section 6.02.
susceptibility	The strength of the relationship between a cause and a threat.
sustainable diversion limit	Generally, sustainable diversion limits are the maximum long-term average quantities of water that can be taken each year for consumptive use from the Murray-Darling Basin. The Commonwealth Water Act requires that the limits reflect an environmentally sustainable level of take. The final Murray-Darling Basin Plan agreed by all Basin states sets a sustainable diversion limit for each catchment and aquifer in the Basin, as well as an overall limit for the whole Basin. In northern Victoria (the southern Basin), this means a sustainable diversion limit is the upper limit on the volume of surface water and groundwater that can be taken for consumptive use within an unregulated river sub-catchment. Sustainable diversion limits will operate from 2019 and will replace the current cap system in the southern Basin.
sustainable diversion limit adjustment mechanism	Allows the sustainable diversion limit to be adjusted under certain circumstances.
sustainable water strategies	Regional long-term planning documents legislated under the Victorian Water Act, to address threats to, and identify opportunities to improve water security and river health outcomes.
system operating water	Water released out of storages to operate river and distribution systems (to deliver water to end users), provide for riparian rights and maintain environmental values and other community benefits (see also storage losses, distribution system operating water, river operating water).
take	Take is the removal of water from, or the reduction in flow of water into, a water resource.

continued

take and use licence	A take and use licence is a fixed term to take and use water from a waterway, catchment dam, spring, soak or aquifer. Each licence includes conditions set by the Minister for Water.
take and use licence transfer	There are two types of transfer for a take and use licence: • permanent transfer; and • temporary transfer.
target application zone	In the Murray-Darling Basin Plan target application zone has the meaning given in section 9.16.
temporary trade	Temporary transfer of a licence or, in a declared water system, transfer of a seasonal allocation.
terminal lakes	Lakes which form the end-point of all surface water flow within a basin.
thermal stratification	The formation of layers of different temperatures in a lake or reservoir.
threat	A deviation from an agreed starting point initiated by a cause that may affect a beneficial use.
trading zone	Zones that make it simpler to manage trade by defining the area where trade can occur and where there may be set conditions. Zones set out the known supply source or management arrangements and the physical realities of relevant supply systems within the zone.
trading zone source	The trading zone that determines where the water share and allocation can be traded and where the allocation can be used.
trading zone use	In a bundled system, the trading zone identified in relation to a take and use licence.
Traditional ecological knowledge	For thousands of years, Aboriginal peoples survived in the Australian landscape relying on their intricate knowledge of the land and its plants and animals. Aboriginal peoples have important knowledge of ecological processes and land and water management practices.
Traditional Owners	People who, through membership of a descent group or clan, are responsible for caring for Country. Aboriginal peoples with knowledge about traditions, observances, customs or beliefs associated with a particular area. A Traditional Owner is authorised to speak for Country and its heritage.
transfer	Refers to the change of holder of a water entitlement.
transpiration	The process by which water that is absorbed by plants, usually through the roots, is evaporated from the plant surface into the atmosphere.
unincorporated area	An area which contains substantial and often unquantified groundwater of varying yield and quality that has not been designated as a GMA or a WSPA.
unregulated river	A river that does not contain any dams or major diversion weirs which control the flow of water in the river.

continued

unregulated system	A system that does not contain any major dams or diversion weirs which control the flow of water in the system.
urban water cycle	The cycle of water through urban environments. Distinguished from the natural urban water cycle by the transfer of water through built infrastructure and the high runoff rates generated by impervious surfaces.
urban water strategies	All urban water corporations in Victoria are required to develop these strategies, which detail how water supplies and water demands will be balanced over the long term. These are the next iteration of water supply demand strategies first prepared in 2007.
use (water use)	The volume of water diverted from a stream or groundwater bore. It is not the same as 'use' by the end consumer of the water.
Victorian Environmental Water Holder	An independent statutory body responsible for holding and managing Victoria's environmental water entitlements.
Victorian Water Act	*Water Act 1989* (Vic). The legislation that, amongst other things, governs the way surface water and groundwater entitlements are issued and allocated in Victoria. It defines water entitlements, establishes the mechanisms for managing Victoria's water resources and sets out arrangements for the governance and operation of rural and urban water corporations.
volumetric limit	Under the Murray-Darling Basin Plan volumetric limit has the meaning given by section 12.17.
wastewater	Water that has had its quality affected by human influence, deriving from industrial, domestic, agricultural or commercial activities.
water access right	Defined in section 4 of the Commonwealth Water Act as: (a) any right conferred by or under a law of a State to do either or both of the following: (i) hold water from a water resource (ii) take water from a water resource and (b) without limiting paragraph (a), includes the following rights of the kind referred to in that paragraph: (i) domestic and stock rights (ii) riparian rights (iii) a water access entitlement (iv) a water allocation and includes any other right in relation to the taking or use of water that is prescribed by the regulations for the purposes of this paragraph.
water accounting	A systematic process of identifying, recognising, quantifying, reporting and assuring information about water, the rights or other claims to water, and the obligations against water. Water accounting applies Australian Water Accounting Standards.

continued

water allocation	The specific volume allocated to water entitlement holders in a given season, often quoted as a percentage of the volume of each entitlement. For example, a 20% allocation in a particular season allows a water user with a 100 ML entitlement to take 20 ML of water.
water authorities	Now called water corporations, although sometimes referred to as Authorities in their role as a licensing authority. The Victorian Water Act uses the term 'Authority' to mean a water corporation or catchment management authority. The use of Authority in relation to bulk entitlements means a water corporation, a power generation company, the Minister administering the *Conservation, Forests and Lands Act 1987*, and the Victorian Environmental Water Holder.
water balance	A statement of the water flows in a given area and time period, in which the sum of the outflows from the area equals the sum of the inflows less the water accumulated in the area.
water corporations	State organisations or agencies established under the Victorian Water Act that provide a range of water services to customers within their service areas including water supply, sewage and trade waste disposal and treatment, water delivery for irrigation and domestic and stock purposes, drainage, and salinity mitigation services. Some water corporations have a regulatory function for the diversion of water from waterways and the extraction of groundwater. Formerly known as water authorities.
water entitlement	An entitlement under the Victorian Water Act to take a specified volume of water from a defined water source.
water infrastructure	Facilities, services and installations needed for the functioning of a water system.
water market	Describes the market in which the trade of permanent and temporary water may occur under certain conditions.
water quality	Refers to the chemical, physical, biological and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and/or to any human need or purpose.
water quality characteristic	In the Murray-Darling Bain Plan water quality characteristic means: (a) other than in Chapter 11 – means a characteristic of water quality for which Part 4 of Chapter 9 sets a target value; and (b) in Chapter 11 – has the meaning given by section 11.02.
water quality management plan	In the Murray-Darling Bain Plan, water quality water quality management plans for a water resource plan area made in accordance with Part 7 of Chapter 10.

continued

Water Register	In Victoria, the Water Register is a public register that records water-related entitlements in Victoria. It holds water shares recorded by the Water Registrar, together with mortgages and limited-term transfers (leases) relevant to these water shares, records of licences to take and use surface water and groundwater, and records of works-related licences. The Register also holds records of water allocations available in the current season and tracks and reconciles volumes of water entitlements by water system and trading zone. It generates statistics and reports on levels of use, directions of trade, and prices paid.
water resource	Defined by section 4 of the Commonwealth Water Act as: (a) surface water or groundwater; or (b) a watercourse, lake, wetland or aquifer (whether or not it currently has water in it) and includes all aspects of the water resource (including water, organisms and other components and ecosystems that contribute to the physical state and environmental value of the water resource).
water resource assessment	An assessment (including one for the purpose of a determination under clause 102(c) of the Agreement) of the volume of water that will be available: (a) for distribution to New South Wales, Victoria and South Australia during a particular period; and (b) for holding in reserve at the end of the period; taking into account matters including: (c) the volume of water held in the major storages; and (d) estimated water use during the period; and (e) assumed or forecast inflows during the period.
water resource plan	For a water resource plan area as defined by section 4 of the Commonwealth Water Act, a plan that: (a) provides for the management of the water resource plan area; and (b) is: (i) accredited under section 63, or (ii) adopted under section 69 but only to the extent to which the water resource plan: (c) relates to Basin water resources, and (d) makes provision in relation to the matters that the Basin Plan requires a water resource plan to include.

continued

water resource plan area	Defined by section 4 of the Commonwealth Water Act, is an area that: (a) contains part of the Basin water resources; and (b) is specified in the Basin Plan as an area that is a water resource plan area for the purposes of this Act.
water right	Previously, rights to water held by irrigators. As a result of unbundling, these have now been separated into a water share, delivery share and water-use licence.
water sector	The broad range of entities with a stake or role in water management. For example, water corporations, catchment management authorities, local government and environmental water holders.
water security	The capacity of a population to access adequate quantities of acceptable quality water to sustain life, socio-economic development and human wellbeing.
water share	A water entitlement issued under the Victorian Water Act. It provides for access to a share of the water available to be taken from a declared water system. Water shares were created as part of the unbundling reforms. Water shares may be high-reliability or low-reliability, and are specified as a maximum volume of seasonal allocation that may be made against that share.
water share transfer	The transfer of ownership of a water share. When you buy a water share, you are not also buying the allocation. Transferring the water share does not transfer the allocation account or any water in it. The buyer only receives a new allocation announced to the water share after the Water Registrar has recorded the transfer.
water storages	A hydrological feature in which water is stored. Surface water storages include natural and artificial ponds, lakes, reservoirs and lagoons, also the bodies of water held behind weirs and dams.
water supply protection area	An area declared under section 27 of the Victorian Water Act to protect the area's groundwater or surface water resources through the development of a management plan which aims for equitable management and long-term sustainability.
water supply system	A body of water which is managed as a unit for the purposes of supplying water users.
water system source	River basin or groundwater management unit from where the water is sourced for regulated and unregulated systems.
water system type	Includes regulated, unregulated, groundwater, recycled, stormwater, managed aquifer recharge and wetlands.
water trading rules	A set of overarching consistent rules enabling market participants to buy, sell and transfer tradeable water rights.

continued

water year (or hydrological year)	A continuous 12-month period starting from July, or any other month as prescribed under the water regulation or a resource operations plan, but usually selected to begin and end during a relatively dry season. Used as a basis for processing streamflow and other hydrological data.
water-use licence (including annual use limit)	Authorises the use of water on land for irrigation, with prescribed conditions of use to avoid or minimise the environmental and offsite impacts of irrigation.
water-use registration	An authorisation to use water for purposes other than irrigation.
waterway	The Victorian Water Act defines a waterway as a river, creek, stream, watercourse and a natural channel where water regularly flows, whether or not the flow is continuous.
waterway condition or waterway health	A term for the overall state of key features and processes that underpins functioning waterway ecosystems (such as species and communities, habitat, connectivity, water quality, riparian vegetation, physical form, and ecosystem processes such as nutrient cycling and carbon storage).
waterway managers	Authorities with a waterway management district under the Victorian Water Act – the nine regional catchment management authorities and Melbourne Water in the metropolitan region.
weirs	A barrier across a river designed to alter flow characteristics.
wetland	Wetlands are areas, whether natural, modified or artificial, subject to permanent or temporary inundation, that hold static or very slow moving water and develop, or have the potential to develop, biota adapted to inundation and the aquatic environment. They may be fresh or saline.
Wimmera-Mallee Pipeline Project	In the Basin Plan the Wimmera-Mallee Pipeline Project means the water infrastructure project undertaken by Grampians Wimmera Mallee Water and funded by the Commonwealth and Victorian Governments.
winter-fill licence	A licence that permits taking water from a waterway only during the winter months (typically July to October).
works	Works refers to infrastructure including a pump or construction designed to hold or extract water including a pump, bore and dam.
works licence	A licence that authorises the construction, alteration, operation, removal or decommissioning of any works on a waterway, or a bore or dam belonging to a prescribed class of dams.
yield	The quantity of water that a storage or aquifer produces.

Acronyms and abbreviations

ABS	Australian Bureau of Statistics
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AWRC	Australian Water Resources Council
BDL	Baseline Diversion Limit
BoM	Bureau of Meteorology
CEWH	Commonwealth Environmental Water Holder
CHW	Central Highlands Water
CMA	Catchment Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CW	Coliban Water
Cwlth/Cth	Commonwealth
DCNR	Department of Conservation and Natural Resources
DDWCAC	Dja Dja Wurrung Clans Aboriginal Corporation
DELWP	Department of Environment, Land, Water and Planning
DPI	Department of Primary Industries
DRP	Drought Response Plan
DSBN	Dryland Salinity Bore Network (managed by DELWP)
DSE	Department of Sustainability and Environment
EC	Electrical Conductivity
EE	Environmental Entitlement
ENSO	El Niño Southern Oscillation
ESC	Essential Services Commission
ESLT	Environmentally Sustainable Level of Take
EWP	Environmental Watering Plan
EWR	Environmental Water Reserve
GL	Gigalitre
GMA	Groundwater Management Area
GMP	Groundwater Management Plan

continued

GMU	Groundwater Management Unit
GMW	Goulburn-Murray Water Corporation
GWMWater	Grampians Wimmera Mallee Water
HA	Hectare
HEW	Held Environmental Water
HRWS	High-Reliability Water Share
ICM	Integrated Catchment Management
IWM	Integrated Water Management
LMP	Local Management Plan
LRWS	Low-relability Water Share
LTCE	Long-term Cap Equivalent
M&E Guidelines	Modernisation and Extension of Hydrologic Monitoring Systems Program Guidelines
MDB	Murray-Darling Basin
MDBA	Murray-Darling Basin Authority
MDBC	Murray-Darling Basin Commission
ML	Megalitre
MLDRIN	Murray Lower Darling Rivers Indigenous Nations
NHMRC	National Health and Medical Research Council
NTU	Nephelometric Turbidity Units
PCV	Permissible Consumptive Volume
PEA	Priority Environmental Asset
PEF	Priority Ecosystem Function
PEW	Planned Environmental Water
REALM	Resource Allocation Models
RWMP	Regional Water Monitoring Partnership
D&S	Domestic and Stock
SDL	Sustainable Diversion Limit
SEACI	South Eastern Australian Climate Initiative
SGMS	State Groundwater Monitoring Strategy
SOBN	State Observation Bore Network
SoO	Statement of Obligations

continued

SRW	Gippsland and Southern Rural Water Corporation
SWIMP	Strategic Water Information and Monitoring Plan
SWRA	Surface Water Resources Assessment
TAZ	Target Application Zones
TCSA	Tertiary Confined Sand Aquifer
TLM	The Living Murray
TO	Traditional Owners
UA	Unincorporated Area (Groundwater)
UWS	Urban Water Strategy
VEWH	Victorian Environmental Water Holder
VFWCC	Victorian Flood Warning Consultative Committee
VWQMN	Victorian Water Quality Monitoring Network
VWRDW	Victorian Water Resources Data Warehouse
WQM Plan	Water Quality Management Plan
WRAP	Water Resources Assessment Program
WSDS	Water Supply Demand Strategy
WSPA	Water Supply Protection Area

Appendix A Wimmera-Mallee Water Quality Management Plan

Contents

1. Water quality and the Murray-Darling Basin Plan

The Murray-Darling Basin Plan identifies a wide range of responsibilities for the Commonwealth, the Murray-Darling Basin Authority, Basin states and water managers.

One core responsibility is that Basin states develop water resource plans which must include a water quality management plan.

1.1 Water quality management under the Basin Plan

Chapter 10 of the Basin Plan sets out the requirements for water resource plans. Part 7 of Chapter 10 requires a water resource plan to include a water quality management plan.

Victoria's Wimmera-Mallee Water Quality Management Plan applies to the following water resource plan areas:

- Wimmera-Mallee (surface water) water resource plan area (SW4)
- Wimmera-Mallee (groundwater) water resource plan area (GW3)

Water quality management plans must:

- Identify causes or likely causes of water quality degradation having regard to the key causes outlined in Schedule 10 of the Basin Plan (section 10.30)
- for surface waters specify measures that contribute to the achievement of the Basin Plan's water quality objectives in Chapter 9 having regard to the causes or likely causes of water quality degradation, the salinity targets for long-term salinity planning and management, and water quality target values identified for the water resource plan area (section 10.33)
- for groundwater, consider and specify rules or measures that support the maintenance of water quality within groundwater SDL resource units against the effects of elevated levels of salinity and other types of water quality degradation,
- have regard to the impact that measures (or absence of measures) have on another Basin State and any adverse impacts of measures on Basin water resources of another state.

Also in relation to water quality:

- water resource plans must be prepared having regard to current and future risks to the condition and continued availability of the water resources in the water resource plan area (section 10.41).
- a water resource plan must specify the monitoring of the water resources of the water resource plan area that will be done to meet obligations of section 13.14 to report on matters listed in Schedule 12 (section 10.46). For water quality:
  - annual reporting is required for how basin states have regard to the water quality targets for flow management as set out in Chapter 9 of the Basin Plan
  - every 5 years Basin states must report on their progress in implementing their measures to contribute to the achievement of water quality objectives that have been specified in water quality management plans.

Water quality management plans are not required to outline how Victoria will respond to extreme water quality events such as an outbreak of blue-green algae. This matter is considered in response to Part 13 of Chapter 10 of Basin Plan and discussed further in **Part 9** of the Wimmera-Mallee Water Resource Plan Comprehensive Report.

1.2 Water quality objectives in the Basin Plan

The Basin Plan's overall objective for water quality and salinity is to maintain appropriate water quality, including salinity levels, for environmental, social, cultural and economic activity in the Murray-Darling Basin.

The outcome is that Basin water resources remain fit-for-purpose (clause 5.04) and reproduces the water quality objectives for Basin resources set out in Chapter 9 of the Basin Plan.

The Basin Plan sets out six qualitative water quality objectives for maintaining and minimising impact on water quality. These objectives are listed in **Table 1**.

Basin States are required to identify measures that will contribute to the achievement of these objectives while having regard to the cause or likely causes of water quality degradation and identified water quality target values.

Table 1: Water quality objectives in the Basin Plan (section 9.04-9.09)

Use	Objective
Fresh water-dependent ecosystems	• *For Ramsar wetlands*: Quality of the water is sufficient to maintain the ecological character of those wetlands (section 9.04) • *For other water-dependent ecosystems:* Quality of the water is sufficient to: – protect and restore the ecosystems, – to protect and restore the ecosystem functions of the ecosystems, and – to ensure that the ecosystems are resilient to climate change and other risks and threats (parallels with Environmental Watering Plan Objectives) (section 9.04)
Raw water for treatment for human consumption	• To minimise the risk that the quality of drinking source water results in adverse human health effects. • To maintain the palatability rating of drinking source water at the level of good as set out in the Australian Drinking Water Guidelines. • To minimise the risk that quality of drinking source water results in odour of drinking water being offensive to consumers (section 9.05).
Irrigation water	• That the quality of surface water, when used in accordance with best irrigation and crop management practices and principles of ecologically sustainable development, does not result in crop yield loss or soil degradation (section 9.06).
Recreational water	• To achieve a low risk to human health from water quality threats posed by exposure through ingestion, inhalation or contact during recreational use of Basin water resources (section 9.07)

continued

Use	Objective
Maintaining good levels of water quality	• If the value of a water quality characteristic (e.g. salinity, nutrients, pH) is at a level that is better than the target value for water quality (in Part 4), an objective is to maintain that level
Salt export	• For the River Murray System: To ensure adequate flushing of salt from the system into the Southern Ocean. This objective is expected to be achieved by the discharge of an average of two million tonnes of salt from the River Murray System into the Southern Ocean each water accounting period (this takes into consideration cyclical climate influences, existing works and measures like salt interception schemes that prevent substantial quantities of salt entering the system and which complement this approach.

2. Victoria's water quality management framework

Surface water and groundwater quality and salinity is affected by many processes and sources including:

- natural catchment processes such as runoff from uncleared catchments and groundwater discharges to waterways
- licensed point source wastewater discharges
- small dispersed point source discharges such as septic tanks
- diffuse sources including; run off from dryland farms, drainage from irrigated land and stormwater from roads and towns
- changes in catchment water balances such as dryland salinity
- naturally occurring minerals present in aquifers that dissolve in groundwater.

Victoria has a well-established water quality management framework to address these issues. This framework will be used to deliver on the water quality and salinity requirements of the Basin Plan.

The Victorian water quality management framework includes a multifaceted arrangement of regulation, policy and strategy for water quality protection.

Important elements of the framework are discussed in this section. **Figure 1** provides a more detailed description of Victoria's water quality management framework.

2.1 Key entities in water quality management

In Victoria the Department of Health and Human Services, Department of Environment, Land, Water and Planning (DELWP), Environment Protection Authority (EPA), municipal councils, water corporations and catchment management authorities all have a role to play in managing water quality.

Department of Health and Human Services, DELWP and the EPA all play a role in regulating water quality requirements and responding to impacts on water quality. In regulating water quality, the Department of Health and Human Services sets standards for drinking water quality and matters of public health.

The EPA implements the State Environment Protection Policy (Waters), regulates discharges into, and pollution of, the environment. The State Environment Protection Policy (Waters) also influences planning schemes which are administered by municipal councils.

DELWP administers the Victorian Water Act and the *Catchment and Land Protection Act 1994* and supports water corporations and catchment management authorities to carry out of their obligations and functions.

Water corporations play a key role in managing Victoria's water resources to support meeting water quality targets and objectives and responding to water quality events.

Catchment management authorities support this role through land management activities.

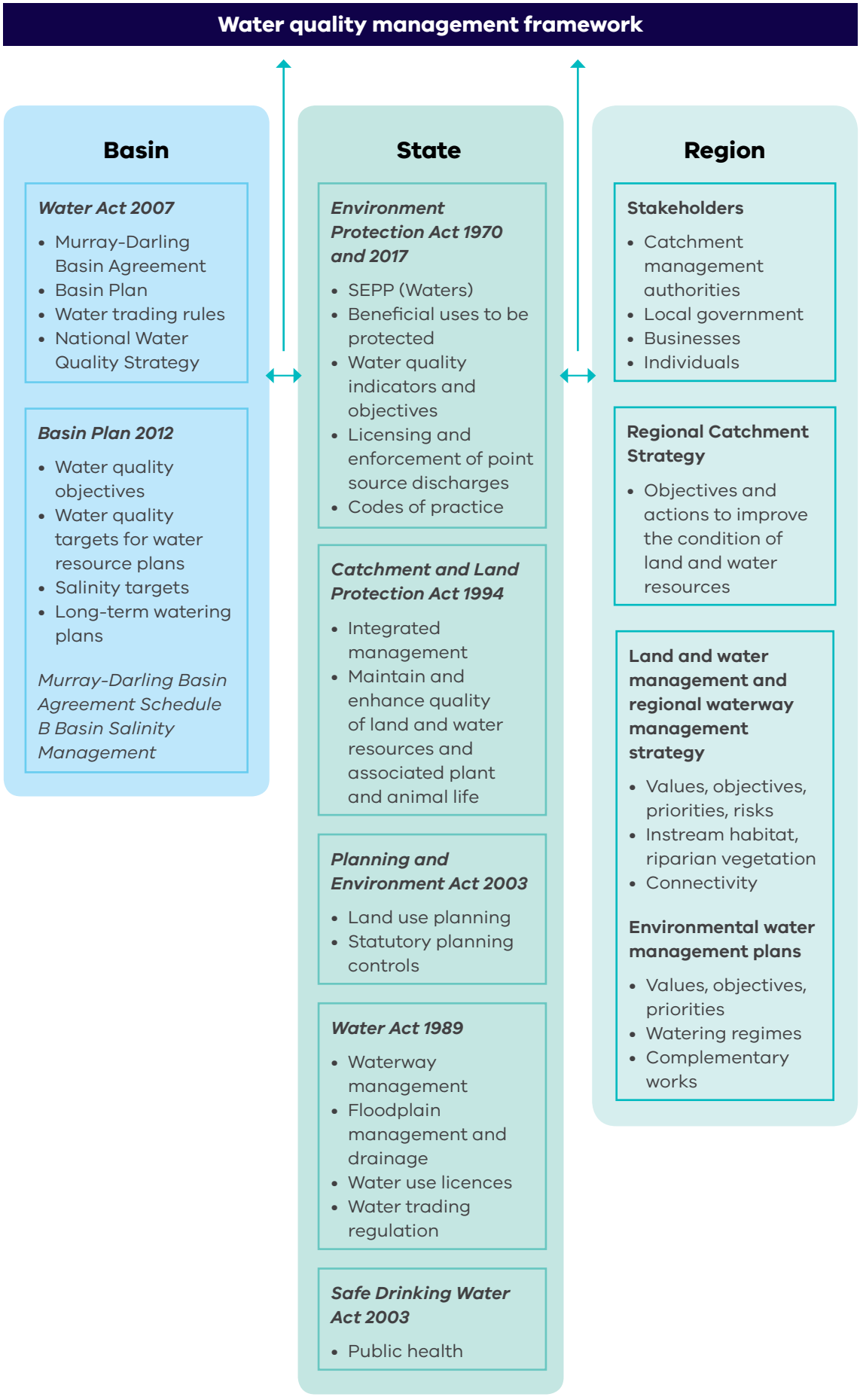

Figure 1: Victoria's water quality management framework

2.2 National Water Quality Management strategy and guidance

The National Water Quality Management Strategy (Australian Government, 2018) developed by the Australian Government in conjunction with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 and 2000 collectively provide a national strategic direction for the management of Australia's surface, groundwater and coastal waters.

The strategy includes nationally agreed policies and principles for water quality management. It recognises the importance of understanding and protecting water quality by maintaining or improving it so that it is 'fit for purpose' and suitable for the desired values and uses and the specific local conditions.

Victoria was an active participant in strategy and guideline renewal process. This is consistent with the state's approach as well as the defined community values for aquatic ecosystem, cultural and spiritual values, drinking water, industrial water, primary industries and recreation and aesthetics.

2.3 Environment Protection Act 1970 and 2017 and the State Environment Protection Policy (Waters)

Victoria's water quality protection framework was first established by the *Environment Protection Act 1970* (the EP Act). The EP Act was updated in 2017 and also states that the objective of the EPA is to protect human health and the environment by reducing the harmful effects of pollution and waste.

The EP Act establishes the powers, duties and functions of the EPA. These include the administration of the EP Act and any regulations and orders made according to it, administering State Environment Protection Policies (SEPPs) and industrial waste management policies, issuing works approvals, licences, permits, pollution abatement notices and implementing National Environment Protection Measures.

The EP Act has a basic philosophy of preventing pollution and environmental damage by setting environmental quality objectives and establishing programs to meet them in State environment protection policies. These policies aim to safeguard the environmental values and human activities (beneficial uses) that need protection from the effect of pollution and waste in the State of Victoria.

SEPP (Waters) 2018 is the instrument that formally defines the beneficial uses and environmental quality (water quality) objectives for the whole of Victoria, including the Wimmera-Mallee water resource plan area. The SEPP (Waters) identifies legally enforceable rules for decision makers and obligations on industry to protect our water environments.

Obligations in the SEPP (Waters) include the requirements for the management of risks to beneficial uses, for example how municipal councils must manage their assets, and how water corporations and other industries manage waste and wastewater. Obligations to protect groundwater beneficial uses are also listed.

The SEPP (Waters) is also used to inform a range of strategies and plans that are prepared at varying scales.

Victoria's SEPP (Waters) defines segments[1] for Victorian waters, beneficial uses and the water quality indicators and objectives necessary to protect those beneficial uses.

These three elements align with the Basin Plan's target application zones, water quality objectives and water quality targets.

2.3.1 Water quality segments and beneficial uses

2.3.1.1 Surface water

SEPP (Waters) defines the beneficial uses and the water quality objectives required to protect them in defined segments.

The surface water segments that apply to the Wimmera-Mallee water resource plan area are:

- Uplands A
- Central Foothills and Coastal Plains
- Murray and Western Plains.

The beneficial uses to be protected for all waters are outlined in **Table 2**.

Table 2: Beneficial uses listed in SEPP (Waters)

Use	Objective
Water dependent ecosystems and species • largely unmodified • slightly to moderately modified • highly modified	Water based recreation: • primary contact • secondary contact • aesthetic enjoyment
Traditional owner cultural values	Cultural and spiritual values
Agriculture and irrigation	Aquaculture
Industrial and commercial	Human consumption after appropriate treatment
Human consumption of aquatic foods	Navigation and shipping
Groundwater specific: potable water supply, potable mineral water supply, buildings and structures and geothermal properties	

Water quality indicators and environmental quality objectives are defined for each of the beneficial use listed in each segment.

The SEPP (Waters) beneficial uses are consistent with the Basin Plan uses: fresh water dependent ecosystems, raw water for treatment of human consumption, irrigation water, recreational water, maintaining good levels of water quality and salt export (Part II, Division 1 of SEPP (Waters)).

2.3.1.2 Groundwater

Groundwater quality is considered in both the Victorian Water Act and SEPP (Waters).

1. Segment is a term used to identify parts of the policy area that have common features in terms of environmental condition, aquatic ecosystem type and a range of current and future beneficial uses.

SEPP (Waters) contains seven groundwater segments and the protected beneficial uses within those segments.

The beneficial uses are assigned to each segment based on the suitability of the environmental quality to support that use or value. The segments are classified based on the background level of total dissolved solids (TDS).

The segments are:

- A1 0 – 600 mg/L
- A2 601 – 1,200 mg/L
- B 1,201 – 3,100 mg/L
- C 3,101 – 5,400 mg/L
- D 5,401 – 7,100 mg/L
- E 7,101 – 10,000 mg/L
- F >10,001 mg/L

Part 5 of this water quality management plan addresses groundwater quality and groundwater salinity, however no groundwater targets have been identified for the Wimmera-Mallee water resource plan area. This is explained further in **Part 5** of this water quality management plan.

2.3.2 Managing wastewater discharges

2.3.2.1 Point source

The EPA regulates point source wastewater discharges to surface water from 'scheduled premises[2]' through a licensing and works approval regime. Direct disposal of waste to groundwater via a bore is prohibited, with few exceptions.

Industrial wastewater is either retained on site or discharged to wastewater treatment systems operated by Victoria's water corporations. Wastewater treatment systems require 'works approvals' issued by the EPA and a wastewater discharge licence if wastewater is discharged off site. The SEPP (Waters) objectives are one of the considerations in the EPA's regulatory decision making about point source wastewater discharges, as well as the existing environmental quality of the receiving environment and the results of a receiving water risk assessment.

SEPP (Waters) contains rules for decision makers and obligations on water corporations and industry in Part 3 Division 1 on waste and wastewater management and Division 3 on protecting groundwater beneficial uses.

2.3.2.2 Diffuse source

Diffuse source discharges such as from septic tanks, stormwater runoff and agricultural runoff cannot be efficiently and effectively controlled by licensing regimes. SEPP (Waters) contains rules for decision makers and obligations on industry in Division 2's management of risks to beneficial uses in all waters. For example, SEPP (Waters) places obligations on industry to manage construction activities, forestry activities and urban stormwater in a way that minimises risks to the environment. The EPA can use the EP Act provisions to enforce SEPP (Waters).

In summary, implementation and enforcement of SEPP (Waters) and the use of instruments and processes from the *Environment Protection Act 2017* will help to protect beneficial uses by managing risks and imposing processes, and protect the Basin Plan values at the same time.

2 Environment Protection (Scheduled Premises) Regulations 2017

2.4 Safe Drinking Water Act 2003

Victoria's safe drinking water regulatory framework ensures a consistent, reliable supply of safe, good quality drinking water. This regulatory framework is overseen by the Department of Health and Human Services and implemented by water suppliers.

It will be used to protect the Basin Plan 'drinking water value' and informs the requirements for raw water when it is treated and used to supply drinking water to communities.

Victoria's *Safe Drinking Water Act 2003* and the *Safe Drinking Water Regulations 2015* require all drinking water suppliers to implement, develop and review risk management plans to manage risks to drinking water. This includes the treatment and sampling of water. These risk management plans are subject to an independent audit at intervals determined by the Department of Health and Human Services.

Specifically the *Safe Drinking Water Act 2003* provides a regulatory framework that includes:

- a risk management framework 'from catchment to tap'
- a set of standards for key water quality criteria
- information disclosure requirements for water businesses
- community consultation processes.

The *Safe Drinking Water Act 2003* applies to a range of designated water businesses like water suppliers and water storage managers and other statutory authorities supplying drinking water to the public, including water corporations, Parks Victoria and alpine resort management boards. The Department of Health and Human Services supports and works with the key stakeholders to make sure the *Safe Drinking Water Act 2003* is upheld across Victoria.

The drinking water provided by water suppliers must meet the objectives of the Australian Drinking Water Guidelines and be safe to drink. The water corporation is responsible for the main water infrastructure and quality of drinking water before it reaches the property meter. The property owner is responsible for maintaining internal plumbing from the property meter.

To protect the quality of Victoria's drinking water supply, water corporations may require property owners to install a backflow prevention device to limit the risk of contaminated water flowing back into a town's reticulated drinking water supply.

2.5 Victorian Water Act and the Victorian Waterway Management Strategy

The Victorian Water Act requires catchment management authorities (CMAs) to prepare regional waterway strategies. The Department of Environment, Land, Water and Planning (DELWP) makes sure the CMAs prepare and implement these strategies.

2.5.1 Regional water strategies

Catchment management authorities' regional waterway strategies identify priority waterways where environmental, social, cultural or economic values are threatened by poor water quality, resulting in high or very high risk to values, and are identified as 'regional hotspots'.

Where the sources of water quality issues for regional hotspots are known, high-level management activities aligned with the broad actions in the SEPP (Waters) to address these risks are included in the regional waterway strategies. If the sources are unknown or uncertain, risk assessments or other investigations need to be carried out to help guide further action planning.

Catchment-scale water quality plans are developed in special cases when risk assessments or other investigations indicate they are required.

Management activities typically require partnership and negotiation between agencies such as waterway managers, Department of Jobs, Precincts and Regions, EPA, public land managers and local government. These are negotiated during development of the regional waterway strategies.

Decisions on the type and quantity of water quality management activities consider the scale of the problem and the resources available to remedy the issue.

The Victorian Environmental Water Holder (VEWH) is appointed under the Victorian Water Act to manage Victoria's environmental water entitlements. The VEWH works with the waterway managers and the Commonwealth Environmental Water Holder to make sure environmental water entitlements are used to achieve the most efficient and effective environmental outcomes.

In particular, the VEWH may supply water to improve water quality at priority sites, such as to increase dissolved oxygen levels, and reduce temperature, salinity and nutrient levels.

Victoria's waterway management framework, as overseen by DELWP and implemented by CMAs and other agencies, and the Victorian environmental water management framework is used to protect the Basin Plan values.

2.6 Planning and Environment Act 1987

The purpose of the *Planning and Environment Act 1987* is to establish a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians. The Department of Environment, Land, Water and Planning (DELWP) manages the legislation for planning, environmental assessment and land subdivision.

The *Planning and Environment Act 1987* sets out procedures for preparing and amending the Victorian Planning Provisions and planning schemes. It also sets out the process for obtaining permits under schemes, enforcing compliance with planning schemes and permits and other administrative procedures.

The main functions of the Act are to:

- set the broad objectives for planning in Victoria
- set the main rules and principles for how the Victorian planning system works
- set up the key planning procedures and legal instruments in the Victorian planning system
- define the roles and responsibilities of the Minister, councils, government departments, the community and other stakeholders in the planning system
- give local councils responsibility for preparing and administering planning schemes.

The planning framework overseen by DELWP and implemented by local councils will be used to protect the Basin Plans values.

2.7 Catchment and Land Protection Act 1994

2.7.1 Regional Catchment Strategies

The *Catchment and Land Protection Act 1994* requires Victoria's catchment management authorities (CMAs) to prepare regional catchment strategies. These strategies provide an overarching framework for land, water and biodiversity management in each of the 10 catchment management regions in Victoria. The regional catchment strategies guidelines (VCMC, 2011):

- assess the land and water resources of the catchments in the region and how they are used
- assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority attention
- identify objectives for the quality of the land and water resources of the catchments in the region
- set a program of measures to promote improved use of land and water resources and to treat land degradation
- state the action necessary to implement the strategy and who should take it
- specify procedures for monitoring the implementation of the strategy, achieving the land and water resource quality objectives
- provide for the strategy to be reviewed.

The regional catchment strategies must have regard to SEPP (Waters) and end-of-valley salinity targets. The CMAs consider water quality and salinity issues and identify these as priority issues for the region where relevant.

CMAs regularly update the strategies after extensive community and stakeholder consultation. The regional catchment strategies provide the overarching strategic framework and priorities for catchment management. More detailed sub-strategies and plans such as waterway management strategies and land and water management plans sit under the regional strategies.

The strategies covering Victoria's Wimmera-Mallee water resource plan are the:

- Wimmera Regional Catchment Strategy 2013-19
- Mallee Regional Catchment Strategy 2013-19.

2.8 Schedule B of the Murray-Darling Basin Agreement – River Murray salinity

Victoria supports and complies with Schedule B to the Murray-Darling Basin Agreement (Schedule 1 to the Commonwealth Water Act). Schedule B sets out the formal accountability framework for managing salinity in the Basin. Management arrangements in the Basin are periodically reviewed and updated. The BSM2030 (MDBA, 2017) reflects the outcomes of the most recent review. Schedule B of the Agreement and its associated operational protocols continue to apply.

The water-use licensing and trading provisions of the Victoria Water Act are used to implement the salinity accountability requirements of Schedule B of the Murray-Darling Basin Agreement.

3. How Victoria's water quality management aligns with the Basin Plan

Figure 2 shows how the Basin Plan requirements are linked to and inform water quality and salinity management in Victoria. The left-hand side of the figure shows the requirements of a water quality management plan as specified in the Basin Plan. The right-hand side of the figure shows the Victorian framework and how the two are connected.

Victoria's water quality framework and the National Water Quality Management Strategy are consistent. The Basin Plan water quality and salinity management plan has been developed using this nationally-agreed framework for water quality planning and management. As a result, Victoria can meet the requirements of the Basin Plan through its existing water quality management arrangements.

SEPP (Waters) environmental quality objectives and load-based reduction targets applied in Victoria are similar to, or more stringent than, those listed in the Basin Plan. Therefore the implementation of Victoria's environmental protection policy will have positive outcomes for the water quality of the shared waters of the River Murray and ultimately on South Australia and New South Wales. Victoria's activities will have no effect on Queensland and the Australian Capital Territory.

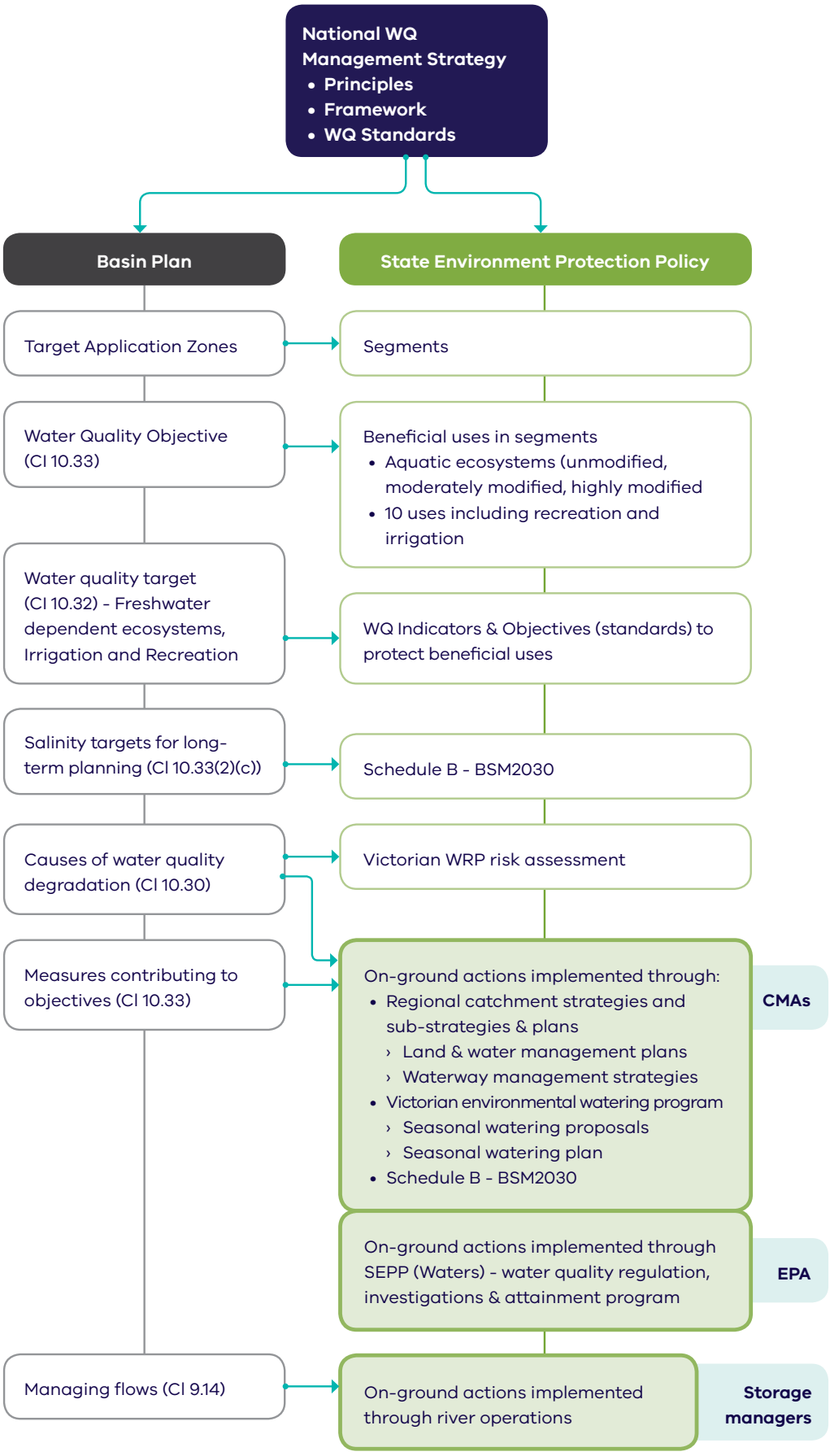

Figure 2: Alignment between Basin Plan water quality requirements and Victoria's water quality management arrangements in the water resource plan area

4. Surface water - Victoria's Wimmera Mallee water resource plan area

This section presents information about the surface waters of the Wimmera-Mallee water resource plan area. It includes general information about the resources and their quality, risks to the condition of these resources, a statement on degradation, causes or likely causes of this degradation, measures to contribute to the achievement of water quality objectives of the Basin Plan and water resource plan water quality targets to inform the development of the measures.

The Wimmera-Mallee water resource plan area is dominated by the Grampians Ranges (*Gariwerd*) to the south, and the broad floodplains of the Wimmera and Avon–Richardson, and Avoca River systems. The region is relatively flat and lies on the geologically stable western plains of Victoria.

The Wimmera River is a large closed drainage basin that retains its water flow through wetland systems and does not outflow to a river, the ocean or any other external bodies. In exceptionally wet years, it fills Lake Hindmarsh, and other lakes including Lake Albacutya and Wirrengren Plain.

The Avoca River flows into a series of lakes and wetlands including the Avoca Marshes and Lake Boga. The Avoca River regularly ceases to flow for many months of the year. During flooding, it occasionally discharges into the River Murray or via stream channels to a further series of lakes. The Avoca Marshes, part of the Kerang Wetlands Ramsar site, are a series of lakes and swamps of different permanence, depth and salinity. Similarly, the Avon–Richardson catchment is internally drained, with most surface water flowing into Lake Buloke. Other wetlands in the south include Lake Lalbert, Sandhill and Sandhill West Lakes, Lake Marmal, Griffiths and Terappee Swamps.

The waterways in the water resource plan area have been modified to varying extents. The modifications have impacted on the hydrologic regime, physical form, riparian vegetation, water quality and instream ecology. Rising saline groundwater, turbidity and algal blooms are among the most common causes of water quality degradation. Historic sluicing, dredging and gold mining causes significant degradation of water quality. Land clearing practices, including removal and destruction of native vegetation through overgrazing, cropping and wood removal, threaten the riparian values of these waterways.

The Wimmera–Mallee headworks system is a complex network of storages, channels and pipes that regulates flow in a number of the waterways of the Wimmera–Mallee water resource plan area. This headworks system enables water to be shifted between storages and interconnects the Wimmera and Glenelg basin

A notable feature of the Wimmera–Mallee system is the dynamic change that has been occurring in recent years, following the completion of the Wimmera–Mallee Pipeline in 2010 and the decommissioning of the Wimmera Irrigation Area. The entitlement volume previously held by irrigators is now available to the Commonwealth Environment Water Holder (CEWH) under a supply by agreement contract with Grampians Wimmera Mallee Water (GWMWater). These two factors have greatly reduced consumptive water demand from the Wimmera–Mallee headworks system and resulted in a wide-scale reconfiguration of the regulated water systems.

The largest unregulated systems in the water resource plan area include the Avon–Richardson, Avoca and upper Wimmera rivers. Surface water resources of the Wimmera–Mallee water resource plan area have historically been managed under a series of local management rules in each catchment, including most recently the Wimmera Regional Catchment Strategy.

The River Murray itself is not included in any of Victoria's water resource plan areas as its bed and banks lie within the borders of New South Wales and South Australia.

Victoria's Wimmera-Mallee water quality management plan addresses the surface water and groundwater resources located within the catchment management authority (CMA) regions of the Mallee CMA, Wimmera CMA and North Central CMA.

4.1 Surface water quality

Surface water quality is highly variable within the Wimmera-Mallee water resource plan area depending on the water sources and flow regime.

Eroding stream channels can cause sediment to be mobilised, which leads to high turbidity and nutrient levels. In some places, the stream channel also intersects with the local groundwater table, which is naturally saline in many instances.

Water quality in the Wimmera River system has elevated salinity, a high level of turbidity and a generally high level of phosphorus. Water quality from the upper Mt William Creek and Wimmera River upstream of Huddleston's Weir is typically much poorer than the flows coming from the northern Grampians (*Gariwerd*) to the lower Mt William Creek and Mackenzie River.

Highly turbid, nutrient-rich and saline water limits the diversity of macroinvertebrate, fish and plant species to those tolerant of poor water quality. The presence of hypersaline groundwater also limits the availability of pool habitat for large-bodied fish as well as creating additional water quality issues when higher flows mobilise the hypersaline water, transporting it downstream.

Blue-green algal blooms are an ongoing issue due to the combination of warm temperatures, high nutrient levels and lack of through flow, leading to thermal stratification. This leads to health risks for humans and animals coming into contact with the toxins produced by the algae. Blue-green algal blooms occur during summer/autumn in weir pools and water storages (particularly Lake Lonsdale, Lake Fyans and Taylors Lake).

Water quality in the Avon–Richardson River system and the Avoca River system is moderate to poor (DEPI 2013a).

The Wimmera Waterway Strategy 2014–2022 (Wimmera CMA 2014) identifies 'improved water quality in priority areas' as one of its four goals. It identifies priority areas for water quality as being those reaches that contribute flows that are harvested into storages for the Wimmera–Glenelg water supply system as well as reaches that contain headworks storages and are used to transfer water within the headworks systems. Management actions have been identified to address water quality impacts in these priority areas.

Many of the management activities undertaken by Wimmera CMA, landholders and Landcare groups lead to improved water quality. Riparian and wetland revegetation works seek to filter out nutrients and silt before they enter waterways. Improved vegetation combined with other engineering works reduces stream instability, which in turn reduces sediment and nutrient inputs into waterways.

4.2 Water quality degradation

Section 10.30 of the Basin Plan requires water quality management plans to identify the causes, or likely causes, of water quality degradation of water resources in the water resource plan area. In identifying the causes or likely causes of degradation, regard must be had to the key causes identified in Chapter 9 of the Basin Plan. The Basin Plan identifies nine types of water quality degradation in the Murray-Darling Basin and their causes, including elevated salinity, suspended matter, and nutrients (details are in the Basin Plan Schedule 10).

Table 3 presents the types of water quality degradation in the Wimmera-Mallee surface water, water resource plan area. Column one presents the causes, or likely causes, of water quality

degradation. In identifying the list, the Risk Assessment (see **Appendix B**) was considered, and regard was had to the Basin Plan Schedule 10 list of causes of water quality degradation in the Basin.

Table 3: Causes or likely causes of surface water quality degradation in the Wimmera Mallee water resource plan area

Type of water quality degradation in Wimmera- Mallee surface water	Causes, or likely causes, of water quality degradation in Wimmera-Mallee (surface water) water resource plan area	Comments
Elevated levels of salinity	Water tables intersecting surface water	Naturally saline groundwater systems intercept the surface in parts of the area, i.e. at Wimmera River. Long-term rises in regional groundwater levels as a result of catchment clearing cause saline pools in some northern parts of the Wimmera River and other waterways.
	Reduction in streamflows, limiting dilution	Salinity levels may increase in rivers that intercept groundwater during periods of low or zero flow. Salinity levels increase in the region's ephemeral wetlands and waterways as they dry out. Whilst a natural process, this can be affected by changes in flow regime.
Elevated levels of suspended sediments	Overgrazing, riparian grazing	This is an endemic issue in the cleared parts of the area.
	Poor soil conservation	This is an issue in the middle and southern parts of the area.
	Decline in stream geomorphology	This occurs in cleared sections of the middle and southern parts of the area because of increases in runoff, riparian grazing and dryland salinity.
	Impacts of carp	Carp can stir up the waterway sediments, increasing turbidity.
	Ash from bushfires	A periodic issue in the Grampians' (Gariwerd) waterways.
Elevated levels of nutrients from point and diffuse sources	Farm runoff with elevated levels of nutrients including from fertilisers	This water quality impact arises from land management practices.

continued

Type of water quality degradation in Wimmera- Mallee surface water	Causes, or likely causes, of water quality degradation in Wimmera-Mallee (surface water) water resource plan area	Comments
Elevated levels of blue-green algae (cyanobateria)	Low flow	Occurs in unregulated waterways and wetlands where flow is very difficult to influence.
	Sunlight	Increased sunlight can be caused by reduction of riparian vegetation.
	Availability of nitrogen and phosphorus	This water quality impact arises from land management practices
Dissolved oxygen outside ranges	Microorganisms consuming oxygen (including after algal blooms)	This water quality impact arises from land management practices.
	Eutrophication (creating algal/blue-green algae (cyanobateria) blooms)	Common part of natural wetting and drying cycle of ephemeral wetlands and waterways. Very little ability to control through flow management.
	Low flows including impacts of stratification	Common part of natural wetting and drying cycle of ephemeral wetlands and waterways.

In addition to catchment scale causes of water quality degradation, other processes can cause localised contamination (see **Table 4**).

Table 4: Local processes of surface water quality degradation

Type of water quality degradation in Wimmera- Mallee surface water	Causes, or likely causes, of water quality degradation in Wimmera-Mallee (surface water) water resource plan area	Comments
Pesticides and other contaminants	Surface water runoff (pesticides from farmland)	Catchment management issue – not related to water allocation management. Little evidence of pesticide pollution of waterways and wetlands
	Point source (industrial waste)	For scheduled premises under the *Environment Protection Act 1970*, a licence must be issued by the Environment Protection Agency
Elevated levels of suspended sediments	Stormwater drains	A limited issue because of the low level of urbanisation in the area
	Rural drains	A limited issue because of the low level of irrigation and rural drainage in the area

continued

Type of water quality degradation in Wimmera- Mallee surface water	Causes, or likely causes, of water quality degradation in Wimmera-Mallee (surface water) water resource plan area	Comments
Elevated levels of nutrients from point and from diffuse sources	E.g. outfall from sewage treatment plants	Generally, a localised impact. For scheduled premises under the Environment Protection Act 1970, a licence must be issued by the Environment Protection Authority

Elevated levels of blue-green algae (cyanobacteria) were not identified as a cause of water quality degradation in the preliminary risk assessment. Rather, this was assessed as an outcome from other causes and combined with pathogens. Similarly, the Wimmera Water Quality Strategy focused on nutrients as the most important type of water quality degradation in the region, due to their contribution to blue-green algal blooms. Elevated levels of cyanobacteria are included in this section because of their importance in the Basin Plan and their presence in documented measures within the Wimmera-Mallee water resource plan area.

4.3 Risks to the condition of surface water in the water resource plan area

Section 10.31 of the Basin plan requires water quality management plans to identify measures to address the risks, of a kind referred to in section 10.41(2)(d) of the Basin Plan, identified as a result of the Risk Assessment (see **Appendix B**).To support meeting this requirement, the Basin Plan requires a water resource plan to be prepared having regard to the current and future risks to the condition and availability of the water resources of a water resource plan area (section 10.41 of the Basin Plan).

Victoria has assessed current and future risks to the availability and condition of the water resources in the water resource plan area. Water quality (condition) related risks are discussed in the Risk Assessment (see **Appendix B**) which outlines:

- the risks
- the level of risk
- description of medium to high risks
- strategies to address each medium to high risk as required in 10.41-10.43 of the Basin Plan.

4.3.1 Medium to high risks to condition of water resources in the Wimmera Mallee water resource plan area

The Risk Assessment (see **Appendix B**) identified risks to the condition of surface water and groundwater. The risks to surface water are summarised below.

Consumptive uses

Water quality risks to consumptive uses are from:

- climate change (elevated pathogens, sediment or nutrients, salinity, toxicants and other water quality impacts)
- extreme events (elevated salinity, elevated levels of suspended sediment and/or nutrients, elevated toxicants, other water quality impacts)
- land use and interception (elevated salinity, suspended sediment and/or nutrients, elevated toxicants, other water quality impacts)
- non-compliance with the Victorian Water Act (elevated sediment and/or nutrients)

- increased use of water access entitlements (elevated levels of suspended sediments and/or nutrients).

These risks were identified with a range of confidence levels from low to high.

These risks are addressed by a range of strategies described in the Risk Assessment (see **Appendix B**), and these are specifically addressed by measures of this WQMP:

- Measure 1: "Implementing the State environment protection policy (Waters), and
- Measure 2: "Implementation of the Wimmera-Mallee Long-term Watering Plan Objective to maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation".

In addition, consumptive use is protected under public health legislation, which specifically regulates for water distributed by urban water corporations for domestic use and consumption.

Risks to the condition of water resources for critical human water needs from extreme events (elevated salinity, toxicants, other water quality impacts) were identified with a low level of confidence. A range of strategies have been described in the Risk Assessment to (see **Appendix B**) address the risks. These are primarily focused on managing emergency of large water volumes. In addition, contribution to responding to this risk is provided through Measure 1: 'Implementing the State Environment Protection Policy (Waters)

Environmental uses

Risks to environmental uses are from:

- climate change (elevated salinity, elevated suspended sediment and/or nutrients, elevated toxicants, other water quality impacts)
- extreme events (elevated salinity, suspended sediment and/or nutrients, toxicants, other water quality impacts)
- land use and interception (elevated suspended sediment, relevant levels of salinity, other water quality impacts)
- non-compliance with the Victorian Water Act (elevated levels of suspended sediment and/or nutrients)
- increased use of water access rights (elevated suspended sediment and/or nutrients).

These risks were identified with a moderate level of confidence and are addressed by a range of strategies described in the Risk Assessment (see **Appendix B**). They are specifically addressed by Measure 1: Implementing the State Environment Protection Policy (Waters).

Aboriginal uses

Risks were identified from:

- climate change
- extreme events
- land use and interception
- non-compliance with the Victorian Water Act
- elevated pathogens
- elevated salinity
- elevated levels of suspended sediment and/or nutrients
- elevated toxicants
- other water quality impacts.

These risks were identified with a low level of confidence.

It is recognised that in Victoria there is limited confidence in understanding of and therefore ability to manage for Aboriginal values of surface water. For this reason, high risks were identified for Aboriginal use of water across all potential causes until there is greater understanding of local values and the ability to assess these more accurately. A range of strategies are being employed to manage and minimise these risks through improved understanding of Aboriginal values and uses of water. Importantly *Water for Victoria* commits to:

- a process of information gathering and understanding of Aboriginal water values and uses to better inform the strategies and measures around water quality.

These risks are addressed by a range of strategies described in **Appendix B**, as well as Measure 1: implementing State Environment Protection Policy (Waters)

Recreational/social

Risks to recreational/social use from:

- climate change (elevated toxicants, salinity, suspended sediment and/or nutrients, pathogens, other water quality impacts)
- extreme events (elevated toxicants, and other water quality impacts)
- land use and interception (elevated toxicants, suspended sediment and/or nutrients, salinity, and other water quality impacts).

These risks were identified with a level of confidence from low to high. These risks are addressed by a range of strategies described in the Risk Assessment (see **Appendix B**) as well as Measure 1: Implementing State Environment Protection Policies for water, or equivalent.

Recognising Aboriginal values

Through this assessment of risk, it was found that whilst environmental and consumptive uses of water are relatively well understood as water resource planning concepts, Aboriginal uses of water are not. Aboriginal Water is an emerging term to describe the full range of Aboriginal interests and aspirations in water. There have been some indicators of connection between water quality and Aboriginal water values. Victoria continues to work to develop Aboriginal Water and will consider how any Aboriginal water values and uses can be integrated into water management instruments to support the protection of these. For more information see **Part 11**.

4.3.2 Measures addressing risks

Section 10.31 of the Basin Plan requires measures to be identified for risks arising from elevated levels of salinity or other types of water quality degradation.

The measures to address risks to surface water are:

- Implementation of the Wimmera-Mallee Long-term Watering Plan objective to maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation.
- The implementation of SEPP (Waters).

The measures contribute to the achievement of the following Chapter 9 water quality objectives (see **Table 5**)

Table 5: Measures contributing to water quality objectives

Waterquality objective	Contributing measures	
	Implementation of SEPP (Waters)	**Implementing Wimmera–Mallee Long-term Watering Plan objective to maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation**
Freshwater-dependent ecosystems	✓	✓
Raw water for treatment for human consumption	✓	✓
Irrigation water	NA	NA
Recreational water	✓	✓
Maintaining good levels of water quality	✓	✓
Salt export	NA	NA

Note: The irrigation water and salt export objectives do not apply to the waters of the Wimmera–Mallee.

It is not considered any other measures are necessary on the basis that the above highlighted risks are addressed in Victoria's Wimmera Mallee water resource plan area through strategies identified in the Risk Assessment (see **Appendix B**).

The measures contributing to the achievement of water quality objectives as outlined in **Part 4.4** below.

4.4 Measures contributing to the achievement of water quality objectives

Victoria has a comprehensive and active water quality management framework that has parallels to many aspects of the Basin Plan's clauses on water quality management. The strategies to address medium to high risks to the condition of water resources identified as part of the Risk Assessments (see **Appendix B**) show this is an active and continuously improving framework for addressing water quality.

Beyond these strategies, Victoria has done a detailed review to identify and specify measures for the Wimmera-Mallee water resource plan area that will contribute to the achievement of the Basin Plan's water quality objectives. Their identification and development have had regard to the causes, or likely causes, of water quality degradation and the water quality targets of the water resource plan area, and the salinity targets for the purposes of long-term salinity planning and management set out in Chapter 9 of the Basin Plan.

Two significant measures that will contribute to the achievement of surface water water quality objectives under section 10.33 of the Basin Plan for the Wimmera-Mallee water resource plan area are:

1. Implementation of the State Environment Protection Policy (Waters)
2. Implementation of the Wimmera-Mallee Long-term Watering Plan objective to maintain adequate surface water salinity to enable growth and reproduction of aquatic vegetation.

4.4.1 Measure 1: Implementation of the State Environment Protection Policies or equivalent

The primary regulatory mechanism for protecting Victoria's water environments from pollution and waste is the *Environment Protection Act 1970* and 2017 (the EP Act). The EP Act defines high level objectives for protection of Victoria's water environments and gives the Environment Protection Authority and other duty holders roles, responsibilities and powers for environmental protection.

SEPP (Waters) ensures that Victoria has a contemporary statutory policy for the protection and management of surface water and groundwater in Victoria. This is achieved by establishing in law the uses and environmental values to be protected, defining the level of environmental quality required for their protection and setting rules and obligations to make sure management actions are taken to protect water quality.

> The SEPP (Waters) objective is: to protect and improve the quality of Victoria's waters while providing for economic and social development.
>
> SEPP (Waters) works in parallel with a number of tools used by Victoria's environment and resource managers, industry groups, and the broader community to protect our water environments and the health of Victoria's waters. The most prominent of these are the Victorian Water Act and associated regional waterway strategies.
>
> In seeking to improve the health of Victorian waters SEPP (Waters) is enhancing the quality of shared waters and has regard to the impacts it may have on the ability of another Basin state to meet water quality targets.
>
> SEPP (Waters) is consistent with the National Water Quality Management Strategy and so will not have adverse impacts on other states.

State Environment Protection Policies (SEPPs) are subordinate legislation under the EP Act. SEPP (Waters) supports the protection of Victoria's waters in two key ways:

- it outlines the beneficial uses or public values to be protected in different water bodies (segments), and associated environmental quality indicators and objectives required to support these beneficial uses
- it provides the rules for the regulator (EPA) and obligations on industry to protect and improve water quality which typically include:
  - obligations on duty holders — detailed expectations and requirements for a range of activities that impact on water quality (e.g. setting the standards for sewerage infrastructure containing flows)
  - decision rules for, and processes to be followed by, the regulator when managing scheduled premises, such as there must not be any direct discharge of waste to any aquifer except for specific purposes and where specified conditions are met, and in issuing a licence, the EPA may approve a mixing zone.

The environmental quality indicators and objectives in SEPP (Waters) have been developed in line with, and to complement, the nationally-agreed approach outlined in the Australian and New Zealand Environment Conservation Council Guidelines.

The SEPP (Waters) rules and obligations clauses collectively make up a program of actions through which environmental quality objectives are to be achieved or 'attained' to protect beneficial uses.

By highlighting these obligations in SEPP (Waters), duty holders can understand their legal requirements to manage water quality. SEPP (Waters) has an implementation plan that outlines the Government's priorities which will drive work priorities and budgeting.

The SEPP (Waters) is also used to inform regional and local strategies and plans that aim to improvement environmental quality objectives.

4.4.1.1 Contribution to achieving objective for fresh water-dependent ecosystems

The Basin Plan objective for water-dependent ecosystems for Ramsar wetlands is that the quality of water is sufficient to maintain the ecological character of those wetlands. The water quality objective for water-dependent ecosystems other than declared Ramsar wetlands is that the quality of water is sufficient to protect and restore ecosystems and their function and to ensure that the ecosystems are resilient to climate change and other risks and threats.

The SEPP (Waters) includes water-dependent ecosystems and species as a beneficial use to be protected in Victoria's surface waters. This beneficial use is consistent with the Basin Plan objective for water-dependent ecosystem. Therefore, implementation of SEPP (Waters) will protect the Basin Plan fresh water-dependent ecosystem.

Water-dependent ecosystems and species are protected in all rivers and streams. Numerical environmental quality objectives have been set for rivers and streams to guide water managers on the appropriate levels of relevant indicators to protect the ecosystems. If these objectives are not attained, further investigation is required to understand if a threat is real, and what action needs to be taken.

4.4.1.2 Contribution to achieving objective for raw water for treatment for human consumption

The Basin Plan objectives are to

- minimise the risk that the quality of raw water taken for treatment for human consumption results in adverse human health effects
- maintain the palatability rating of water taken for treatment for human consumption at the level set out in the Australian Drinking Water Guidelines
- minimise the risk that the quality of raw water taken for treatment for human consumption results in the odour of drinking water being offensive to consumers.

The SEPP (Waters) identifies 'water suitable for human consumption after appropriate treatment' as a beneficial use of Victoria's surface waters. It is protected where water is sourced for supply in accordance with the special water supply catchments area set out in Schedule 5 of the *Catchment and Land Protection Act 1994* or the *Safe Drinking Water Act 2003*.

The SEPP (Waters) beneficial use is consistent with the intent of the Basin Plan raw water for treatment for human consumption. Therefore, implementation of SEPP (Waters) will protect the Basin Plan raw water for treatment for human consumption.

SEPP (Waters) does not establish specific numerical environmental quality objectives for raw or treated water for human consumption for surface waters. However, because the protection of water-dependent ecosystems and species, which has the most stringent environmental quality objectives, is identified in all segments, the measures/activities to protect water-dependent ecosystems and species will provide protection for raw water for human consumption.

4.4.1.3 Contribution to achieving the objective for recreational water

The Basin Plan water quality objective for recreation water quality is to achieve a low risk to human health from water quality threats posed by exposure through ingestion, inhalation or contact from recreational use of Basin water resources.

Recreational use of water is recognised as a beneficial use in SEPP (Waters), which is categorised as primary and secondary contact recreation and aesthetic enjoyment of the waters. The three uses are protected across all rivers and streams in Victoria, except where public access is legally restricted or has specifically been exempted by the policy. SEPP (Waters)

provides comprehensive environmental quality objectives for primary and secondary contact, with E.coli as the freshwater indicator of pathogenic bacterial contamination.

The SEPP (Waters) beneficial use is consistent with the intent of the Basin Plan recreational water consumption. As a result, implementation of SEPP (Waters) will protect the Basin Plan recreational water.

4.4.1.4 Contribution to achieving objective of maintaining good levels of water quality

The Basin Plan outlines the objective to maintain good levels of water quality as being the maintenance of water quality characteristics at a level that is better than the target value set out in Part 4 of Chapter 9 of the Basin Plan.

SEPP (Waters) identifies environmental quality objectives of beneficial uses that are appropriate to the segment in which they are applied. The objectives define the level of water quality necessary to protect beneficial uses. Environmental quality objectives describe the concentration, level or biological sate/condition of an indicator for different segments that would not cause harm or pose a significant risk to beneficial uses.

4.4.2 Measure 2: Implementation of the Wimmera Mallee Long-Term Water Plan Objective to Maintain Adequate Surface Water Salinity to Enable Growth and Reproduction of Aquatic Vegetation

Long-term watering plans (LTWPs) have been prepared by Victoria for each of its three surface water resource plan areas in accordance with Chapter 8 of the Basin Plan. The watering plans are prepared consistent with the Basin Plan. They assist planning for environmental water outcomes, in order to meet the Basin Plan objectives and targets and the overall environmental objectives for water-dependent ecosystems outlined in the Basin Plan. The Wimmera–Mallee LTWP has collated long-term environmental water planning information for priority rivers, wetlands and ecosystem functions in the water resource plan areas to inform:

- Victoria's Annual Watering Priorities
- Basin-wide Watering Strategy and Basin Annual Watering Priorities
- water resource plans, particularly environmental watering requirements
- long-term outcomes and environmental water demands in the Commonwealth Environmental Water Holder's (CEWH) portfolio management plans
- decisions for environmental watering by the Southern Connected Basin Environmental Watering Committee (SCBEWC).

Salinity levels that allow growth and reproduction of aquatic vegetation is one of four priority ecosystem functions identified in the Wimmera-Mallee Long-Term Watering Plan 2015.

Maintaining adequate water resource plan area salinity levels for this purpose is one of 13 objectives of the plan. It is expected that this will be achieved through low flow watering to prevent water quality decline and freshes to flush pools of water.

Environmental watering in Victoria is managed in accordance with the requirements of the Basin Plan, having regard to dissolved oxygen.

4.4.2.1 Contribution to achieving objective for freshwater-dependent ecosystems

The Wimmera–Mallee LTWP recognises the importance of maintained salinity levels to enable aquatic vegetation to grow and reproduce. This vegetation in turn is important for its broader ecosystem. Maintaining salinity levels is one of four priority ecosystem functions of the LTWP. Watering plans, Basin-scale priorities and strategies together with annual watering plans support this objective.

4.4.2.2 Contribution to achieving objective for raw water for treatment for human consumption

Environmental watering in the Wimmera River can be delivered from the headworks and can contribute to the objective of raw water for treatment for human consumption where such water is improving salinity levels, and raw water is extracted downstream of the environmental watering.

4.4.2.3 Contribution to achieving objective for recreational water

Release of water for environmental watering purposes must have regard to the water quality targets for flows, which includes targets for salinity, dissolved oxygen and blue-green algae. By having regard to blue-green algae in the delivery of environmental water consideration is given to improving water quality for recreational users.

4.4.2.4 Objective for irrigation water

The objective for irrigation in the Wimmera–Mallee relates to the water quality target for irrigation waters which the Basin Plan applies to water distributed by irrigation infrastructure operators primarily for the purpose of irrigation. As no such water is distributed in the Wimmera–Mallee, this objective does not apply to this WQMP. It is noted, however, that the SEPP (Waters) includes an agriculture and irrigation beneficial use, and EC objective for rivers and streams, and so protection of surface waters is achieved through this objective.

4.4.2.5 Salt export objective

The salt export objective aims to have adequate flushing of salt from the River Murray system into the Southern Ocean. In Victoria this objective relates to flows along the River Murray crossing the border into South Australia to support this adequate level of flushing. Management of waters in the Wimmera–Mallee water resource plan area do not contribute to this objective, as there is only limited connection in flows between Wimmera-Mallee surface waters and they are not considered to contribute to this objective.

4.5 Development of the measures: having regard to the causes

The development and identification of the measures for the Wimmera-Mallee Water Quality Management Plan had regard to the causes, or likely causes, of water quality degradation of the surface waters and groundwater of the respective water resource plan areas. While a number of causes of water quality degradation can be, and are being, addressed through land management actions, overarching and water management actions address some of these causes. See **Table 6**: Having regard to causes in developing the measures for surface water.

Table 6: Having regard to causes in developing the measures for surface water (10.33(2)(a))

Type of water quality degradation	Causes, or likely causes, of water quality degradation in Wimmera–Mallee (surface water) water resource plan area	Consideration by measures
Elevated levels of salinity	• water tables intersecting surface water • reduction in streamflows, limiting dilution	The LTWP identifies maintaining adequate salinity levels that allow growth and reproduction of aquatic vegetation as an objective. The risk of elevated salinity in groundwater affecting beneficial uses has guided the developed of the Border Groundwaters Agreement and enabled salinity monitoring and actions to be taken should an increase in salinity of the aquifer be realised.
Elevated levels of suspended sediments	• overgrazing, riparian grazing • poor soil conservation • decline in stream geomorphology • impacts of carp • ash from bushfires	SEPP (Waters) establishing environmental quality objectives to guide land management programs
Elevated levels of nutrients from point and diffuse sources	• farm runoff with elevated levels of nutrients, including from fertilisers	SEPP (Waters) establishing environmental quality objectives to guide land management programs
Elevated levels of cyanobacteria	• low flow • sunlight • availability of nitrogen and phosphorus	SEPP (Waters) establishing environmental quality objectives for nutrients
Dissolved oxygen outside ranges	• microorganisms consuming oxygen (including after algal blooms) • eutrophication (creating algal/cyanobacterial blooms) • low flows including impacts of stratification	SEPP (Waters) establishing environmental quality objectives to guide land management programs

4.6 Water quality targets for the Wimmera Mallee water resource plan areas

To help maintain appropriate water quality for environmental, social, cultural and economic activities, the water quality management plan identifies water quality target values for fresh water-dependent ecosystems, irrigation water and recreational water for the water resource plan area. Setting these target values provides the framework for addressing the causes of water quality degradation and maintaining or improving water quality in the water resource plan area.

The Basin Plan presents water quality target values for water resource plans (section 9.15-9.18) which are to be considered in the development of measures for each water resource plan area.

They are identified as:

- water quality targets for fresh water-dependent ecosystems
- water quality targets for irrigation water
- water quality targets for recreational water.

These targets must be identified for each water resource plan area, or alternative targets may be identified (section 10.32(4)).

For the purposes of section 10.32 of the Basin Plan, for the Wimmera-Mallee water resource plan area, Victoria identifies here:

- alternative targets for fresh water-dependent ecosystems
- alternative targets for irrigation water
- alternative targets for recreational water.

The next sections provide more detail on the water quality targets for fresh water-dependent ecosystems, irrigation water and water used for recreation.

4.6.1 Targets for freshwater dependent ecosystems

In October 2018 Victoria gazetted the State Environment Protection Policy (Waters). The review process involved considerable scientific analysis of water quality data and stakeholder consultation to revise the environmental quality objectives.

Table 7 and Table 8 identify Victoria's environmental quality objectives for water-dependent ecosystems and species for the Wimmera-Mallee water resource plan area. Using the indicator and objective values of water-dependent ecosystems and species and segments from SEPP (Waters), as distinct from the Basin Plan targets for freshwater dependent ecosystems, means the environmental quality objectives are more relevant to the local Victorian conditions.

The Wimmera Mallee WQMP applies the SEPP (Waters) segments and sub-segments. These targets are not only more targeted level of protection, they will also provide effective management because they integrate seamlessly into Victoria's current water quality management framework.

Table 7: Fresh Water-Dependent Ecosystem Targets for Wimmera-Mallee (surface water) water resource plan area

WATER RESOURCE PLAN (WRP) AREA WIMMERA MALLEE	SEGMENT	ENVIRONMENTAL QUALITY INDICATOR									
		Total phosphorus (µg/L)	Total nitrogen (µg/L)	Dissolved oxygen (percent saturation)		Turbidity (NTU)	Electrical conductivity (µS/cm@ 25°C)	pH (pH units)		Toxicants Water	Temperature [b]
		75th percentile	75th percentile	25th percentile	Maximum	75th percentile	75th percentile	25th percentile	75th percentile	% protection [a]	
	Uplands A (*Largely unmodified*)										
The Grampians	The Grampians	≤35	≤370	≥80	130	≤5	≤200	≥5.4	≤7.0	95	<= 20%ile and <= 80%ile of the reference distribution
	Central Foothills and Coastal Plains (Slightly to moderately modified)										
Uplands of Campaspe, Loddon Avoca, Wimmera and Hopkins Basins	Uplands of Moorabool, Werribee, Maribyrnong, Campaspe, Loddon Avoca, Wimmera and Hopkins basins.	≤55	≤1,050	≥70	130	≤15	≤2,000	≥6.8	≤8.0	95	<= 20%ile and <= 80%ile of the reference distribution
	Murray and Western Plains (Slightly to moderately modified)										
Wimmera, Avoca and Mallee basins	Lowlands of Campaspe, Loddon, Avoca, Wimmera and Mallee basins	≤50	≤900	≥65	130	≤40	≤2,000	≥6.8	≤7.8	95	<= 20%ile and <= 80%ile of the reference distribution

a 95% level of protection relates to the ANZECC trigger values for freshwater as set out in Appendix A of this water quality management plan, and as derived from Table 3.4.1 of ANZECC Guidelines.

This is a default figure from ANZECC and ARMCANZ (2000). SEPP (Waters) does not present a Temperature Objective for Rivers and Streams and in the absence Clause 17 of SEPP (Waters) refers to default values such as this.

Table 8: Environmental quality objectives for physical and chemical indicators for wetlands

Wetland Type	Sub-type	ENVIRONMENTAL QUALITY INDICATOR						
		pH range	Dissolved oxygen range (% saturation)	Electrical conductivity (µScm-1)	Turbidity (NTU)	Total Nitrogen (µg/L)	Total Phosphorus (µg/L)	Toxicants Water
		Min-Max	Min-Max	75th percentile	75th Percentile	75th Percentile	75th Percentile	% protection
Riverine	Flow-through	6.5-8.5	80-120	1,500	5	500	30	95
	Terminal	6.5-8.5	80-120	N/A	15	1,500	100	
	Floodplain	6.5-8.5	80-120	N/A	15	1,500	100	
Deep inland	Fresh	6.5-8.5	80-120	1,500	5	500	30	95
	Saline	6.5-8.5	80-120	N/A	5	500	30	
Shallow inland	With an outflow	6.5-8.5	80-120	N/A	15	1,500	100	95
	Closed	N/A	N/A	N/A	N/A	N/A	N/A	

4.6.1.1 About these alternative targets

The WQM Plan may specify an alternative water quality target value if:

a. *it is consistent with the water quality objectives in Part 3 of Chapter 9; and*

b. *it is determined in accordance with the procedures set out in the ANZECC Guidelines; and*

c. *either:*

   i. *the alternative target value provides a better level of protection than the value that would apply under subsection (2) or (3), as applicable; or*

   ii. *the WQM plan sets out reasons why the alternative target value will be as effective in achieving the objectives in Part 3 of Chapter 9; or*

   iii. *the WQM plan sets out reasons why the target value in subsection (2) or (3), as applicable, is inappropriate for the water resource plan area; and*

d. *for a water resource that is also covered by a water resource plan area of another Basin State—it is developed in consultation with that State.*

Victoria's alternative targets for fresh water-dependent ecosystems are in line with the requirements for alternative targets set out in 10.32, and are:

a. consistent with the water quality objectives in Part 3 of Chapter 9; and

b. were developed using best practice and in accordance with the procedures set out in the ANZECC Guidelines; and

c. will be as effective in achieving the objectives in Part 3 of Chapter 9.

This is described next.

Consistency with the Basin Plan objectives for water-dependent ecosystems (Basin Plan section 9.04)

Victoria's alternative values (environmental quality objectives) for fresh water-dependent ecosystem are based on best practice for setting environmental values. They present values that indicate where a direct toxic effect or adverse effect on environmental values may occur, as a trigger for further investigation, while recognising community values and feasibility for waterway protection. They are drawn from the SEPP (Waters) and are therefore consistent with water quality management framework in the state, reinforcing their role for water quality protection.

These targets are therefore consistent with the Basin Plan objectives for water-dependent ecosystems which seek that water quality is sufficient to maintain, protect and restore ecosystems.

Developed using best practice and in accordance with the procedures set out in the ANZECC Guidelines

Victoria's alternative values are developed using best practice and in line with the ANZECC Guidelines. SEPP (Waters) is consistent with the National Water Quality Management Strategy charter, policies and procedures, in particular the approach of the Australian and New Zealand Guidelines for Fresh and Marine Quality (ANZECC Guidelines).

Our targets provide a value that indicates where a direct toxic effect, or adverse effect on environmental values may occur or has occurred, and therefore they act as a 'trigger' to prompt a management response, such as further investigation.

At the same time as these values are in line with the ANZECC Guidelines' recognition of three levels of protection for aquatic ecosystems, based on the condition of the ecosystem, the SEPP (Waters) values are based on three levels of protection of largely unmodified, slightly to moderately unmodified and highly modified water environments for surface waters. By recognising the condition of the ecosystems in this way, the values presented are feasible and in line with community values for protection.

Our alternative values draw on local water quality data from 1990-2013 and were used to derive these environmental quality objectives.

The process outlined in the ANZECC Guidelines involves identifying the most appropriate indicator relevant to the environmental threat. Reference sites were used to derive local values for indicators. Reference sites are those that were considered to be near natural or minimally-disturbed versions of that environment, such as where there are no intensive agriculture, mining or wastewater discharges. Water quality data from as many reference sites as practicable was then used to derive the local values for these indicators.

Further information on the process for developing Victoria's SEPP (Waters) values – which are drawn on here – is available in the Environment Protection Authority (2018) Publication 1688: Development of environmental quality indicators and objectives for the SEPP (Waters).

Values will be as effective, as Basin Plan targets, in achieving the Basin Plan objectives for water-dependent ecosystems (Basin Plan section 9.04)

Victoria's alternative targets presented here will be as effective as the Basin Plan targets in achieving the Basin Plan objectives for water-dependent ecosystems because they:

- have been developed using extensive local data in their development
- take into consideration the level of protection relevant to their condition and use
- are in line with Victoria's water quality management framework and policies.

The alternative values more accurately represent condition, and through alignment with state policy will enable policies and management responses that will achieve water quality outcomes.

Schedule 1 of this plan provides a comparison of values between the Basin Plan targets and Victoria's alternative targets presented in this plan. The small levels of variance in values are likely to be because of Victoria's use of extensive local data sets and the updated data available since the Basin Plan targets were developed before 2012.

4.6.2 Target for irrigation waters

There are no irrigation infrastructure operators that deliver services in the Wimmera Mallee water resource plan area. Therefore, this target does not apply to this water quality management plan.

4.6.3 Water quality targets for recreational water

The Basin Plan specifies the cyanobacteria values as per the National Health and Medical Research Council (NHMRC) Guidelines for Managing Risk in Recreational Water.

SEPP (Waters) includes indicators and objectives for primary and secondary contact recreation that are mostly based on the NHMRC guidelines:

- Marine and estuarine waters: As with SEPP (Waters), the indicator is enterococci and objectives

are based on those in the NHMRC guidelines. E. coli can be used for estuarine waters if there is a saltwater wedge creating a freshwater top layer.

- Freshwaters: E. coli or enterococci can be used for freshwaters. Water managers can select either indicator but are recommended to use E. coli if they have been doing this previously, to maintain a historical dataset.

As the NHMRC guidelines do not provide objective values for E.coli, values from the New Zealand Government Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas 14 were used for SEPP (Waters).

SEPP (Waters) also includes objectives for secondary contact recreation, which are not provided for in the NHMRC guidelines. SEPP (Waters) was largely based on the NHMRC guidelines, departed from these guidelines in some aspects. To provide confidence about this, three international experts were invited to peer review the work done to develop the draft SEPP (Waters).

These experts were Graham McBride from the National Institute of Water and Atmosphere Research in New Zealand, Timothy Wade from the US Environment Protection Authority and Professor Charles Gerba from the University of Arizona. The reviewers' feedback supported the Victorian EPA's work and the reviewers considered it was sound in substance, rational and scientifically defensible.

The Basin Plan water quality targets for water used for recreational purposes are the values for cyanobacteria cell counts or biovolume in the Guidelines for Managing Risks in Recreational Water (Chapter 6 in NH&MRC 2008).

The water quality management plan will apply the SEPP (Waters) water quality objectives for recreational water, noting that these are based on a rigorous scientific review process.

SEPP (Waters) Schedule 3 section 6 contains the water-based recreation indicator and environmental quality objectives.

4.6.4 End-of-valley salinity targets

There are two end-of-valley Basin salinity target sites in the Wimmera Mallee water resource plan area used for long-term planning purposes, consistent with clause 10.33(2)(c) of the Basin Plan. These targets are not included in SEPP (Waters). The two end-of-valley targets are shown in **Table 9**.

Victoria reports annually on these targets. The most recent report, Victoria's Annual Status Report 2015/16 Basin Salinity Management 2030, is available at **https://www.water.vic.gov.au/murray-darling-basin/basin-salinity-management**.

Table 9: Victoria's end of valley salinity targets

End of Valley Basin	Target (EC us/cm)		Mean annual salt load (tonnes per year)
	Median	80th percentile	
Wimmera River at Horsham (gauging site 415200)	1,380	1,720	31,000
Avoca River at Quambatook (gauging site 408203)	2,096	No target	No target

4.6.5 Having regard to these targets in the development of measures:

These targets are a key component of the Basin Salinity Management 2030 strategy, and its predecessor Basin Salinity Management Strategy 2000-2015, delivered across jurisdictions. For example, through monitoring of these targets and through associated modelling it has been determined that catchments deliver less salt into the River Murray than was previously considered in the establishment of the Basin Salinity Management approach.

The numerical value of the target for the Wimmera-Mallee has been identified as a target for the Wimmera-Mallee Long-term Watering Plan.

These targets apply to surface water sites, and are not affected by the waters managed under the South Australian-Victorian Border Groundwaters Agreement.

4.6.6 Having regard to the impact on another state when developing measures

Section 10.35 of the Basin Plan requires that the measures in the water quality management plan must be developed having regard to the impact on the ability of another Basin state to meet water quality targets and any adverse impacts the measures may have on other Basin states' water resources.

The Wimmera-Avon rivers surface water basin is not connected to the River Murray. The Avoca basin is infrequently connected to the River Murray via the Avoca floodway that connects with the Kerang Lakes during floods. The Mallee basin is a semi-arid zone that has no perennial streams, localised runoff during exceptionally wet conditions and no surface water diversions. Any measures, or the absence of measures, in the Wimmera-Mallee water resource plan area therefore have minimal to no impact on another state.

Victoria is contributing to the water quality objectives of the Commonwealth Water Act and the Basin Plan 2012 as a signatory to the Murray-Darling Basin Agreement and the Basin Salinity Management 2030 strategy.

5. Groundwater – Wimmera-Mallee (groundwater) water resource plan area

The Wimmera-Mallee water resource plan addresses the requirements for the Wimmera–Mallee (surface water) water resource plan area (SW4) and the Wimmera–Mallee (groundwater) water resource plan area (GW3) as a single instrument. The Wimmera–Mallee WQMP addresses the surface water and groundwater resources within these slightly different geographic areas.

The northern boundary of the Wimmera–Mallee (groundwater) water resource plan area extends to the River Murray. There is no Murray corridor defined for groundwater in the Basin Plan.

The geology of the Wimmera–Mallee includes alluvium and dune deposits in the vast floodplains, signifying windblown Aeolian landscapes over the Woorinen Formation to the north of the water resource plan area and Cambrian rock of the Grampians (*Gariwerd*) and St Arnaud groups in the south-east. Underlying these are sediments of the Murray Group which encompasses the marine mud, clay and limestone sediments. Important units within the Murray Group are the Duddo Limestone, Geera Clay and Ettrick Formation. Underlying these are the regionally extensive units of the Renmark group aquifer system.

5.1 Groundwater quality

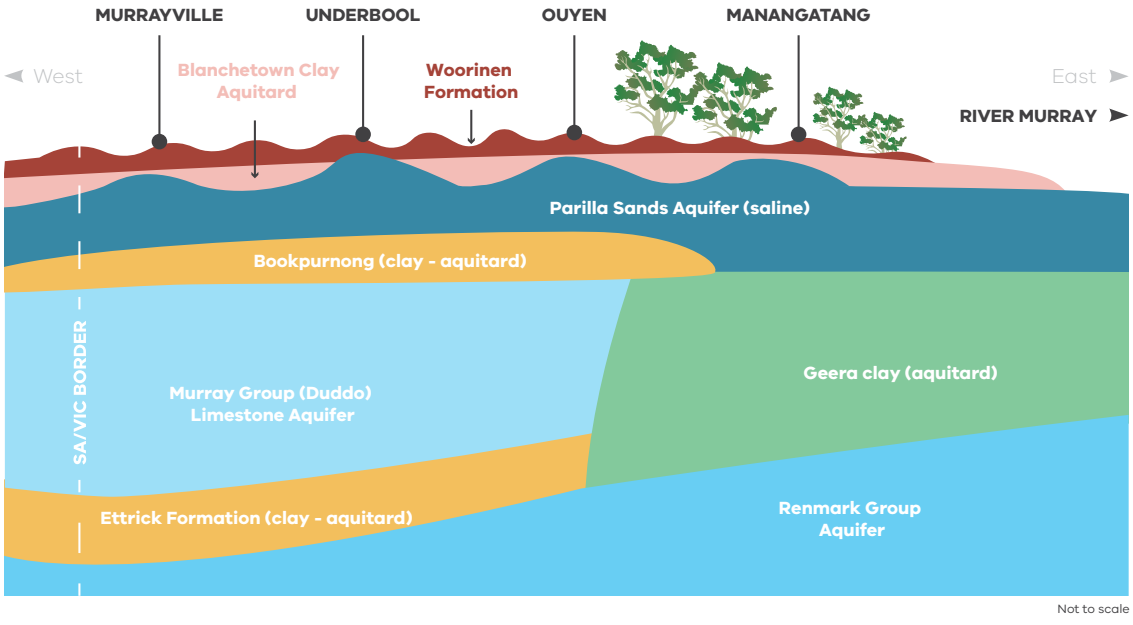

Figure 3: Simplified stratigraphy of the Wimmera-Mallee: Sedimentary Plain SDL in northern part of the Wimmera-Mallee water resource plan area

Most of the Wimmera River system overlies the regional groundwater flow system within the Parilla Sands aquifer, which is very saline. Salinity of groundwater within the aquifer in areas away from the River Murray generally ranges between 20,000 and 100,000 EC (11,000–55,000 mg/L) (Aquaterra 2009). In recent times, irrigation of the surface has caused 'freshening' in the upper section of the aquifer, reducing concentrations to between 2,000 and 50,000 EC (1,100 to 27,500 mg/L) (Aquaterra 2009). Typically, the groundwater table is well below waterway channels. For the Wimmera River, analysis of depths to the water table and base flow filtering for the

Wimmera River Environmental Flows Study (Alluvium 2013) confirmed that there are no significant groundwater contributions to surface water flow beyond the intrusion of hypersaline groundwater into the river channel when it intersects with the water table in the lower Wimmera River.

In the lower Wimmera River, groundwater enters pools typically at depths greater than two metres. During low flow conditions, water quality can become extremely poor and unable to support fish and macroinvertebrates, with salinity levels more than 50,000 EC. The density difference between the deeper hypersaline water and overlying surface water leads to stratification, which reduces the amount of oxygen reaching the hypersaline layer from the surface. Bacterial oxidation of organic matter further reduces oxygen in the hypersaline layer, leading to a bacterial reduction of sulfate, which then creates toxic hydrogen sulfide as a by-product. These processes contribute to the low water quality during these conditions.

The Avon–Richardson river systems, as well as the upper Wimmera tributaries including Mt William Creek, can also intersect groundwater through low flow or incised channels. This can also lead to saline water entering these systems in dry conditions.

Mallee groundwater systems are predominately saline and unsuitable for agriculture or human use. The exception to this is the Murray Group Limestone Aquifer, a confined aquifer that lies deep under the western part of the Mallee, on the Victoria-South Australia border (**Figure 2**). This aquifer is shared by Victoria and South Australia. In Victoria, all groundwater extraction except for domestic and stock is licensed. In the Wimmera-Mallee water resource plan area, the licensing authority is GWMWater.

An area of intensive use along the border where the aquifer contains fresher water is managed as the Murrayville Groundwater Management Area (GMA) (see **Figure 3**). The Murrayville GMA covers 1,578 km^2 and is centred on the town of Murrayville, between Murray-Sunset National Park (to the north) and the Big Desert Wilderness Park. The current permissible consumptive volume (PCV) of the Murrayville GMA is 10,883 ML per annum (gazetted in July 2011), which is the limit on the total licensed volume that can be issued in the Murrayville GMA. Along the border with South Australia, a 20 km wide strip of Victoria is part of the Designated Area of the South Australian–Victoria Border Groundwaters Agreement (see **Part 4.4.2**).

5.2 Causes, or likely causes, of groundwater quality degradation

Section 10.35A of the Basin Plan requires Water Quality Management Plans to identify the causes, or likely causes, of water quality degradation of water resources in the water resource plan area. In identifying the causes or likely causes of degradation, regard must be had to the key causes identified in Chapter 9 of the Basin Plan. The Basin Plan does not specify types of groundwater quality degradation and/or the key causes of groundwater quality degradation. No causes or likely causes of water quality degradation have been identified at WRP scale for the groundwater resources.

In identifying any causes, or likely causes of water quality degradation in groundwater, Victoria considered the Wimmera-Mallee Risk Assessment, existing studies and strategies, and had regard to the key causes of water quality degradation in the Murray-Darling Basin, as listed in Schedule 10 of the Basin Plan. **Table 10**, below, provides a summary of issues considered.

Victoria's approach to identifying causes and likely causes for the purposes of section 10.30 was to consider any relevant water quality degradation and identifying what did or was likely to have caused any identified degradation.

Table 10: Assessing groundwater degradation and causes

Type of water quality degradation	Causes with potential relevance to groundwater and degradation discussion
Elevated levels of salinity	Irrigation at high salinity risk locations without adequate drainage management; reduction in streamflows that limit the dilution of salinity; the use of groundwater for irrigation purposes at locations where highly saline upper aquifer water drains to the lower aquifer. Groundwater management in the Wimmera-Mallee focuses on the risk of elevated levels of salinity in groundwater that affects beneficial uses. In the Murrayville Groundwater Management Area Local Management Plan, the aquifer is confined and the risk of salinisation is from lateral movement of aquifers from the east. The potential for pumping for irrigation to increase the hydraulic gradient and therefore increase the rate of groundwater movement is monitored through the plan. Salinity is also monitored in selected observation bores. While elevated salinity of groundwater is a potential risk to the condition and availability of groundwater under the risk assessment, no increased salinity has been observed and therefore no causes or likely causes can be identified.
Elevated levels of suspended matter	Not relevant to groundwater degradation
Elevated levels of nutrients	Not identified as a broad area of concern in groundwater in Wimmera- Mallee groundwater
Elevated levels of cyanobacteria	Not relevant to groundwater
Water temperature outside natural ranges	Not relevant to groundwater
Dissolved oxygen outside natural ranges	Not relevant to groundwater
Elevated levels of pesticides and other contaminants	Not identified as a broad area of concern in groundwater in Wimmera- Mallee groundwater, though in limited sites in the water resource plan area, localised contamination from old gasworks and fuel storage have been identified and examined by the Environment Protection Authority*.
pH outside natural ranges	Not identified as a broad area of concern in groundwater in Wimmera- Mallee groundwater.
Elevated pathogen counts	Not identified as a broad area of concern in groundwater in Wimmera- Mallee groundwater.

* Newall (2015) Examination of causes of water quality degradation in the Wimmera-Mallee (unpublished).

The most relevant water quality threats to the groundwater resource include inappropriate water use practices such as excessive pumping, which can lead to considerable localised drawdown of the aquifer, and contamination with saline groundwater from leakage between aquifers (e.g. due to failed bore infrastructure). Excess water accumulation underlying clay in the landscape due to excessive drainage can lead to a perched water table causing waterlogging, salt accumulation, crop or vegetation loss and, in some cases, damage to infrastructure such as roads. These are threats which the Victorian Government address through its management framework.

Groundwater and surface water interactions have been observed in the Wimmera region involving regional or local groundwater flow systems. These localised groundwater flow systems are found next to the Grampians (*Gariwerd*), where groundwater infiltrates colluvium deposited from weathered and eroded sediments, and can discharge at the base of foot-slopes and is of reasonable quality. Given that the MacKenzie River and Mt William Creek flow next to the Grampians (*Gariwerd*) in some places, groundwater–surface water interactions can occur.

In summary, no water quality degradation has been identified in the groundwater resources of this water resource plan area. The aquifers of this region are generally highly saline, and extraction for use is only from a few specific locations where yield and water quality have been identified as viable. Where there is intensive use of the groundwater, primarily in the border zone with South Australia, including part of the Murrayville Groundwater Management Area, salinity is monitored to ensure the quality of the water continues to be protected under the mechanisms of the plan. Salinity monitoring since 2001 under the Murrayville Groundwater Management Area Local Management Plan has shown no degradation of water quality in this timeframe.[3]

Risks are identified through the Wimmera–Mallee Water Resource Plan Risk Assessment (see **Appendix B**) and, as outlined below, they are not considered to have eventuated.

3. See Appendix 2 - Grampians Wimmera Mallee Water (2016) Murrayville Water Supply Protection Area Annual Report. http://www.gwmwater.org.au/component/edocman/895-2015-16-murrayville-wspa-annual-report/download

5.3 Risks to the quality of groundwater resources

5.3.1 Summary of risk assessment

The Risk Assessment for the Wimmera-Mallee (groundwater) water resource plan area assessed risks to the condition of the ground waters. The Risk Assessment (see **Appendix B**) outlines the risks, the level of risk, description of medium to high risks, and strategies to address each medium to high risk as required in 10.41-10.43 of the Basin Plan.

The identification of causes under the risk assessment does not affect the assessment of causes and likely causes for section 10.30 of the Basin Plan as outlined above. The Risk Assessment (see **Appendix B**) identified any possible causes that could occur across the Victorian Basin water resources. The likelihood of those causes occurring, and potential impact were assessed under the Risk Assessment (see **Appendix B**). This assessment lead to the identification of medium and high risks which are summarised below.

Risk of impacts on consumptive uses from:

- climate change (elevated salinity)
- land use changes which affect water condition (elevated salinity and toxicants).

These risks were identified with a low level of confidence. It is considered that in climate change conditions there may be greater drive for groundwater use which, if not managed effectively, could lead to a greater drawdown on fresh groundwater. This has the potential to affect relative pressures of aquifers and may lead to salinity contamination from surrounding aquifers.

These risks are addressed by a range of strategies described in the Water Resource Plan Risk Assessment (see **Appendix B**) and by Measure 3: 'Implementing the South Australian-Victorian Border Groundwaters Agreement'.

Risk of impacts on Aboriginal uses of water were identified from:

- climate change
- bushfires
- extreme drought
- extreme wet
- flooding and overbank inundation
- point source discharges
- increase in farm dams
- earth resources development
- failure to continue to invest in best practice land use initiatives
- land use change which affects water condition
- non-compliance with the Victorian Water Act
- increase in the number of entitlements leading to increased take
- increased use of water access rights (elevated salinity and toxicants, and other water quality impacts).

These risks were identified with a low level of confidence.

It is recognised that in Victoria there is limited confidence in understanding of and therefore ability to manage for Aboriginal values of groundwater. For this reason, high risks were identified for Aboriginal use of water across all potential causes until there is greater understanding of local values and the ability to assess these more accurately. A range of strategies are being employed to manage and minimise these risks.

Water for Victoria commits to a process of information gathering and understanding of Aboriginal water values and uses to better inform the strategies and measures around water quality. These risks are:

- addressed by a range of strategies described in the Risk Assessment (see **Appendix B**).
- specifically addressed by the measure of this WQMP: "implementing SEPP (Waters)".

In addition, this risk is addressed through Measure 3: 'Implementing the South Australian-Victorian Border Groundwaters Agreement'.

Risk of impacts on Environmental Uses from:

Medium and high risk of impacts on environmental uses were not identified for the Wimmera-Mallee. There are few groundwater dependent ecosystems in the Wimmera-Mallee water resource plan area, and no priority sites.

CSIRO and SKM (2010) reported no groundwater-dependent ecosystems were identified for the Wimmera-Mallee water resource plan area, and the long-term watering plan for the Wimmera-Mallee has not identified any groundwater-dependent ecosystems as priority environmental assets.

The Wimmera Wetlands Asset Strategy (2011) identified potential groundwater-dependent ecosystems in the Wimmera section of the Wimmera-Mallee water resource plan area as the Wimmera River and shallow lakes west of the river. The primary groundwater-dependent wetland assets in the Wimmera River floodplain are deep pools where saline groundwater from the Parilla Sands Aquifer enters during low flow conditions, which may result in anoxic or toxic environments.

The major aquifer for extraction is the Murray Group Limestone aquifer, which underlies and is separated from the shallow Parilla Sands aquifer by the Bookpurnong aquitard layer. The regional groundwater flow in the Murray Group Limestone aquifer is also to the west and north-west, away from the Wimmera River. For these reasons the groundwater-surface water connectivity of the Wimmera River is classified as very low, manifesting over large time scales (greater than 50 years) (SKM 2012).

In the Mallee area of the Wimmera-Mallee water resource plan area, there are no major rivers or significant surface water features that receive groundwater discharge from the water table aquifer, so there is a low risk of impacts on key ecosystem function. The Mallee Wetland Strategy (2006) identified saline lakes such as Lake Tyrrell and riverine wetlands at risk from rising saline groundwater levels. However, these have not been identified as priority environmental assets.

In the Highlands SDL Resource Unit, CSIRO and SKM (2010) report there are no key environmental assets identified as groundwater dependent and sensitive to groundwater extraction that are associated with the Wimmera-Avoca Highlands SDL area.

Consumptive and Aboriginal uses

Risks of impacts on consumptive and Aboriginal uses of water from interception activities caused by land use change, which affects water condition, increase in farm dams, and earth resource developments were identified with a low level of confidence.

The Basin Plan does not specify types of groundwater water quality degradation and/or the key causes of groundwater quality degradation. Groundwater quality has also not generally been addressed in regional catchment strategies apart from water salinity. Natural salinity levels of groundwater are considered with regard to the suitably of the resource, and are not considered to be water quality degradation. Groundwater management has generally been addressed in issues of extraction, yield and recharge.

5.3.2 Measures addressing risks

Section 10.31 of the Basin Plan requires measures to be identified for risks arising from elevated levels of salinity or other types of water quality degradation.

The measures to address these risks to groundwater are:

- Implementing the Border Groundwaters Agreement between South Australia and Victoria
- The implementation of SEPP (Waters).

The measures contribute to the achievement of the following Chapter 9 water quality objectives from the Basin Plan (see **Table 11**).

Table 11: Measures contributing to water quality objectives

	Measure 1: Implementation of SEPP (Waters)	Measure 3: Implementing the Border Groundwaters Agreement–South Australia–Victoria
Freshwater-dependent ecosystems	NA	NA
Raw water for treatment for human consumption	✓ where relevant aquifers used locally	✓ where relevant aquifers used locally
Irrigation water	There is no distributed groundwater for irrigation	There is no distributed groundwater for irrigation
Recreational water	NA	NA
Maintaining good levels of water quality	✓	✓
Salt export	NA	NA

It is not considered any other measures are necessary on the basis that the above highlighted risks are addressed in Victoria's Wimmera Mallee water resource plan area through:

- Strategies identified in the Risk Assessment as outlined in **Appendix B**; and
- The measures contributing to the achievement of water quality objectives as outlined in section 5.4 below.

5.4 Measures contributing to the achievement of water quality objectives

As already mentioned Victoria has a comprehensive and active water quality management framework that has parallels to many aspects of the Basin Plan's clauses on water quality management. The strategies to address medium to high risks to the condition of water resources identified as part of the risk assessments for the Wimmera Mallee water resource plan show this is an active and continuously improving framework for addressing water quality.

Beyond these strategies, Victoria has done a detailed review to identify and specify measures for the Wimmera-Mallee water resource plan area that will contribute to the achievement of the Basin Plan's water quality objectives. Their identification and development have had regard to the causes, or likely causes, of water quality degradation and the water quality targets of the water resource plan area, and the salinity targets for the purposes of long-term salinity planning and management set out in Chapter 9 of the Basin Plan.

Two significant measures that will contribute to the achievement of water quality objectives under section 10.33 of the Basin Plan for the Wimmera-Mallee water resource plan area (groundwater) are:

1. Implementation of the State environment protection policy (Waters)
2. Implementing the Border Groundwaters Agreement between South Australia and Victoria.

Further Victoria's water quality management framework supports these measures and obligations.

5.4.1 Measure 1: Implementation of the State Environment Protection Policy (Waters)

In addition to surface water Victoria's SEPP (Waters) also applies to groundwater see **Part 2.3**. For further information about how this Measure addresses risks to water quality see **Part 4.5** above.

5.4.2 Measure 3: Implementing the South Australian-Victorian Border Groundwaters Agreement

The Border Groundwaters Agreement between the South Australian and Victorian governments aims to cooperatively manage the groundwater resources along the states' border. The agreement provides that the available groundwater shall be shared equitably between the two states. It applies to all existing and future bores within the designated area, except domestic and stock bores, which are exempt from the agreement. Bore construction authorisations and extraction licences may not be granted or renewed within the designated area by either state unless they conform to the management prescriptions established by the agreement. The agreement establishes the South Australian-Victorian Border Groundwaters Agreement Review

Committee ('Review Committee'), with membership from both states, as the body responsible for jointly managing the groundwater resources in the two states within the designated area. This area is a 40 km wide strip centred on the border and extending for its length from the River Murray to the coast, divided into 22 zones with 11 zones in each state (see **Figure 4**).

The agreement allows for a permissible annual volume (PAV) to be extracted for each aquifer in a zone in the designated area. The PAV is the maximum licensed extraction volume that is permitted in each aquifer in a zone and provides for a groundwater rate of drawdown that must not be exceeded in a zone. This is known as the permissible rate of potentiometric surface lowering and can be specified for each aquifer in a zone. It also allows for a permissible distance from the border to be prescribed within this area in each state. The Review Committee must agree to any proposed licensed withdrawals of groundwater or bore construction (excluding domestic and stock bores). The permissible distance is currently

1 km for the Tertiary Limestone Aquifer in Zones 1 to 9 and 3 km for Zones 10 and 11 and the Tertiary Confined Sand Aquifer. A permissible salinity level can be specified for each zone to safeguard groundwater quality. This has not yet been set for any zone.

5.4.2.1 Contribution to achieving objective for raw water for treatment for human consumption

Some local use of waters in this border management area is for domestic purposes. By monitoring and managing for salinity in this resource, these purposes are protected from increased salinisation that may otherwise affect users.

5.4.2.2 Maintaining good levels of water quality

Monitoring the resource for quality, and commitments to manage the resource within managed use constraints, enables the quality of the water to be maintained.

5.4.2.3 Contribution to achieving objective for freshwater-dependent ecosystems

The potential for groundwater to effect groundwater dependent ecosystems in the Wimmera-Mallee is limited to salinity impacts, there is not considered to be water quality degradation within the groundwaters of the Wimmera-Mallee at the WRP scale. Saline impacts from groundwater may instead occur for example through unnatural flows of naturally saline groundwater into waterways such as into the Wimmera River. The Basin Plan's water quality targets for fresh water-dependent ecosystems however, do not contain a salinity target and therefore do not provide a useful target for having regard to in the development of measures. An objective for groundwater can be such that water bodies do not degrade in quality such that the resource is reclassified as part of a more saline segment.

5.4.2.4 Contribution to achieving objective for recreational water

These groundwater resources do not contribute to a recreational water objective.

5.4.2.5 Objective for irrigation water

The objective for irrigation in the Wimmera-Mallee relates to the water quality target for irrigation waters which the Basin Plan applies to water distributed by irrigation infrastructure operators primarily for the purpose of irrigation. As no such water is distributed in the Wimmera-Mallee, this objective does not apply to this water quality management plan. It is noted however, that local direct diverters of these groundwaters for various uses including local irrigation are supported by this measure.

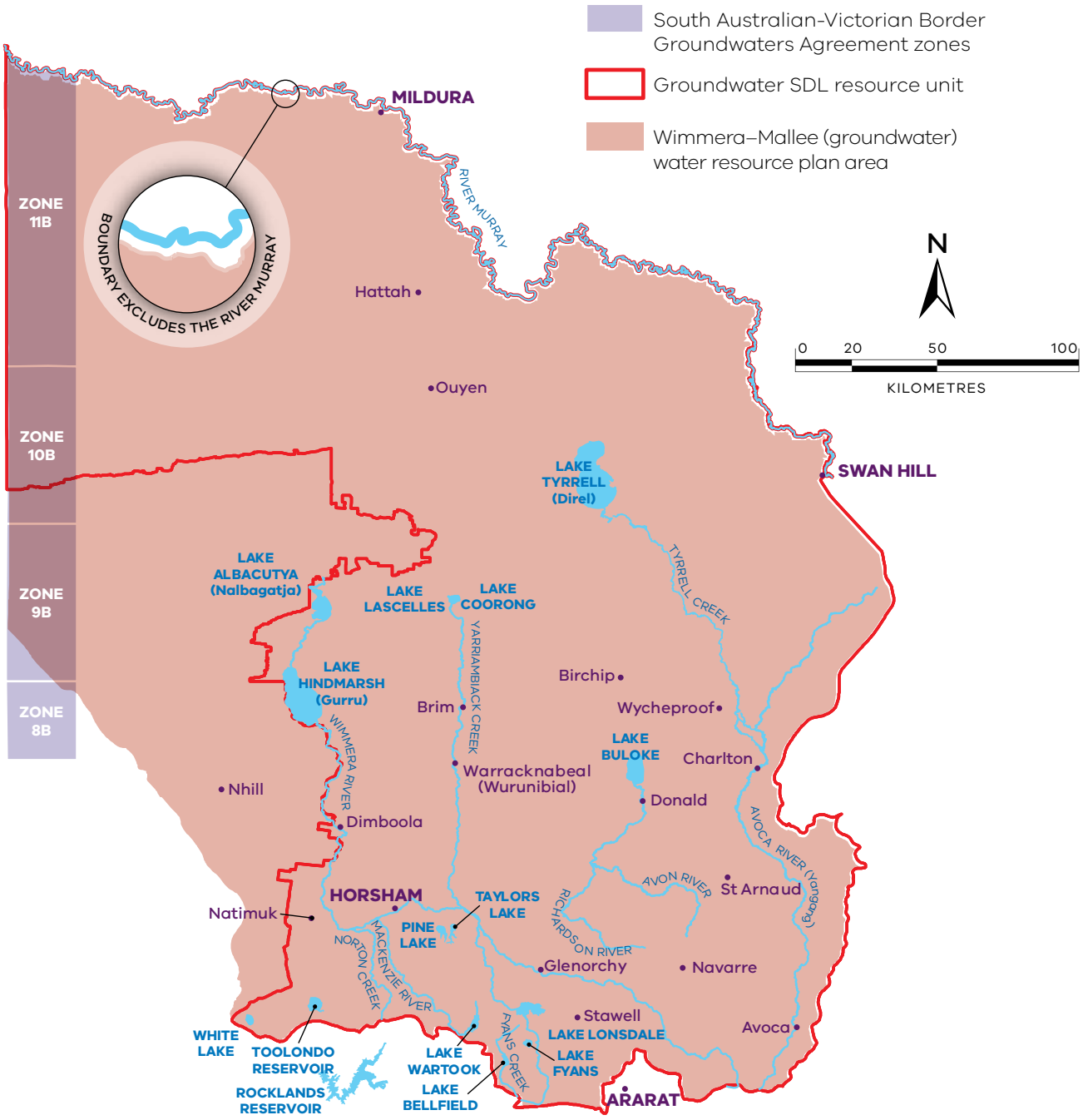

Figure 4: South Australian-Victorian Border Groundwaters Agreement

5.4.3 Development of the measures: having regard to the causes

The development and identification of the measures for the Wimmera-Mallee Water Quality Management Plan had regard to the causes, or likely causes, of water quality degradation of the surface waters and groundwater of the respective water resource plan areas. While a number of causes of water quality degradation can be, and are being, addressed through land management actions, overarching and water management actions address some of these causes.

5.4.4 Having regard to the targets in the development of measures

No targets were identified for the Wimmera-Mallee (groundwater) water supply protection area.

5.4.5 Having regard to the impact on another state when developing measures

Section 10.35 of the Basin Plan requires that the measures in the water quality management plan must be developed having regard to the impact on the ability of another Basin state to meet water quality targets and any adverse impacts the measures may have on other Basin states' water resources.

Groundwaters of the Wimmera-Mallee water resource plan area on the South Australian border are managed through the South Australian-Victorian Border Groundwaters Agreement.

5.5 Water quality target values for groundwater

There are no water quality target values for the Wimmera–Mallee Groundwater WQMP.

The Basin Plan does not specify water quality target values specifically for groundwater, and therefore those presented for surface water (section 9.16, 9.17 and 9.18 of the Basin Plan) were considered. Water quality targets for irrigation water (section 9.17 of the Basin Plan) do not apply because no groundwater is distributed by an irrigation infrastructure operator for the purpose of irrigation.

Water quality targets for recreational water (section 9.18 of the Basin Plan) do not apply to groundwater because groundwater is not used in situ for recreation, and does not support the growth of cyanobacteria unless exposed through surface ponds – where it becomes classified as surface water.

MDBA advice (published in Position Statement 7a) is that where a wetland depends on groundwater, the targets for freshwater-dependent ecosystems apply to that groundwater. The water quality targets for freshwater-dependent ecosystems have been reviewed for applicability to the Wimmera–Mallee groundwater resources; however, they are not considered to be appropriate.

Victoria identifies groundwater segments by the beneficial uses they can support based on salinity level. The objective of Victoria's management of groundwater is to prevent saline water from infiltrating fresher aquifers.

6. Monitoring, data management and reporting

Victoria manages its fresh water and groundwater systems through a range of long-term monitoring programs. Various water quality indicators are monitored, depending on the objectives of the monitoring program. The Department of Environment, Land, Water and Planning (DELWP), with the help of catchment management authorities (CMAs) and water corporations, carry out monitoring programs across the state using a range of physio-chemical, bacteriological and biological indicators.

DELWP is responsible for carrying out long-term assessment of the state's water resources under the Victorian Water Act. It monitors Victoria's environmental water quality through its Victorian Water Quality Monitoring Network, largely through regional water monitoring partnerships and biological monitoring in partnership with the Environment Protection Authority.

Monitoring in the Wimmera-Mallee water quality management plan applies the general principles for monitoring set out in section 13.04 of the Basin Plan.

There is a range of strategies which all assist in the management of water quality across the state. These include, but are not limited to:

- SEPP (Waters)
- regional sustainable water strategies
- the Victorian Environmental Water Holder's seasonal watering plan
- strategies and plans delivered by other stakeholders including regional catchment strategies and regional waterway strategies
- water corporation annual reports.

Victoria's Waterway Management Strategy provides the key policy direction for managing waterways. It is intended to provide a single framework to address community expectations and obligations for waterways. This strategy is supported by regional waterway management strategies, consistent with the Victorian Water Act.

The SEPP (Waters) sets out indicators and quantitative objectives to protect the uses of the state's water resources of public importance. The policy identifies beneficial uses and sets environmental quality objectives and indicators to measure whether these uses are being protected.

6.1 Data management and reporting

The Regional Water Monitoring Partnerships and State Observation Bore Network have been established to collect data on water quality and water quantity for surface water and groundwater respectively. They work to satisfy needs including legislative and regulatory compliance, performance monitoring, policy development and operational decision-making as set out in the Victorian Water Act.

Victoria has a range of reporting initiatives being implemented to improve water quality monitoring. Data collected primarily through the Regional Water Monitoring Partnerships, State Observation Bore Network and salinity management program is made available for a variety of data sources and reports.

These include:

- **Water Management Information System** data collected on water quality and quantity is held in this system, which is made available on the DELWP website.
- **Annual Victorian Water Accounts** documents key water management data for Victoria and provides a summary of water availability, water allocation and use of bulk water for surface water and groundwater.
- **Victorian Environmental Water Holder** publishes its annual report and various other reports about outcomes of the use of environmental water allocations.
- **Basin Salinity Management 2030 (BSM2030)** monitors and documents salinity management including analysing and modelling to quantify, validate and review accountable actions to delayed salinity impacts. BSM2030 supports river managers, environmental holders and other water managers.

Victoria also reports annually on streamflow and salinity for end-of-valley target sites. Every second year, a comprehensive report is provided to the Ministerial Council on the progress against BSM2030 objectives. Every other year, a status report is provided for the Basin Officials Committee along with a summary report for the Ministerial Council.

Schedule 12 of the Basin Plan requires the Basin states to report on water quality targets on a five-yearly basis. The Basin Plan water quality objectives in Chapter 9 are consistent with the state's beneficial uses for protecting drinking, industrial and aquatic ecosystems that a waterway and waterbody can support.

Implementing the SEPP (Waters) protects beneficial uses. It makes sure that actions in the catchments do not have a detrimental impact on the quality of fresh water and that different uses and values of water, including drinking, agricultural, recreational and aquatic ecosystem, are fit-for-purpose consistent with section 5.04 of the Basin Plan.

Continuous improvements to water quality management

Victoria continues to improve planning, management and implementation arrangements for water quality. The Victorian Government, through its water plan Water for Victoria (DELWP, 2016) committed to the following initiatives that will improve water quality across Victoria:

- Protect water quality through the State Environment Protection Policy
- Invest in integrated catchment management
- Provide $222 million state-wide over four years to improve waterway health
- Improve environmental water management in a changing climate
- Support community partnerships and citizen science
- Improve knowledge and information about waterways and catchments
- Improve water delivery efficiency in irrigation districts
- Manage salinity, waterlogging and water quality
- Improve salinity management in the Mallee.

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Schedule 1: Water quality target tables

S1.1. Comparison of Chapter 9 Basin Plan targets for fresh-water dependent ecosystems with alternative targets adopted by Victoria

Table S1: Basin Plan water quality targets and corresponding SEPP (Waters) objectives for water-dependent ecosystems (rivers and streams) in the Target Application Zones of Wimmera-Mallee WRPA and groundwaters in this area

	Equivalent areas		Equivalent areas		Equivalent areas		Equivalent areas		Equivalent areas	
Geographic Zone: Basin Plan Target Application Zone/ SEPP (Waters) Segment	lM lower Murray	Murray & Western Plains – lowlands of the Wimmera and Mallee Basins	A4 – Lowland Zone including Avoca, Campaspe, Wimmera and Loddon	Murray & Western Plains – lowlands of the Campaspe, Loddon, and Avoca, Basins	B4: Avoca, Campaspe, Wimmera & Loddon	Murray & Western Plains – lowlands of the Campaspe, Loddon, and Avoca, Basins	B4: Avoca, Campaspe, Wimmera & Loddon	Uplands A: The Grampians	B4: Avoca, Campaspe, Wimmera & Loddon	Central Foothills & Coastal Plains: Uplands of the Avoca, Wimmera & Hopkins Basins
Indicators	Basin Plan Target	SEPP (Waters) Objective	Basin Plan Target	SEPP (Waters) Objective	Basin Plan Target	SEPP (Waters) Objective	Basin Plan Target	SEPP (Waters) Objective	Basin Plan Target	SEPP (Waters) Objective
pH	6.5 - 9.0 (median range)	6.8 / 7.8 (25th/75th)	6.5 / 8.3 (median range)	6.8 / 7.8 (25th/75th)	6.5-8.3 (median range)	>6.8 / <7.8 (25th/75th)	6.5-8.3 (median range)	5.4 / 7.0 (25th/75th)	6.5-8.3 (median range)	6.8 / 8 (25th/75th)
Turbidity (NTU)	50 (annual median)	<40 (75th %ile)	30 (annual median)	40 (75th %ile)	10 (annual median)	<40 (75th %ile)	10 (annual median)	<5 (75th %ile)	10 (annual median)	<15 (75th %ile)
Total phosphorus (µg/L)	100 (annual median)	<50 (75th %ile)	45 (annual median)	50 (75th %ile)	25 (annual median)	<50 (75th %ile)	25 (annual median)	<35 (75th %ile)	25 (annual median)	<55 (75th %ile)
Total nitrogen (µg/L)	1000 (annual median)	900 (75th %ile)	900 (annual median)	900 (75th %ile)	600 (annual median)	<900 (75th %ile)	600 (annual median)	<370 (75th %ile)	600 (annual median)	<1,050 (75th %ile)

	Equivalent areas		Equivalent areas		Equivalent areas		Equivalent areas		Equivalent areas	
Dissolved oxygen % sat.	85 / 110 (median range)	65 / 130 (25th/max)	80 / 110 (median range)	65 / 130 (25th/max)	80 / 110 (median range)	>65 – 130 (25th/max)	80 / 110 (median range)	80/130 (25th/max)	80 / 110 (median range)	>70 / 130 (25th/max)
EC (uS/cm)	End of Valley Targets	<2000 (75th)	Loddon 711 (median)	<2000 (75th)	NA	<2,000 (75th %ile)	NA	<200 (75th)	NA	<2,000 (75th)
Temperature	Basin Plan: Between the 20%ile and 80%ile of natural monthly water temperature SEPP (Waters): deferring to ANZECC and ARMCANZE (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality: <= 20%ile and <= 80%ile of the reference distribution. Note: SEPP (Waters) does not specify temperature as an environmental quality indicator for rivers and streams. Clause 17 of the policy states that If the level of any environmental quality indicator or objective is not provided for in Schedule 3 for the policy, contamination must not cause an adverse impact on the beneficial uses, and the level of any indicator must not be greater than— the levels specified in the ANZECC Guidelines. In this case Section 3.3.2.5 ANZECC & ARMCANZ (2000), specifically Table 3.3.1 applies. These are the same values as included in the Basin Plan.									
Toxicants	Basin Plan (non-Ramsar) and SEPP (Waters) both use Table 3.4.1, ANZECC & ARMCANZ (2000) at 95% species protection									

The reference site approach recommended in ANZECC & ARMCANZ (2000) was used in the development of targets in the Basin Plan and the SEPP (Waters) environmental quality objectives.

The advantages of using SEPP (Waters) environmental quality objectives are:

- they are based on larger and more up-to-date water quality and biological data sets
- with more data available, SEPP (Waters) environmental quality objectives used more reference site data sets and relied less heavily on expert opinion for objective setting;
- SEPP (Waters) used greater acknowledgement of the importance of levels of ecosystem modification within the environmental quality objective setting process, resulting in less stringent (i.e. more realistic) environmental quality objectives for more modified ecosystems
- the Basin Plan assessment method uses the median of the assessment data rather than the 75th percentile used by SEPP (Waters), resulting in a less stringent outcome than for SEPP (Waters). That is, under the Basin Plan targets, sites only needed to meet the target half the time, instead of three-quarters of the time as required by SEPP (Waters).

The recent assessment of SEPP (Waters) environmental quality objectives with the Basin Plan targets found that across the Murray-Darling Basin catchments in Victoria, the proportion of the time the Basin Plan targets have been met is slightly greater than the SEPP (Waters) environmental quality objectives (less than 10% difference) except for pH where the differences were greater than 30%. The SEPP (Waters) objectives, therefore, are generally slightly more stringent than the Basin Plan targets. It is important to note that greater stringency does not necessarily equate to 'better protection'. Through provision of more realistic targets, the lower stringency identified for the third dot point, above, is likely to enhance uptake of the alternative targets, supporting a system of regulation and management that improves water quality in a substantially modified region.

Water-dependent ecosystems (lakes and wetlands non-Ramsar):

The Basin Plan targets for non-Ramsar lakes and wetlands are the same as the targets for rivers and streams.

The SEPP (Waters) objectives for lakes and wetlands are based on detailed studies of Victorian lakes and wetlands (EPA 2010), following the ANZECC & ARMCANZ (2000) approach. The SEPP (Waters) environmental quality objectives are based on lake types, not geographic location (EPA 2010). Therefore, the Basin Plan targets and the SEPP (Waters) objectives cannot be compared, as the SEPP (Waters) environmental quality objectives cannot be assigned to any individual target application zone (TAZ) (i.e., all lake types potentially apply to each TAZ).

Water-dependent ecosystems (Ramsar):

There are currently two Ramsar sites in the Wimmera-Mallee region: the Lowland Wimmera Valley Ramsar wetland Lake Albacutya and the Kerang Wetlands Ramsar Site (including the Avoca Marshes). The Kerang Wetlands Ramsar site has Limits of Acceptable Change provided for salinity concentration (as measured by electrical conductivity) in many wetlands at the site. Salinity concentration is assessed as a critical component, a high priority risk and the greatest threat to fish species in the Kerang region (Kellogg, Brown & Root Pty Ltd 2011). However, the Limits of Acceptable Change are all based on electrical conductivities at or above 4000 µS/cm. Ramsar sites' listing criteria and Limits of Acceptable Change are generally based on presence of biological populations and communities, in particular threatened water-dependent species and communities; water quality is not always an issue compared to water quantity and habitat availability and quality.

Therefore, although Limits of Acceptable Change specifying water quality requirements for individual wetlands could be considered as alternative targets within a Ramsar site, they are

rarely provided in the Ramsar process, limited in number and are typically applicable to a single water body. This greatly restricts their applicability for regional application.

The Basin Plan has separate targets for Ramsar wetlands (Tables 3 and 4). Although SEPP (Waters) has no environmental quality objectives for Ramsar sites, the SEPP (Waters) environmental quality objectives for 'lakes and wetlands' are specifically derived for the protection of lakes and wetland types identified in Victoria and therefore are likely to be more representative of these ecosystems in Victoria, despite not being aimed at any specific Ramsar plan requirement. This includes the species protection levels for toxicants which incorporates a recent decision by EPA Victoria's external Scientific Advisory Panel that 95% species protection was more appropriate than 99% for Victoria (EPA unpublished, released May 2017). The SEPP (Waters) Scientific Advisory Panel agreed that 99% protection was too stringent in Victoria and the 95% was more appropriate. However, for the purposes of Basin Plan implementation, Basin Plan targets have been applied for Ramsar wetlands under the Wimmera-Mallee Water Resource Plan.

Table S2: Basin Plan water quality targets and corresponding SEPP (Waters) objectives applicable to the Lake Albacutya Ramsar Site

Aquatic ecosystem type	Rivers and streams		Lakes and Wetlands			
			All Lakes and Wetlands	Riverine Flow-through	Riverine Terminal	Riverine Floodplain
Source	Basin Plan*	SEPP (Waters) †	Basin Plan*	SEPP (Waters) ¥	SEPP (Waters) ¥	SEPP (Waters) ¥
Total phosphorus (µg/L)	25 (median)	<50 (75th)	10 (median)	30 (max)	100 (max)	100 (max)
Total nitrogen (µg/L)	350 (median)	<900 (75th)	350 (median)	500 (max)	1500 (max)	1500 (max)
Turbidity (NTU)	10 (median)	<40 (75th)	20 (median)	5 (max)	15 (max)	15 (max)
Electrical conductivity (µS/cm)		<2000 (75th)		100 (max)	NA	NA
Dissolved oxygen (% sat)	85 – 110 (median range)	65 /130 (25th/max)	90-110 (median range)	80-120 (min-max)		
pH	6.4 – 7.7 (median range)	6.8 / 7.8 (25th/75th)	6.5-8.0 (median range)	6.5-8.5 (min-max)		
Toxicants [Table 3.4.1, ANZECC & ARMCANZ (2000)]	99% protection (max)	95% protection (max)	99% protection (max)	95% protection (max)		

* Targets specifically allocated for Ramsar ecosystems in the TAZ A4: Goulburn Lowland Zone

† Objectives derived for protection of rivers and streams in SEPP (Waters) segment 5.2: Murray and Western Plains (Lowlands of the Wimmera and Mallee basins)

¥ Objectives derived for protection of each lake/wetland type, for Victoria.

Table S3: Basin Plan water quality targets and corresponding SEPP (Waters) objectives applicable to the Kerang Wetlands Ramsar Site

Aquatic ecosystem type	Rivers and streams		Lakes and Wetlands			
			All Lakes and Wetlands	Riverine Flow-through	Riverine Terminal	Riverine Floodplain
Source	Basin Plan*	SEPP (Waters) †	Basin Plan*	SEPP (Waters) ¥	SEPP (Waters) ¥	SEPP (Waters) ¥
Total phosphorus (µg/L)	15 (median)	<50 (75th)	10 (median)	30 (max)	100 (max)	100 (max)
Total nitrogen (µg/L)	320 (median)	<900 (75th)	350 (median)	500 (max)	1500 (max)	1500 (max)
Turbidity (NTU)	5 (median)	<40 (75th)	20 (median)	5 (max)	15 (max)	15 (max)
Electrical conductivity (µS/cm)		<2000 (75th)		100 (max)	NA	NA
Dissolved oxygen (% sat)	80 – 110 (median range)	65 /130 (25th/max)	90-110 (median range)	80-120 (min-max)		
pH	6.5 – 8.3 (median range)	6.8 / 7.8 (25th/75th)	6.5-8.0 (median range)	6.5-8.5 (min-max)		
Toxicants [Table 3.4.1, ANZECC & ARMCANZ (2000)]	99% protection (max)	95% protection (max)	99% protection (max)	95% protection (max)		

* Targets specifically allocated for Ramsar ecosystems in the TAZ A4: Goulburn Lowland Zone

† Objectives derived for protection of rivers and streams in SEPP (Waters) segment 5.2: Murray and Western Plains (Lowlands of the Loddon)

¥ Objectives derived for protection of each lake/wetland type, for Victoria

S1.2 Comparison of geographic boundaries for fresh water-dependent ecosystems

A comparison of geographical boundaries between the Basin Plan and SEPP (Waters) is complicated not only by boundary differences between the two documents, but also by differences between target application zone (TAZ) boundaries and water resource plan area boundaries, within the Basin Plan (see Figure A1).

Table A4 lists the target application zone boundaries for the Wimmera-Mallee water resource plan area and the valley zones within the water resource plan area that these boundaries cover and also displays the corresponding SEPP (Waters) segments and sub-segments for the valley zones within each TAZ.

The Basin Plan sets target values for each target application zone. The part of the Murray and Western Plains segment that contains the Avon, Richardson, Avoca and Wimmera catchments is largely equivalent to the A4 Zone and the parts of the cleared foothills and coastal plain and Uplands A segments that contain the upland reaches of the Avoca and Wimmera catchments are combined into the B4 Zone. The Mallee catchments that are in the Murray and Western Plains segment are entirely in the Murray Valley (Lower) zone (lM).

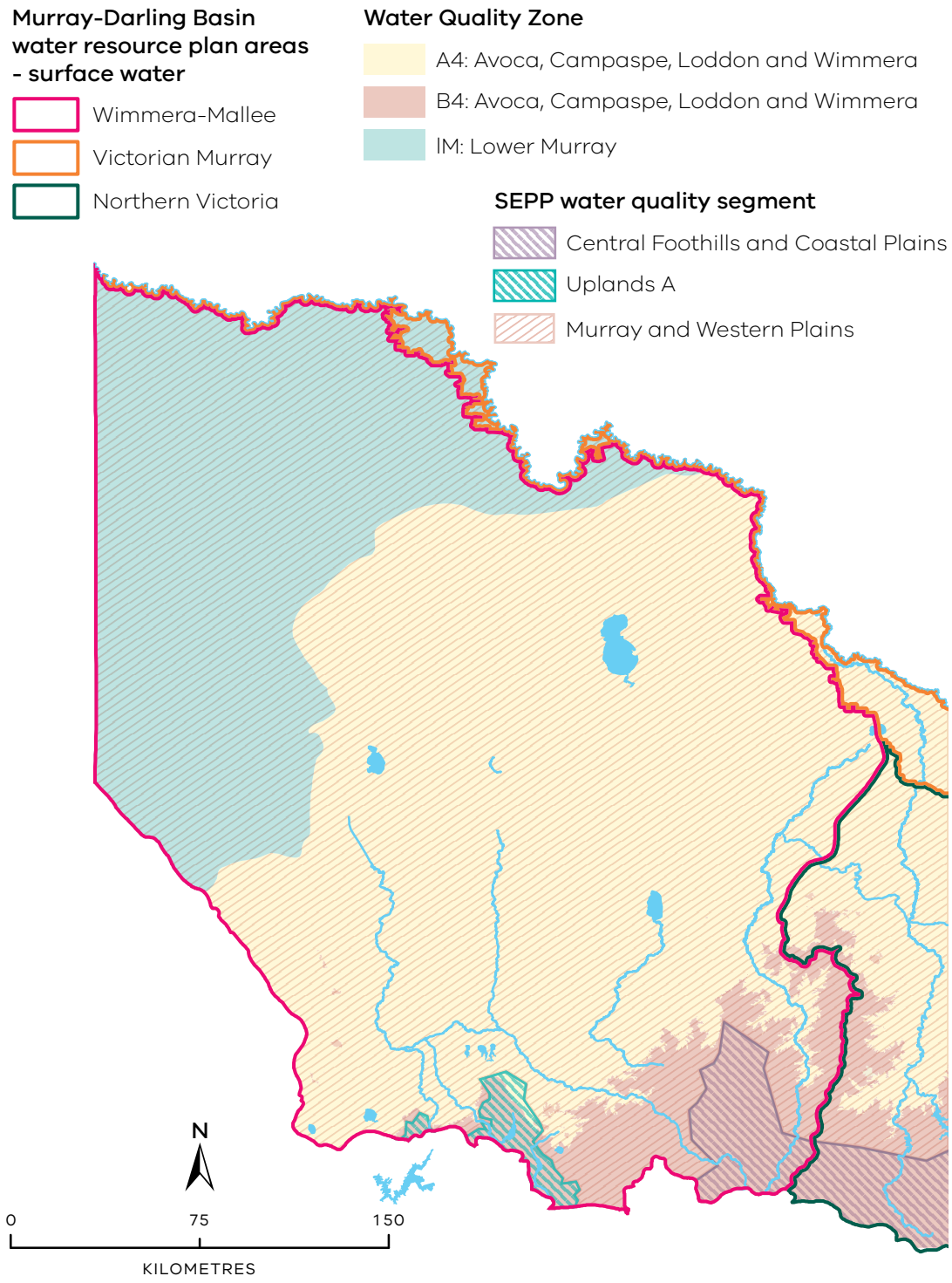
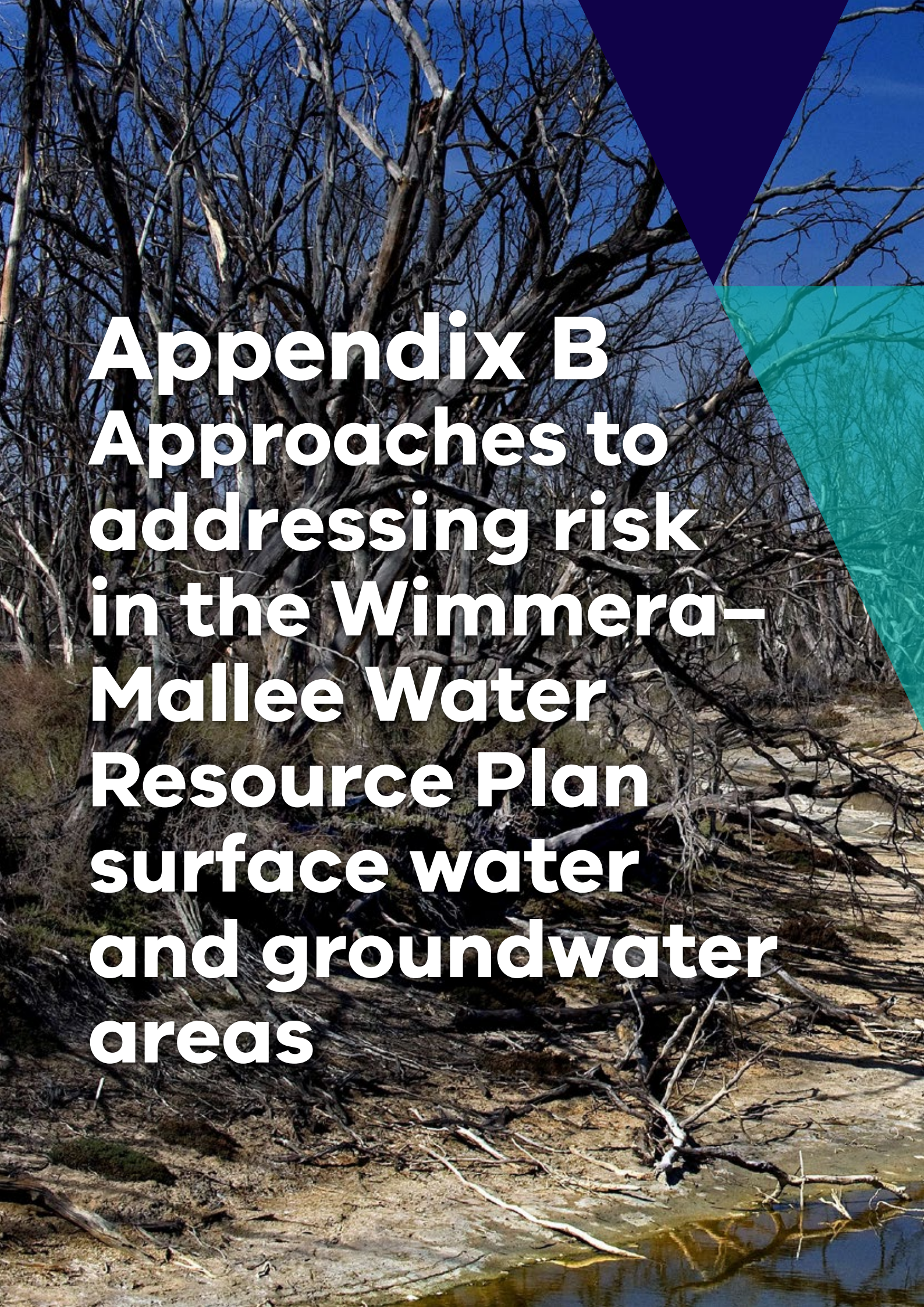


Figure S1: Comparison of surface water resource plan areas, Basin Plan target application zones and SEPP water quality segments across Victoria

Table S4: Basin Plan Target Application Zones and corresponding SEPP (Waters) segments in the Wimmera-Mallee water resource plan area

Target Application Zone	Valley zones	Corresponding SEPP (Waters) segments and sub-segments	
		SEPP description	SEPP Sub-segment description
lM	Lower Murray	Murray and Western Plains	Lowlands of Wimmera and Mallee Basins
A4	Lowland of Avoca, Campaspe, Wimmera and Loddon Valleys	Murray and Western Plains	Lowlands of the Campaspe, Loddon and Avoca Basins.
		Uplands A	The Grampians
B4	Upland of Avoca, Campaspe, Wimmera & Loddon Valleys	Murray and Western Plains	Lowlands of the Campaspe, Loddon and Avoca Basins
		Uplands A	The Grampians
		Central Foothills & Coastal Plains	Uplands of the Avoca, Wimmera & Hopkins Basins



Appendix B Approaches to addressing risk in the Wimmera–Mallee Water Resource Plan surface water and groundwater areas

Contents

1. Requirements for addressing risks

1.1 Commonwealth Water Act

The *Commonwealth Water Act 2007* requires the Basin Plan to identify the risks to the condition or continued availability of water resources in the Murray–Darling Basin (section 22(1), item 3).

The risks must deal with the availability of Basin water resources which arise from the taking and use of water (including interception activities), the effects of climate change, land use changes and limitations on the state's knowledge of water resources on which estimates about matters relating to Basin water resources are made.

1.2 Basin Plan requirements

Consistent with the Commonwealth Water Act, Section 4.02 of the Basin Plan identifies potential risks to Basin water resources, particularly to the condition or continued availability of water, and strategies to manage or address these risks.

The risks identified are:

- insufficient water available for the environment (availability)
- water being of unsuitable quality for use (condition)
- poor health of water-dependent ecosystems.

The Basin Plan identifies that the consequences of these risks eventuating would be insufficient water or water not of a suitable quality being available:

- for consumptive and other economic uses
- to maintain social, cultural, Indigenous and other public benefit values.

Section 4.03 of the Basin Plan details many strategies to manage or address the risks identified in section 4.02.

These strategies are:

- implementing the Basin Plan including its following key elements:
  - environmental watering plan
  - water quality and salinity management plan
  - water trading rules
  - water resource planning
- developing water resource plans and amendments to the Basin Plan based on the best available knowledge and in consultation with relevant stakeholders
- promoting a risk-based approach to water resource planning and management
- managing flows to optimise outcomes across the range of water uses in the Murray–Darling Basin
- ensuring effective monitoring and evaluation of the implementation of the Basin Plan
- promoting and enforcing compliance with the Basin Plan and water resource plans
- improving knowledge of water requirements within the Murray–Darling Basin including:
  - environmental watering requirements
  - requirements relating to the social, spiritual and cultural use of Basin resources by Indigenous peoples
  - the impact of climate change on water requirements

  - the water required to deliver social and economic benefits to Basin communities
- improving knowledge of the impact on Basin water resources of:
  - interception activities and land use change
  - floodplain harvesting and peri-urban and industrial take
  - climate change
- improving knowledge of:
  - groundwater and surface water resources, including through improved measurement
  - the causes of water quality degradation and the effects of water quality on environmental assets and ecosystem function.

1.3 Water resource plan requirements

Section 10.41(1) of the Basin Plan requires Victoria to prepare water resources plans having regard to the current and future risks to the condition (quality) and continued availability of water in the resource plan area.

The methodology for conducting the risk assessment, described in the Basin Plan (10.41), covers primary causes of risks, threats to and implications for beneficial uses of water resources. These requirements are set out in multiple cross-referenced provisions within the Basin Plan (see below).

The identification and interpretation of the detailed requirements of the risk assessment can be challenging. However, the key requirement is clear: that the risk assessment should consider "current and future risks to the condition and continued availability" of water resources (Basin Plan 10.41(1)).

A water resource plan must:

- identify, list, assess and define the level of risk (high, medium or low) consistent with the AS/NZS 120 31000:2009 (10.40)
- describe the data and methods used to assess the risk (10.41(7))
- describe quantified uncertainties (10.41(8)).

For risks assessed as medium or high, a water resource plan must describe the risks (10.42(a)) and the factors contributing to the risks (10.42(b)) as well as describing strategies to address them (10.43).

The Commonwealth Water Act, Basin Plan and MDBA (2013) provide interpretation of the terms that help set the context for the water resource plan risk assessments:

- water resource – includes "all aspects of the water resource, including water, organisms, other components and ecosystems"
- condition – includes condition of all the above aspects of the water resource
- current and future risks – includes risks that could occur during and beyond the life of the water resource plan, regardless of whether a management strategy is currently in place.

2. Risk identification and assessment methodology (10.41)

Chapter 10 of the Basin Plan requires a water resource plan to have regard to the risks, strategies and guidelines from 'Chapter 4 – Identification and management of risks'.

The risk assessment required an approach that provides structure to the mix of causes, threats and beneficial uses set out in the Basin Plan. Such structure enables a methodical, systematic, repeatable and transparent approach to the identification and evaluation of risks necessary for the development of water resource plans.

Victoria undertook a risk assessment in accordance with the requirements of the Basin Plan. This approach is summarised below.

The approach adopted for the risk assessment aligns with international and national standards, with risk being assessed as the product of the likelihood and consequence of a threat impacting on an 'asset'.

In accordance with the provisions of the Basin Plan, levels of risk assigned to events and their consequences have been defined in a manner consistent with AS/NZS ISO 31000:2009 Risk management – principles and guidelines. The approach adopted for risk identification and assessment has been undertaken in accordance with the risk management process set out in ISO 31000 (see Figure 1).

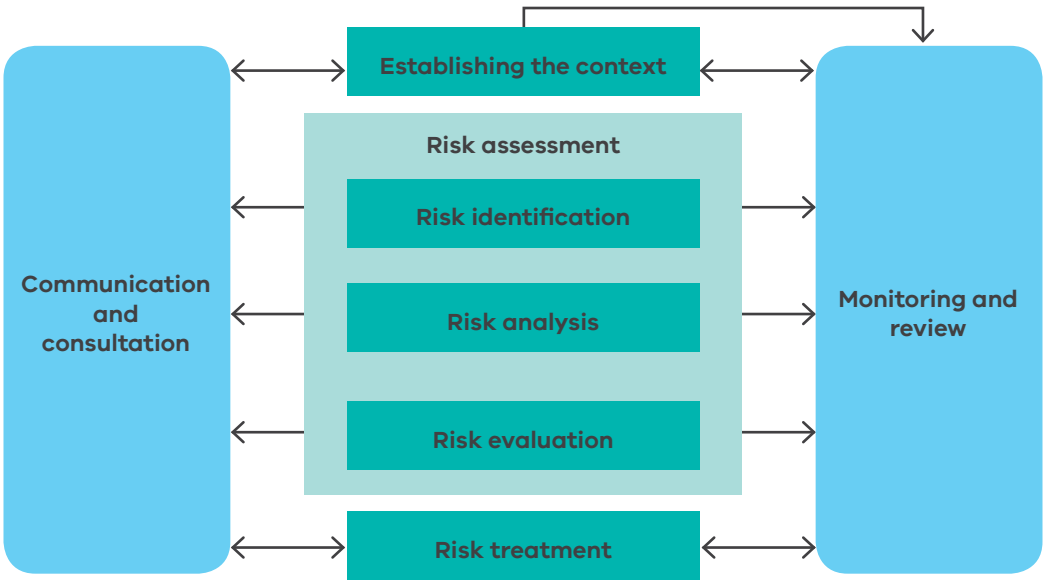


Figure 1: The risk management process set out in ISO 31000

A single, common and consistent risk assessment framework has been adopted for Victoria's five water resource plan areas. The framework provides a transparent, comprehensive assessment of risk, allowing all risks to be documented and explicitly considered. As such, the framework allows for a detailed exploration and analysis of risk and allows any individual risk to be reviewed and updated if and as required. The structured nature of the framework also enables risks to be combined and analysed in themes, allowing summaries of risks across the water resource plan areas to be generated and evaluated.

The assessment was undertaken over a 12-month period and overseen by the:

- DELWP Water Resource Plan risk Assessment Working Group, comprising subject matter leads from within DELWP, with skills and responsibilities in surface water policy, interception (farm dams and forestry), climate change, groundwater, environmental water, water quality and drought. This group provided preliminary review and input to data, methods and project outputs before a review by the Water Resource Plan Risk Assessment Advisory Panel.
- Water Resource Plan Risk Assessment Advisory Panel, which was established to provide milestone reviews of the risk assessment. It consisted of representatives from DELWP, rural water corporations, catchment management authorities, VicWater, Murray Lower Darling Rivers Indigenous Nations and the Victorian Environmental Water Holder. A representative from the Victorian Farmers Federation was also invited to attend as an observer. The advisory panel members and their respective organisations provided critical review of the data used in the risk assessment, the identification of risks, the method adopted for the risk assessment, the scenarios to be assessed and the outcomes of the assessment.

The following core concepts framed the scope of the risk assessment and the assessment of risks.

Scope of the risk identification and assessment

The risk assessment must identify the current and future risks to the condition and availability of water resources in the water resource plan area (10.41(1)).

For the purposes of the risk assessment current and future risks were interpreted to mean the following:

- **current risks** represent those threats and causes being experienced now
- **future risks** represent threats and causes proposed by scenarios of a possible future.

Basin Plan definitions have been adopted for this risk assessment and therefore the condition of the water resource includes not only water quality, but the health of the water-dependent ecosystems including priority environmental assets. The risk assessment must therefore identify and assess the risks to the condition of organisms, water-dependent ecosystems and other components of the water resource.

The identified risks need to include (but not be limited to) those specified in the Basin Plan (see section 2.1). The risk assessment has included these risks and others identified through the risk identification process.

Temporal and spatial scale

The Basin Plan requires water resource plans to address risks to the availability and condition of water resources in Victoria's water resource plan areas.

For this assessment, risks were assessed in terms of their scale of impact on the water resources and the uses of the water resource plan area.

This scale of impact included assessment of the magnitude, spatial extent and duration of impact within the water resource plan area over the life of the resource plan (2019 to 2029) and beyond. This approach has enabled site-specific and broad-scale risks to be assessed, reflecting the issues within each water resource plan area. The risk assessment considered potential future risks for a period beyond the life of the water resource plan up to 50 years.

Residual risk

The risk assessment is based on the current level of risk assuming existing policy and practice are in place. In this respect, the risk assessment identifies the level of residual risk under current arrangements in Victoria.

Data used to identify and assess risks (10.41(7))

Data has formed the basis of this risk assessment. The literature reviewed is listed in Appendix A of the main report consistent with its thematic category. The adequacy of the literature to describe its relevant relationship is rated High (H), Medium (M) and Low (L).

The Basin Plan requires the data and methods used to identify and assess risk to be described in the water resource plan. The descriptions provided in this report and the accompanying materials are considered to be adequate for MDBA to understand and assess the water resource plan and the risk assessment against Basin Plan requirements. There is also a requirement for the water resource plan to describe any quantified uncertainties and sensitivity analysis. The data and methods adopted for the risk assessment and the level of uncertainty in the assessment have been explicitly included in the risk assessment and reporting, including the Risk Register.

2.1 Risks to be assessed

The Basin Plan describes the methodology for identifying and assessing risk. Under the provisions of the Basin Plan, the risk assessment must consider:

2.1.1 Availability and condition of water resources

- risks relating to water condition and availability (10.41 (1)) for economic (4.02 (2) (a)), social, cultural, Indigenous/Aboriginal and other public benefit values (4.02 (2) (b))
- risks that water will not be of a suitable quality for use (4.02 (1) (b)) including salinity (10.41 (2) (d))
- poor health of water-dependent ecosystems (4.02 (1) (c)) (10.41 (2)(a))
- risks to meeting environmental watering requirements (identified in Victoria's long-term watering plans) (LTWPs) (10.41 (2) (a))

- risks to groundwater systems (including structural damage and groundwater/surface water connections) (10.20 (1) (a) and (b)) (10.41(2)(b))
- risks arising from elevated salinity and other types of water quality degradation (10.31 and 10.41(2)(d)).

2.1.2 Interception

Risks from interception activities (10.41(c)) that may have a significant impact on water resources including those identified in 10.23 of the Basin Plan:

- runoff dams
- commercial plantations
- mining activities, including coal seam gas mining
- floodplain harvesting.

2.1.3 Extreme events

As required by the Basin Plan, a water resource plan must describe how the water resources of the resource plan area will be managed during extreme events (10.51). These types of risks are 'event based' – for example, extreme drought, major asset failure, bushfire, point-source discharge, flooding and overbank inundation – and were included in the risk assessment in terms of their impact on the ability to meet critical human water needs as defined below.

In Victoria, critical human needs are defined as:

The volume of water required to supply Stage 4 restricted demand in urban areas, supply domestic and stock needs and operate the distribution system to deliver that water.

2.1.4 Aboriginal objectives

Under the Basin Plan, a water resource plan must identify the objectives and outcomes sought by Aboriginal people in relation to the management of water resources in the water resource plan area (10.52). Regard must be had to the social, spiritual and cultural values of Indigenous peoples and the uses of water resources for these purposes.

2.1.5 Environmental outcomes

The risk assessment has also examined requirements related to the sustainable use and management of water resources of the water resource plan area within the long-term annual diversion limit for the SDL unit:

- surface water–environmental water requirements for priority environmental assets and ecosystem functions (10.17 and 10.22(b))
- groundwater-related risks, including groundwater requirements for priority environmental assets and ecosystem functions (10.18):
  - groundwater and surface water connections (10.19)
  - productive base of groundwater and its management (10.20)
  - environmental outcomes related to groundwater (10.21 and 10.22(b)).

Priority environmental assets and ecosystem functions

The risk assessment includes risks to:

- priority environmental assets and ecosystem functions relating to surface water (10.17)
- priority environmental assets and ecosystem functions relating to groundwater (10.18)
- meeting environmental watering requirements identified in Victoria's LTWPs.

Victoria has developed LTWPs for each of the three surface water water resource plan areas.

The priority environmental assets identified in Victoria's LTWPs are set out in **Table 1** and **Table 2** and are the environmental watering assets considered in this risk assessment.

Table 1: Priority waterways in the Wimmera–Mallee water resource plan area

Waterway	Type	Catchment	CMA	Terminates
Wimmera River	Regulated	Wimmera	Wimmera	Lakes Hindmarsh and Albacutya
Mount William Creek	Regulated	Wimmera	Wimmera	Lakes Hindmarsh and Albacutya
MacKenzie River	Regulated	Wimmera	Wimmera	Lakes Hindmarsh and Albacutya
Bungalally Creek	Regulated	Wimmera	Wimmera	Lakes Hindmarsh and Albacutya
Burnt Creek	Regulated	Wimmera	Wimmera	Lakes Hindmarsh and Albacutya
Outlet Creek	Unregulated	Wimmera	Wimmera	Lake Albacutya
Yarriambiack Creek	Regulated	Wimmera	Wimmera, Mallee	Lake Coorong
Avon–Richardson River	Unregulated	Avoca	North Central	Lake Buloke
Avoca River	Unregulated	Avoca	North Central	Kerang Lakes

Table 2: Priority wetlands in the Wimmera–Mallee water resource plan area

Wetland	Complex	Catchment	CMA
Barbers Swamp, Broom Tank, Bull Swamp, Carapugna, Challambra, Cherrip Swamp, Chiprick, Clinton Shire dam, Cokym bushland reserve, Considines on Tyrrell, Corack Dam, Coundons wetland, Creswick Dam, Cronomby Tanks, Crow Swamp, Davis Dam, D Smith, Falla Dam, Fieldings Dam, Goulds Reserve, Greens wetland, Homelea, J Ferrier Wetland, Jeffcott Wildlife Reserve, Jesse Swamp, John Ampt, Kath Smith Dam, Krong Swamp, Lake Danaher Bushland Reserve, Lake Marlbed (Towma), Mahoods Corner, Moreton Plains Reserve, Mutton Swamp, Opie's Dam, Pam Juergens Dam, Part of Gap Reserve, Paul Barclay, Pinedale, Poyner, R Ferriers Dam, Rickard Glenys Dam, Roselyn Wetland/Reids Dam, Round Swamp Bushland Reserve, Sawpit Swamp, Schultz/Koschitzke, Shannons Wayside, Tarkedia, Tchum Lake North, Wal Wal Swamp	Wimmera–Mallee Pipeline wetlands	Wimmera–Mallee Pipeline	Wimmera Mallee North Central
Beulah Weir pool	—	Wimmera	Mallee
Avoca River marshes	—	Avoca	North Central
Lake Albacutya	Terminal lakes	Wimmera	Wimmera
Lake Hindmarsh	Terminal lakes	Wimmera	Wimmera

2.2 Risk assessment methodology

The approach adopted for the risk assessment was based on the requirements of the Basin Plan for water resource plans (10.41).

> For this risk assessment, risks have been identified in terms of causes, threats and beneficial uses of the water resource, whereby a cause may result in a threat that impacts on a beneficial use of water.

A framework for the risk assessment based on ISO 31000:2009 and based on the concept of likelihood and consequence was developed and adopted for the assessment as described below.

As set out in ISO 31000:2009, the likelihood and consequence assessment must be appropriate to the context of the risk assessment, and customisation of likelihood and consequence categories is entirely appropriate.

The framework developed for the water resource plan risk assessment considers the level of risk to be the product of likelihood and consequence. Where, for this risk assessment:

- likelihood is assessed in terms of how each cause impacts on each threat
- consequence is assessed in terms of how each threat impacts on each beneficial use

The overall risk therefore represents how each cause will impact on each threat, and how that threat will in turn impact on each beneficial use.

For this risk assessment, likelihood has been defined as a function of susceptibility and probability, and consequence defined as a function of sensitivity. This framework developed and adopted for the preliminary risk assessment is shown in **Figure 2**.

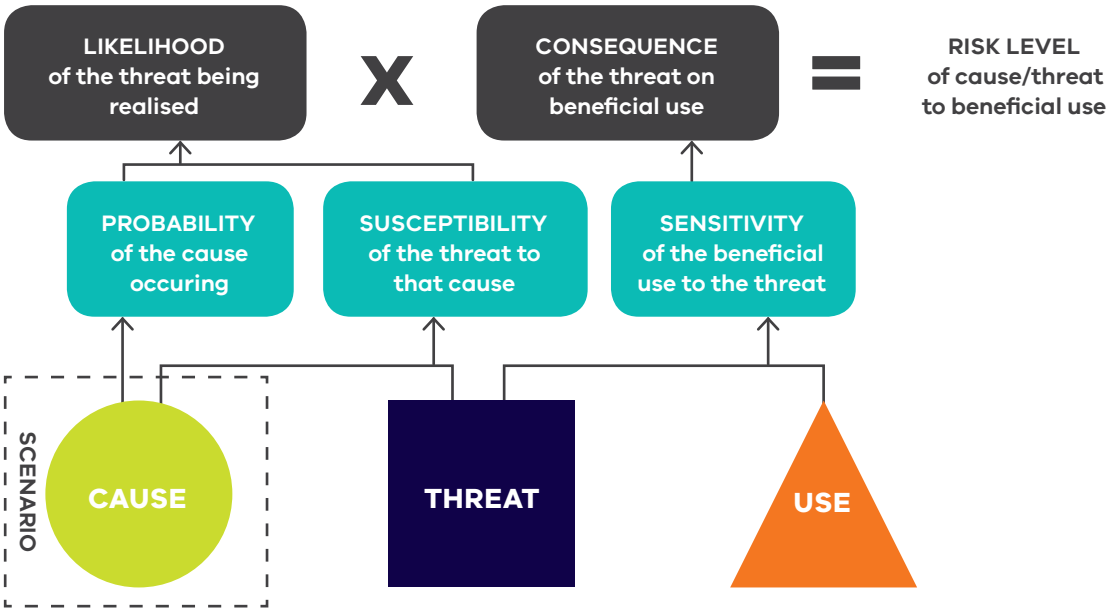


Figure 2: Process for identifying and assessing risk

Example: Risk identification

A cause (e.g. extreme drought) may result in a threat (e.g. decline in water availability) that impacts on a use (e.g. consumptive use) of water.

As an example, there may be a risk associated with an increased number of farm dams ('cause'), that leads to a reduction in volume of surface water available ('threat'), adversely impacting on the environment ('use').

Table 3: Components to determine risk

Risk component	Description
	An event and accompanying scenario that gives rise to or generates a threat. For this risk assessment, the causes are described as the events that led to the development of a threat. Causes can be changes in levels of development such as increased utilisation of existing rights and entitlements, or events such as climate change or bushfires.
	Threat is a deviation from an agreed starting point that may affect the use of the water resource. For this risk assessment, a deviation from an agreed starting point could include: adverse changes in the volume or pattern of water continuation or changes in water quality or ecosystems that renders them not fit for purpose.
	The use to which water resources are applied including, environmental, consumptive, recreational/social and Indigenous/Aboriginal uses. For this risk assessment, the water resource plans will be developed to protect the "condition and continued availability" of Basin water resources for beneficial uses. For this risk assessment, the impact on the availability of water for the environment (surface or groundwater) considers all water used by the environment and not just water which has been specifically released from storage for environmental purposes, or water which is allocated as an environmental entitlement. In this respect, environmental, recreational/social and Indigenous/Aboriginal values may be supported by the provision of water and may not 'use' water in the same manner as consumptive use.

2.2.1 Causes and scenarios

A set of potential causes of risk were identified from an extensive literature review and through the engagement process. The causes identified (e.g. climate change) were then assigned a specific scenario that would generate an adverse threat. These causes and accompanying scenarios included one-off natural events, gradual changes over time, and incremental changes to land and water use and management. The causes are listed in **Table 4**.

Descriptions of these causes and the scenario adopted are provided in **Table 5**.

Table 4: Causes of risk considered in the risk assessment

	Description	Causes considered in the assessment:
CAUSE	An event (and specific scenario) that gives rise to or generates a threat. For this risk assessment, the causes are described as the events that lead to the development of a threat. Causes can be changes in levels of development such as increased utilisation of existing rights and entitlements, or events such as climate change or bushfires.	Climate change • extreme events: • bushfires • extreme drought • extreme wet periods • flooding and overbank inundation • major asset failure • point-source discharges Land use and interception: • earth resource development • failure to continue to invest in best practice land use initiatives • increase in farm dams • land use change (affecting water availability) • land use change (affecting water condition) • pests and weeds Non-compliance: • non-compliance with the Victorian Water Act Water access, take, utilisation and location: • increase in the number of rights and volume of entitlements • increased utilisation of water access rights • timing and location of demands.

Scenarios

Specific scenarios, for each cause, are required to enable risks to be assessed. Each scenario adopted for the risk assessment comprises a detailed description of the specific cause to be assessed.

Many alternative scenarios could be envisaged for each cause. For example, many alternative climate change scenarios are possible. Analysis of each possible scenario for each potential cause would significantly expand the list of potential risks and render the analysis unworkable. For this assessment, one scenario has been assessed for each identified cause. As an example, the International Panel on Climate Change median warming scenario has been adopted for the assessment of the cause 'climate change'.

A full description of the scenario options and rationale for the scenario chosen is contained in the Preliminary Risk Assessment Report (Alluvium, 2016). A brief description of each adopted scenario within each water resource plan area is set out in **Table 5** with further detail provided in criteria adopted for the selection of scenarios included:

- the probable scenario that produces the highest risk (e.g. extreme drought)
- an extrapolation of past trends (e.g. farm dams, land use)
- that which is adopted in literature (e.g. median climate change).

Importantly, the scenarios cover a range of possible future situations and are not 'forecasts' of a most likely future. The scenarios each represent a possible future. The risk assessment has not combined these scenarios to form one overall future scenario. Each scenario has been assessed independently to identify the risk associated with that cause and related scenario. Scenarios have also been identified at the water resource plan area scale to ensure their relevance to the causes and threats that will potentially drive risks in each area.

Table 5: Causes and adopted scenarios of risk considered in Wimmera–Mallee Water Resource Plan risk assessment

Cause category	Cause	Consequence	Surface water area	Groundwater area
Climate change	Climate change	Likely to lead to reduced rainfall over south-eastern Australia, increased variability of rainfall and increased mean temperatures	Median (50th percentile) of global climate model projections based on Moran and Sharples (2011). The median is considered appropriate given much of the analysis available is based on the median rather than the high scenario, and scenario based on the Millennium Drought (see extreme drought scenario) is equivalent to the high scenario in mid to late this century. This scenario and its analysis will be based on the outputs from Scenario B from the Western Region Sustainable Water Strategy (2011) and Northern Region Sustainable Water Strategy (2009)	As for surface water
Extreme events	Bushfires	Impacts on availability and condition of water resources arising from bushfires	Water quality and availability: Major fire during water resource plan period followed by significant flow event (based on worst known examples, including post 2005–06 Grampians (*Gariwerd*) bushfire)	Water quality and availability: Water quality impacts of bushfire on groundwater based on Wimmera–Mallee surface water area
Extreme events	Extreme drought	An extended period of low rainfall resulting in severe, low water availability	Repeat of the Millennium Drought 13-year climate pattern scaled to represent the rarity of a 1 in 100-year drought. Scenario includes low flow events (minor freshes) within the drought	As for surface water
Extreme events	Extreme wet period	An extended period of above average rainfall, which may lead to rising groundwater levels and associated waterlogging and salinity threats	Wet period equivalent to late 1980s to early 1990s scaled to represent the rarity of a 1 in 100-year wet period. Scenario includes periods of low flow (events) within the wet period	As for surface water
Extreme events	Flooding and overbank inundation	Significant flooding can adversely impact on the condition of water resources	5% annual exceeded probability (AEP) event (or appropriate historical example)	Not applicable
Extreme events	Major asset failure	A catastrophic failure of major water harvesting and storage infrastructure	50% reduction in the available storage volume in Lake Bellfield over the period of the water resource plan	Failure of bores/ bore casings on up to 5% of bores based on review of state bore data

continued

Cause category	Cause	Consequence	Surface water area	Groundwater area
Extreme events	Point-source discharges	Point-source discharges are assumed to be a continuation of existing licensed discharges, urban stormwater runoff, and accidental spills. Note: point-source discharges associated with mining are described under the 'earth resource development' cause. Point-source discharges associated with irrigation drainage are assessed as a component of 'Land use practice'	Agricultural chemical spill directly into the Wimmera River	Leaking landfill sites
Land use and interception	Earth resource development	The development, operation, closure and legacy of earth resource activities such as mining, quarrying, oil and gas (hydrocarbons), carbon capture and storage, geothermal and pipelines that intersect aquifers/ aquitards and/or are near waterways pose hazards to surface and groundwater availability and condition (including structural damage to aquifers)	Coal seam gas: No coal seam gas development in Victoria's water resource plan areas, note that there may also be effects on Victoria's groundwater resources due to gas development in NSW). Mining: The cessation of mining (and aquifer dewatering) in the region, and legacy issues (such as mercury and arsenic contamination) in the historic mining areas. Ongoing gold mining with tailing storage facilitates. Open pit: Quarrying – 20% expansion of existing floodplain-based sand and gravel extractions with onsite disposal dams. Mineral sands – development in the Wimmera and Mallee	As for surface water
Land use and interception	Failure to continue to invest in best practice land use initiatives	Failure to invest in best practice management: grazing, irrigation, cultivation, clearing, road and other infrastructure construction	Continuation of existing land and waterway management practice in the absence of ongoing support for existing strategies and plans of management	As for surface water
Land use and interception	Increase in farm dams	Increased construction of farm dams to supply water for domestic and stock consumption	4 GL increase in the volume of small farm dams over a period of 10 years Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high.	As for surface water

continued

Cause category	Cause	Consequence	Surface water area	Groundwater area
Land use and interception	Land use change (affecting water availability)	In western Victoria, significant revegetation activity is being undertaken to protect soils. Revegetation activity is also being undertaken under several other funding arrangements including vegetation and carbon offsets	Increase in catchment vegetation cover consistent with Wimmera Region Salinity Action Plan	As for surface water
Land use and interception	Land use change (affecting water condition)	Conversion from grazing to cropping is likely to have a significant impact on runoff water quality in stream systems, particularly in the western areas of the state In the Wimmera–Mallee, the conversion of grazing land to cropping could generate some adverse impacts on the condition of the water resource	Conversion of 5% of grazing land to cropping.	N/A This issue is not expected to have any measurable effect on groundwater recharge rates, and has therefore not been considered for groundwater water resource plans
Land use and interception	Pests and weeds	Considers the impact of weeds such as willow colonisation of stream systems and pests such as carp invasions. Pest plants such as willow and pest animals such as carp have the potential to pose significant threats to the condition of water resources. Willow can lead to seasonal increases in biological oxygen demand and decreases in dissolved oxygen levels. Willow can also contribute to the abandonment of stream systems. Invasive species such as carp can increase turbidity in stream systems, while trout can predate on native fish species	Adopt current level of willow extent Adopt 25% increased level of carp	N/A
Non-compliance	Non-compliance with the *Victorian Water Act 1989*	Includes the unauthorised take and/or use of water or the constructing or altering of works without consent.	5% illegal take and continuation of current level of unauthorised works on waterways	5% above licensed bore take without authorisation 10% of domestic and stock bore use being applied to (unlicensed) non-stock and domestic use

continued

Cause category	Cause	Consequence	Surface water area	Groundwater area
Water access, take, utilisation and location	Increase in the number of rights and volume of entitlements	Leads to increased take. The MDBA has capped surface water diversions and there are caps on groundwater entitlement volumes in major groundwater management areas. There are no limits on the number of domestic and stock users. Risk lies in the issue of new groundwater licences (for commercial or irrigation purposes) in unincorporated areas outside existing groundwater management areas (GMAs) or in GMAs where total entitlement volumes are lower than the permissible consumptive volume	For surface water resources, the only plausible increase in rights or entitlements could be through stock and domestic use, excluding farm dams. Even a generous estimate of increase in these small entitlements would represent a negligible proportion of the overall unregulated licence pool. On this basis, this scenario has not been applied to surface water.	5% increase in unincorporated areas
Water access, take, utilisation and location	Increased utilisation of water access rights	Some existing water entitlements are not fully utilised by their holders. Increased utilisation of these entitlements may impact on the availability/ condition of water resources	5% increase in use of unregulated surface water entitlements	2006-07 levels of demand occurs on two or more occasions and a 2.5% increase in the domestic and stock bores
Water access, take, utilisation and location	Timing and location of demand	Changes to the timing and location of demands for water within the river system may give rise to a range of threats to water availability and/or condition.	Victoria does not envisage any significant change in the timing of delivery of water in the Wimmera region or a change that will impact on water resources	As for surface water

2.3 Threats

THREAT

> 10.41 (1) A water resource plan must be prepared having regard to current and future risks to the condition and continued availability of the water resources of the water resource plan area.

To meet the requirements of 10.41(1) Victoria has had regard to the current and future risks to the continued availability of water resources by embedding these into the risk assessment as described below.

Threats refer to the condition and availability of water. The condition and availability of water have been assessed in terms of a defined starting point comprising:

- continuation of existing active legislation, instruments, policies, processes, and practices used for the planning and management of the state's water resources
- the implementation of the Basin Plan, with full recovery of 2,750 GL of water for the environment across the Basin (as adjusted)

A threat is a deviation from an agreed starting point that may affect water uses.

For this risk assessment, a deviation from an agreed starting point includes:

- adverse changes in the volume or pattern of water
- continuation or changes in water quality or ecosystems that renders them not fit for purpose.

The threats have been developed to reflect the terminology of the Basin Plan (i.e. the risks to the condition and availability of the water resources of the water resource plan area). For the purpose of the risk assessment the threats have been divided into sub-categories to allow exploration of the specific attribute of availability and condition that contribute to risk. The threats are set out and described in **Table 6**.

The condition of the water resource as set out in the Basin Plan refers not only to the water quality but the health of a water-dependent ecosystem. For the purpose of this risk assessment, those elements of 'condition' that have inherent value (e.g. the organisms and or ecosystems) have been assessed as a 'beneficial use' supported by suitable availability and condition. Other elements of 'condition' of the water resource that do not have inherent value (e.g. levels of salinity in surface water, a decline in the quality of the physical habitat) have been treated as threats that generate risks to the beneficial use of water.

Table 6: Threat categories assessed

Threats	Category	Sub-category	Definition
Continued availability of the water resource	Surface water	Reduction in volume	A change to the inflow of water to the water resource plan area
		Changes to seasonal pattern of water	A change to the seasonal pattern of rainfall and runoff (e.g. a shift in weather patterns that results in an increase in summer rainfall within the water resource plan area)
		Changes to the inter-annual pattern	A change to the annual pattern of water such as increased annual variability
	Groundwater	Decline or adverse rise in inflow to aquifer	A long-term decline or adverse rise in the inflow of water to the aquifers of the area. An adverse rise would include increases that result in waterlogging or rising salinity
		Adverse change to the seasonal pattern of inflows to aquifer	A change to the seasonal pattern of inflow to the aquifers of the area that have an adverse impact on beneficial users and uses
Condition of the water resource **Risks arising from elevated salinity and other types of water quality degradation (10.31 and 10.41(2)(d))**	Water quality	Levels of salinity	Level of salinity in the water resource plan area
		Levels of suspended sediment and/or nutrients	Level of suspended sediment and nutrients (phosphorus and nitrogen) in the water resource plan area
		Levels of toxicants	Level of toxicants (pesticides, herbicides, heavy metals, hydrocarbons) in the water resource plan area
		Levels of pathogens	Level of pathogens (such as Giardia and cyanobacteria) present in the water resources of the water resource plan area
		Other water quality attributes	Level of other water quality attributes such as water temperature, pH and/or dissolved oxygen including temperature

continued

Threats	Category	Sub-category	Definition
Priority environmental assets and ecosystem functions – surface water (10.17)	Structural form (physical/ non-water/ non-biological) of priority rivers and wetlands	Loss or decline in longitudinal connectivity	Defined to comprise barriers to fish passage and other barriers such as vegetation connectivity
		Loss or decline in lateral connectivity	Defined to comprise loss of floodplain connectivity such as levees
		Loss or decline in physical habitat	Defined to comprise the loss or decline in condition of instream physical habitat such as sedimentation, erosion, loss of large wood
Groundwater–surface water connections (10.19) **Risks to the productive base of groundwater (10.20)**	Risks to groundwater systems (including structural damage and groundwater–surface water connections) (10.19) (10.20 (1) (a) and (b))	• Loss of structural form of aquifer as an impact affecting connection to surface water • Risk to the productive base of groundwater for consumptive uses	• Loss of structural form of aquifer as an impact from the causes • Risk to availability consumptive uses of groundwater

2.4 Use of water

For a threat to be realised and ultimately generate a risk it must have an impact on a use of water from the perspective of availability (quantity) or condition (quality).

For the purpose of this risk assessment, the water resource plans have been developed to protect the "condition and continued availability" of Basin water resources for use. In many risk assessments the relative importance of a beneficial use has been used along with sensitivity to define consequence. For this risk assessment only beneficial uses of regional, state, national and/or international importance have been considered, and these beneficial uses have been considered to be of equal importance for the risk assessment. Beneficial uses of local importance are not the focus of the water resource plans and therefore have not been examined in this risk assessment.

The water resource plans protect the "condition and continued availability" of Basin water resources for beneficial uses.

Beneficial uses have been assessed in terms of:

- consumptive uses
- environmental uses
- recreational/social uses, and
- Indigenous/Aboriginal uses

These beneficial uses have been assessed based on assessment of risk to:

- surface water availability based on categories that define the legal entitlement or right to water (**Table 7**)
- groundwater availability based on categories that reflect the physical attributes of the aquifer from which water is derived (**Table 8**)
- water quality condition based on the SEPP beneficial use categories (**Table 9**)
- structural form of surface water resources based on categories that reflect priority assets – wetlands and rivers (**Table 10**)
- structural form of aquifers.

The following tables set out the sub-classes of beneficial use adopted for the risk assessment. Sub-classes have been adopted as they:

- can reflect the sensitivity to the threatening process (e.g. the availability of water from held entitlements is less sensitive to changes in the seasonal pattern of surface water than the availability of water from unregulated flow)
- can be developed to be consistent, as far as possible, with the 'indicators' used in the 2010 Victorian Risk Assessment for the Murray–Darling Basin Risks to Shared Water Resources Program
- can be general enough that there are a workable number of beneficial use-threat combinations to assess.

A note on Aboriginal water

The environmental and consumptive uses of water are relatively well understood as water resource planning concepts. However, Aboriginal uses of water are not as well understood.

Aboriginal water is an emerging term to describe the full range of Aboriginal interests and aspirations in water. It encompasses "Aboriginal environmental outcomes" and: "cultural flows" (see below) and identifies improvements in environmental outcomes and economic benefits for Aboriginal communities.

The MDBA has proposed the term "Aboriginal environmental outcomes" to describe and communicate the benefits to Aboriginal people that can be derived from environmental watering. To help understand the term Aboriginal environmental outcomes, it is important to know what they are not. They are not "cultural flows" or "cultural water", which are water entitlements held by Aboriginal Nations and which may also have a commercial benefit where any revenue accrued goes to Aboriginal people.

Ownership of water by Aboriginal people can bring many benefits, including:

- improved self-esteem and empowerment as a result of being able to care for Country
- improvements to health and wellbeing through being able to see Country in a healthy state as a result of their interventions
- potential economic returns.

Aboriginal environmental outcomes can occur as a result of healthier rivers and wetlands; for example:

- improved fish populations
- more reeds that can be harvested
- increased bird breeding events.

Cultural flows or cultural water nourishes a socio-economic relationship with water; Aboriginal environmental outcomes provide tangible physical benefits.

Victoria's water management framework, including existing instruments and processes, may be used to address both aspects of Aboriginal Water. An evidence-based approach is necessary to identify the appropriate implementation options. These are expected to be different in different locations.

While it is clear that Aboriginal uses of water encompasses a wide range of cultural and environmental benefits, for the purposes of this risk assessment these have been grouped together as a single beneficial use because there is limited information to allow risks to be assessed differently for each sub-group of Indigenous/Aboriginal use.

2.4.1 Surface water availability

Table 7 sets out the categories used for the assessment of risks to beneficial users associated with surface water availability. The risk associated with the availability of surface water for consumptive use (or any other use) with one form of right to water (e.g. high-reliability bulk entitlements) was examined separately to the risk associated with the availability of surface water for consumptive uses accessed via other rights (e.g. stock and domestic). This enabled the risks to the different forms of water entitlement to be examined.

Table 7: Beneficial use categories for assessment of surface water availability risk

Beneficial use	Entitlement and right /form of access to water (temporal)
Environment	• high-reliability bulk entitlement and water shares • low-reliability bulk entitlement and water shares • controlled water (passing flows) • uncontrolled water (above-cap water)
Consumptive	• very-high-reliability water (urban bulk entitlements) • high-reliability bulk entitlements and water shares • low-reliability bulk entitlements and water shares • system operation water • section 51 licences • section 8 domestic and stock rights
Recreational/social	• recreation bulk entitlement • social and recreation values not provided by a recreation bulk entitlement (e.g. water harvested for entitlements in storages or water released into waterways by the environmental water holders)
Indigenous/Aboriginal	• section 8A Traditional Owner rights note: Other Indigenous/Aboriginal uses of surface water include consumptive, environmental and social uses. The current entitlement framework for these are set out under these headings above

2.4.2 Groundwater availability

The categories for the assessment of risks to beneficial users associated with groundwater are set out in **Table 8** (based on the groundwater management framework, with groundwater basis and groundwater catchments in the Victorian MDB).

The groundwater beneficial use sub-categories divide the Basin into groundwater areas that are intrinsically different in terms of the inertia of the aquifer. The inertia of the aquifer is associated with:

- the storage (S) of the aquifer relative to recharge (R) rate to the aquifer (S/R).

An aquifer with a small S/R will be more sensitive to a change in recharge condition.

Conversely, an aquifer with a high S/R has a significantly large storage volume relative to annual recharge and hence is less sensitive to a change in recharge. This method was used in the development of the groundwater SDLs for the Basin Plan (CSIRO & SKM 2010).

Table 8: Beneficial use categories for assessment of groundwater availability risk

Beneficial use	Sub-beneficial use class	Storage to recharge ratio	Form of access to water
Environment	Basin GCS	>40	None (disconnected to surface systems)
	Basin Margin GCS (deep)	20–40	
	Basin Margin GCS (shallow)	10–20	Considerations around environmental water needs described in groundwater management plans
	Upland Layered Valley	10–20	
	Uplands GCS	<10	
Consumptive	Basin GCS	>40	Licence entitlements and domestic and stock rights
	Basin Margin GCS (deep)	20–40	
	Basin Margin GCS (shallow)	10–20	
	Upland Layered Valley GCS	10–20	
	Uplands GCS	<10	
Recreational/social	Not assessed		
Aboriginal	Aboriginal values provided by groundwater		

2.4.3 Water quality condition

The beneficial use categories adopted for the assessment of water quality (condition) reflect the beneficial uses of water as set out in State Environment Protection Policy (Waters). These categories are set out in **Table 9**.

Table 9: Beneficial use categories for assessment of surface and groundwater condition (water quality) risk

Beneficial uses	Categories
Environment/aquatic ecosystems	Largely unmodified
	Slightly to moderately modified
	Highly modified
Consumptive	Human consumption after appropriate treatment
	Agriculture and irrigation
	Aquaculture
	Industrial and commercial use
	Fish, crustaceans and molluscs for human consumption
Recreational/social	Primary contact recreation (e.g. swimming)
	Secondary contact recreation (e.g. boating)
	Aesthetic enjoyment
Indigenous/Aboriginal	Indigenous cultural and spiritual values

2.4.4 Priority environmental assets – structural form

For this risk assessment, the beneficial uses associated with the structural form of the water resource includes two categories, rivers and wetlands (**Table 10**).

Table 10: Beneficial use categories for assessment of condition (structural form) risk

Beneficial uses	Categories
Priority environment/aquatic ecosystems	Rivers
	Wetlands

2.5 Susceptibility, probability and consequence

2.5.1 Probability

Probability refers to the chance of a cause occurring, given the adopted scenario and existing management arrangements (e.g. the IPCC median warming scenario – a 2° C increase in global temperature – is almost certain to occur despite existing management arrangements).

What is the probability that { *climate change*, *extreme drought*, *earth resource extraction*, *major asset failure*, *etc...* } *will actually occur?*

Each cause was assessed separately for each water resource plan area, and included consideration of:

- probability of the cause
- confidence in that assessment.

2.5.2 Susceptibility

Susceptibility considers how susceptible a threat is to a particular cause (e.g. the volume of surface water is highly susceptible to impacts from climate change).

If { *climate change*, *extreme drought*, *earth resource extraction*, *major asset failure*, *etc...* } *will actually occured, to what extent would it cause* { *reduction in available volume*, *decline in aquifer inflow*, *elevated salinity levels*, *changes to lateral connectivity*, *etc...* } *?*

The susceptibility of each threat to each cause has been assessed in terms of three variables. Each combination of cause and threat was assessed separately for each water resource plan, and included consideration of the:

- magnitude of the change/impact of a cause on a threat
- spatial extent of the cause on the threat
- duration of the change/impact on the threat arising from the cause.

In addition, the level of confidence was ranked for each susceptibility assessment.

2.5.3 Sensitivity

For the purpose of this assessment, sensitivity refers to the linkage between a threat and a beneficial use (e.g. high-reliability water entitlements (for consumptive use) may be moderately sensitive to changes in the long-term volume of surface water).

If { *reduction in available volume*, *decline in aquifer inflow*, *elevated salinity levels*, *changes to lateral connectivity*, *etc...* } *actually occurred, how would it affect* { *high reliability consumptive users*, *domestic and stock users*, *uncontrolled environmental flows*, *Aboriginal cultural uses of water*, *etc...* } *?*

Each combination of threat and beneficial use was assessed for each water resource plan, and included:

- development of rating tables to compare how each beneficial use would be affected for different levels of threat
- confidence in that assessment.

Note: in many risk assessments the relative importance of a beneficial use has been used along with sensitivity to define consequence. For this risk assessment, only beneficial uses of regional, state, national and/or international importance have been considered, and these beneficial uses have been considered to be of equal importance for the risk assessment. Beneficial uses of local importance are not the focus of the water resource plans and therefore have not been examined in this risk assessment.

The explicit treatment of these factors (probability, susceptibility and sensitivity) can introduce some complexity but has helped to produce a comprehensive, transparent and readily justified risk assessment.

2.6 Quantified uncertainties (10.41(8)) through sensitivity analysis

A rating on the level of confidence was applied to each element of the risk assessment (probability, susceptibility and sensitivity). The level of confidence assessment ratings has enabled the establishment of an individual level of confidence rating for each individual combination of cause, threat and beneficial use. A three-level assessment of confidence was applied to each assessment of probability, susceptibility and sensitivity:

High confidence:	where the assessment is based on the literature or statistical analysis
Moderate confidence:	where the assessment is based on sound professional opinion
Low confidence:	where the assessment is based on a best estimate.

A final level of confidence rating, using the sum of the three level of confidence scores for each of the probability (of cause occurring), susceptibility (of the threat to the cause) and sensitivity (of the beneficial use to the threat), was calculated for each risk. The addition, rather than multiplication, of the three levels of confidence scores was adopted to avoid the potential to under or overstate the final level of confidence as a result of high or low levels of confidence applied to each element of the risk assessment.

The approach adopted for the risk assessment quantifies uncertainty for each assessment of probability, susceptibility and sensitivity. As such the approach provides for an explicit assessment of uncertainty for each individual risk (i.e. each and every individual combination of cause, threat and beneficial use). This treatment of uncertainty is required under the Basin Plan and enables the effective management of risk. The addition of confidence scores resulted in a rating of 3 to 8 as identified in **Table 12** (surface water) and **Table 14** (groundwater). The ratings were translated into the following rating provided in the risk tables (**Table 15** - **Table 77**) in **Part 4** of this report.

Legend	8	7	6	5	4	0
	High confidence	Moderate – High confidence	Moderate confidence	Low – Moderate confidence	Low confidence	No plausible risk

3. List of risks (10.41(4)) assessment of level of each risk (10.41(5)) and quantified uncertainties (10.41(8))

The Basin Plan requires all identified risks to be listed in water resource plans (10.41 (4)). Such a listing is provided for the Wimmera–Mallee water resource plan area below. There are many thousands of potential risks included in these charts. A hierarchical structure has been adopted to manage the analysis and management of these risks. Importantly, this hierarchal structure has not resulted in the arbitrary exclusion of risks. The approach adopted has enabled detailed analysis of specific risks and grouping of risk into themes that allows broad analysis of issues.

The Basin Plan requires that all identified risks must be assessed (10.41(5)). The level of risk (as defined by ISO 31000) must be defined using the categories low, medium and high, although further categories can be used. AS/NZS ISO 31000:2009 Risk management – principles and guidelines, has been used to guide the risk assessment.

Victoria has added risk categories to help classify and consider risks in water resource plan development to reflect the risk and its associated impact on the condition and continued availability of water 10.41(1). This further classification of risk has also helped identify some strategies for addressing risks in a manner commensurate with the level of risk 10.43(1)(a).

For clarity risks noted as 'moderate' in the tables below correspond to medium level risks in ISO:31000 and risks identified as 'high' or 'very high' correspond to high level risks under the ISO:310000 principles.

The Basin Plan also requires that quantified uncertainties in the level of risk attributed to each risk, including the results of any sensitivity analysis, are identified 10.41(8). Tables setting out the level of confidence in each risk assessment are provided below. No risks were found to be associated with the lowest level of confidence (i.e. low level of confidence with the assessment of probability, susceptibility and sensitivity). Similarly, no risks were found to associated with the highest level of confidence for each of probability, susceptibility and sensitivity. Low levels of confidence were most commonly applied to and associated with risks to Aboriginal water use.

These are presented in table form below.

Risk Assessment

Legend	5	4	3	2	1	0
	Very high risk	High risk	Medium risk	Low risk	Very low risk	Not plausible – no risk

Level of confidence/sensitivity analysis

Legend	8	7	6	5	4	0
	High confidence	Moderate – High confidence	Moderate confidence	Low – Moderate confidence	Low confidence	No plausible risk

3.1 Wimmera–Mallee (surface water) water resource plan area

Table 11: Wimmera–Mallee (surface water) water resource plan area – List and assessment of risks

		Availability											Condition & Avail		Condition - Water Quality									Waterway Risks	
		Environment				Consumptive						Social			Environment/ aquatic ecosystems	Consumptive						Social			Environment	
	Wimmera Mallee WRPA - Surface Water Level of risk	HR BE	LR BE	Contr'd water	Uncontr'd water	VHR BE	HR BE	LR BE	System op. water	s51 licences	s8 S&D rights	Rec. BE	Rec. & amenity	Aborig. culture	Wimmera Mallee	Human drink	Ag & irrig	Aqua-culture	Industry / commerc'l	Fish crust'ne consum'n	Primary contact rec.	Secondary contact rec.	Aesthetics	Rivers	Wetlands
Climate change	Reduction in volume	4	5	4	5	4	4	5	4	4	4	4	4	5											
	Change to seasonal pattern	3	3	3	5	3	3	3	3	5	4	3	3	5											
	Change to the inter annual pattern	2	3	2	3	1	2	3	1	3	3	2	2	4											
	Salinity													5	4	5	5	5	5	5	5	5	4		
	Suspended sediment & nutrients													5	4	3	3	3	3	4	3	3	3		
	Toxicants													5	5	5	5	5	4	5	5	5	3		
	Pathogens													4	2	3	3	3	1	3	3	2	2		
	Other water quality impacts													5	4	4	5	5	3	5	4	4	3		
	Loss or decline in longitudinal connectivity													5										5	4
	Loss or decline in lateral connectivity													5										4	5
	Loss or decline in instream physical habitat													5										5	5
Extreme drought	Reduction in volume	3	4	3	4	3	3	4	2	3	3	4	3	4											
	Change to seasonal pattern	2	2	2	3	1	2	2	1	3	3	2	2	4											
	Change to the inter annual pattern	2	3	2	4	1	2	3	2	4	4	3	2	4											
	Salinity													4	3	4	4	3	3	4	1	1	2		
	Suspended sediment & nutrients													3	3	2	2	2	1	3	1	1	1		
	Toxicants													4	4	4	3	4	3	4	3	3	2		
	Pathogens													2	1	1	1	1	1	1	1	1	1		
	Other water quality impacts													4	3	3	3	3	2	3	3	3	2		
	Loss or decline in longitudinal connectivity													4										4	3
	Loss or decline in lateral connectivity													4										3	4
	Loss or decline in instream physical habitat													3										3	3
Extreme wet period	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to seasonal pattern	1	1	1	2	1	1	1	1	2	1	1	1	3											
	Change to the inter annual pattern	1	1	1	1	1	1	1	1	1	1	1	1	3											
	Salinity													4	3	4	4	3	3	4	1	1	2		
	Suspended sediment & nutrients													3	3	2	2	2	1	3	1	1	1		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													3	1	1	1	1	1	1	1	1	1		
	Other water quality impacts													3	1	1	2	2	1	2	1	1	1		
	Loss or decline in longitudinal connectivity													0										0	0
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													3										3	3
Flooding and erosion and inundation	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													3	1	1	2	1	1	2	1	1	1		
	Suspended sediment & nutrients													3	1	1	1	1	1	2	1	1	1		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													3	1	1	1	1	1	1	1	1	1		
	Other water quality impacts													3	1	1	1	1	1	1	1	1	1		
	Loss or decline in longitudinal connectivity													0										0	0
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													3										3	3
Bushfires	Reduction in volume	1	2	1	2	1	1	2	1	1	1	1	1	4											
	Change to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													3	1	1	1	1	1	1	1	1	1		
	Suspended sediment & nutrients													3	1	1	1	1	1	1	1	1	1		
	Toxicants													1	1	1	1	1	1	1	1	1	1		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	2	2	3	3	2	3	2	2	1		
	Loss or decline in longitudinal connectivity													2										2	1
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													2										2	2
Land use change - Availability	Reduction in volume	1	2	1	2	1	1	2	1	1	1	1	1	3											
	Change to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													0	0	0	0	0	0	0	0	0	0		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													0	0	0	0	0	0	0	0	0	0		
	Loss or decline in longitudinal connectivity													0										0	0
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													0										0	0
Land use change - Condition	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													4	2	1	2	2	2	3	1	1	1		
	Suspended sediment & nutrients													3	1	1	1	1	1	1	1	1	1		
	Toxicants													3	1	1	1	1	1	1	1	1	1		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	1	1	2	2	1	2	1	1	1		
	Loss or decline in longitudinal connectivity													0										0	0
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													1										1	1
Recreational use	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													4	2	2	2	2	1	1	1	1	1		
	Toxicants													4	2	2	3	3	2	3	3	2	1		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													0	0	0	0	0	0	0	0	0	0		
	Loss or decline in longitudinal connectivity													0										0	0
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													0										0	0
Point source discharges	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													0	0	0	0	0	0	0	0	0	0		
	Toxicants													2	1	2	2	2	1	2	2	1	1		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													3	1	1	1	1	1	1	1	1	1		
	Loss or decline in longitudinal connectivity													0										0	0
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													0										0	0
Higher rainfall & flow s	Reduction in volume	2	3	1	3	1	2	3	1	2	2	2	2	3											
	Change to seasonal pattern	1	1	1	2	1	1	1	1	2	2	1	1	3											
	Change to the inter annual pattern	1	1	1	2	1	1	1	1	2	2	1	1	3											
	Salinity													3	2	3	3	3	3	3	1	1	1		
	Suspended sediment & nutrients													3	1	1	1	1	1	1	1	1	1		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													3	2	2	3	3	1	3	2	2	1		
	Loss or decline in longitudinal connectivity													0										0	0
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													1										1	1
Pest and weeds	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Change to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													4	4	4	4	4	3	4	3	3	3		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	3	3	3	3	2	3	3	3	2		
	Loss or decline in longitudinal connectivity													3										3	3
	Loss or decline in lateral connectivity													0										0	0
	Loss or decline in instream physical habitat													3										3	3

Legend

Very high risk

Table 12: Wimmera–Mallee (surface water) water resource plan area – Level of confidence

Wimmera Mallee WRPA - Surface Water Level of confidence in risk assessment		Availability											Condition & Avail		Condition - Water Quality									Waterway Biota	
		Environment				Consumptive						Social			Environment/ aquatic ecosystems	Consumptive					Social			Environment	
		HR BE	LR BE	Contr'd water	Uncontr'd water=	VHR BE	HR BE	LR BE	System op. water	s51 licences	s8 S&D rights	Rec. BE	Rec. & amenity	Aborig. culture	Wimmera Mallee	Human drink	Ag & irrig	Aqua-culture	Industry / commerc'l	Fish crust'ns consum'n	Primary contact rec.	Secondary contact rec.	Aesthetics	Rivers	Wetlands
Climate change	Reduction in volume	7	7	7	6	7	7	7	7	7	7	7	7	6											
	Changes to seasonal pattern	7	7	7	7	7	7	7	7	7	7	7	7	6											
	Changes to the inter annual pattern	6	6	6	6	6	6	6	6	6	6	6	6	5											
	Salinity													5	6.5	5	5	5	5	5	7	7	6		
	Suspended sediment & nutrients													6	7	6	6.5	7.5	6	6.5	7	6	6		
	Toxicants													6	7	6	6	6	6	6	6	6	6		
	Pathogens													6	7	6	6	6	6	6	6	6	6		
	Other water quality impacts													6	7	6	6	6	6	6	6	6	6		
	Longitudinal connectivity													6										7	7
	Lateral connectivity													6										7	7
	Instream physical habitat													6										7	7
Extreme drought	Reduction in volume	8	8	8	7	8	8	8	8	8	8	8	8	7											
	Changes to seasonal pattern	6	6	6	6	6	6	6	6	6	6	6	6	5											
	Changes to the inter annual pattern	6	6	6	6	6	6	6	6	6	6	6	6	5											
	Salinity													6	7.5	6	6	6	6	6	8	8	7		
	Suspended sediment & nutrients													6	7	6	6.5	7.5	6	6.5	7	6	6		
	Toxicants													6	7	6	6	6	6	6	6	6	6		
	Pathogens													6	7	6	6	6	6	6	6	6	6		
	Other water quality impacts													6	7	6	6	6	6	6	6	6	6		
	Longitudinal connectivity													6										7	7
	Lateral connectivity													6										7	7
	Instream physical habitat													6										7	7
Extreme wet period	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	7	7	7	7	7	7	7	7	7	7	7	7	6											
	Changes to the inter annual pattern	6	6	6	6	6	6	6	6	6	6	6	6	5											
	Salinity													6	7.5	6	6	6	6	6	8	8	7		
	Suspended sediment & nutrients													6	7	6	6.5	7.5	6	6.5	7	6	6		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													6	7	6	6	6	6	6	6	6	6		
	Other water quality impacts													5	6	5	5	5	5	5	5	5	5		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													6										7	7
Flooding and overbank inundation	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													6	7.5	6	6	6	6	6	8	8	7		
	Suspended sediment & nutrients													6	7	6	6.5	7.5	6	6.5	7	6	6		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													6	7	6	6	6	6	6	6	6	6		
	Other water quality impacts													5	6	5	5	5	5	5	5	5	5		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													6										7	7
Bushfires	Reduction in volume	6	6	6	5	6	6	6	6	6	6	6	6	5											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													5	6.5	5	5	5	5	5	7	7	6		
	Suspended sediment & nutrients													5	6	5	5.5	6.5	5	5.5	6	5	5		
	Toxicants													4	5	4	4	4	4	4	4	4	4		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													5	6	5	5	5	5	5	5	5	5		
	Longitudinal connectivity													5										6	6
	Lateral connectivity													0										0	0
	Instream physical habitat													5										6	6
Land use change: Availability	Reduction in volume	6	6	6	5	6	6	6	6	6	6	6	6	5											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													0	0	0	0	0	0	0	0	0	0		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													0	0	0	0	0	0	0	0	0	0		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													0										0	0
Land use change Condition	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													4	5.5	4	4	4	4	4	6	6	5		
	Suspended sediment & nutrients													5	6	5	5.5	6.5	5	5.5	6	5	5		
	Toxicants													4	5	4	4	4	4	4	4	4	4		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													5	6	5	5	5	5	5	5	5	5		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													4										5	5
Existing land use practices	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													5	6.5	5	5	5	5	5	7	7	6		
	Suspended sediment & nutrients													5	6	5	5.5	6.5	5	5.5	6	5	5		
	Toxicants													4	5	4	4	4	4	4	4	4	4		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	5	4	4	4	4	4	4	4	4		
	Longitudinal connectivity													6										7	7
	Lateral connectivity													4										5	5
	Instream physical habitat													6										7	7
Farm dams	Reduction in volume	6	6	6	5	6	6	6	6	6	6	6	6	5											
	Changes to seasonal pattern	5	5	5	5	5	5	5	5	5	5	5	5	4											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													4	5.5	4	4	4	4	4	6	6	5		
	Suspended sediment & nutrients													5	6	5	5.5	6.5	5	5.5	6	5	5		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	5	4	4	4	4	4	4	4	4		
	Longitudinal connectivity													4										5	5
	Lateral connectivity													0										0	0
	Instream physical habitat													5										6	6
Increased utilisation of water access rights	Reduction in volume	5	5	5	4	5	5	5	5	5	5	5	5	4											
	Changes to seasonal pattern	6	6	6	6	6	6	6	6	6	6	6	6	5											
	Changes to the inter annual pattern	6	6	6	6	6	6	6	6	6	6	6	6	5											
	Salinity													4	5.5	4	4	4	4	4	6	6	5		
	Suspended sediment & nutrients													4	5	4	4.5	5.5	4	4.5	5	4	4		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	5	4	4	4	4	4	4	4	4		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													0										0	0
Increase in the number of entitlements leading to increased take	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													0	0	0	0	0	0	0	0	0	0		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													0	0	0	0	0	0	0	0	0	0		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													0										0	0
Non-compliance with the Water Act 1989	Reduction in volume	6	6	6	5	6	6	6	6	6	6	6	6	5											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													4	5.5	4	4	4	4	4	6	6	5		
	Suspended sediment & nutrients													4	5	4	4.5	5.5	4	4.5	5	4	4		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	5	4	4	4	4	4	4	4	4		
	Longitudinal connectivity													4										5	5
	Lateral connectivity													4										5	5
	Instream physical habitat													4										5	5
Timing and location of demands	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													0	0	0	0	0	0	0	0	0	0		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													0	0	0	0	0	0	0	0	0	0		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													0										0	0
Earth resources development	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													6	7	6	6.5	7.5	6	6.5	7	6	6		
	Toxicants													5	6	5	5	5	5	5	5	5	5		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													0	0	0	0	0	0	0	0	0	0		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													0										0	0
Point source discharges	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													0	0	0	0	0	0	0	0	0	0		
	Toxicants													5	6	5	5	5	5	5	5	5	5		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	5	4	4	4	4	4	4	4	4		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													0										0	0
Major asset failure	Reduction in volume	7	7	7	6	7	7	7	7	7	7	7	7	6											
	Changes to seasonal pattern	7	7	7	7	7	7	7	7	7	7	7	7	6											
	Changes to the inter annual pattern	6	6	6	6	6	6	6	6	6	6	6	6	5											
	Salinity													5	6.5	5	5	5	5	5	7	7	6		
	Suspended sediment & nutrients													5	6	5	5.5	6.5	5	5.5	6	5	5		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													5	6	5	5	5	5	5	5	5	5		
	Longitudinal connectivity													0										0	0
	Lateral connectivity													0										0	0
	Instream physical habitat													6										7	7
Pest and weeds	Reduction in volume	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to seasonal pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Changes to the inter annual pattern	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Salinity													0	0	0	0	0	0	0	0	0	0		
	Suspended sediment & nutrients													4	5	4	4.5	5.5	4	4.5	5	4	4		
	Toxicants													0	0	0	0	0	0	0	0	0	0		
	Pathogens													0	0	0	0	0	0	0	0	0	0		
	Other water quality impacts													4	5	4	4	4	4	4	4	4	4		
	Longitudinal connectivity													5										6	6
	Lateral connectivity													0										0	0
	Instream physical habitat													5										6	6

Legend

8	High confidence
7	Moderate - High confidence
6	Moderate confidence
5	Low - Moderate confidence

3.2 Wimmera–Mallee (groundwater) water resource plan area

Table 13: Wimmera–Mallee (groundwater) water resource plan area – List and assessment of risks

	Wimmera Mallee WRPA - Groundwater Level of risk	Condition & Avail		Availability								Condition - Water Quality				
				Environment				Consumptive				Consumptive				
		Rec. & amenity	Aborig. culture	Basin Margin Deep	Basin Margin Shallow	Upland Layered Valley	Uplands	Basin Margin Deep	Basin Margin Shallow	Upland Layered Valley	Uplands	Human drink	Ag & irrig	Aqua-culture	Industry / commerc'l	Fish crust'ns consum'n
Climate change	Decline in inflow to or increase in extraction from aquifer	3	5	3	4	5	5	4	4	5	5					
	Change to the seasonal pattern of inflow to or extraction from aquifer	3	5	3	4	5	5	4	4	5	5					
	Salinity		5					4	4	4	3	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Extreme drought	Decline in inflow to or increase in extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Extreme wet period	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		3									1	1	1	1	1
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		3									1	1	1	1	1
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Flooding and overbank inundation	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		3									1	1	1	1	1
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		3									1	1	1	1	1
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Bushfires	Decline in inflow to or increase in extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		3									1	1	1	1	1
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		3									1	1	1	1	1
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Land use change: Availability	Decline in inflow to or increase in extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		3									1	1	1	1	1
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		3									1	1	1	1	1
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Land use change: Condition	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		4					1	2	1	1	1	3	2	2	3
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		4									3	3	3	2	3
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		4									1	2	2	1	2
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Existing land use practices	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		3									1	1	1	1	1
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		3									1	1	1	1	1
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Farm dams	Decline in inflow to or increase in extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Increased utilisation of water access rights	Decline in inflow to or increase in extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Increase in the number of entitlements leading to increased take	Decline in inflow to or increase in extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Non-compliance with the Water Act 1989	Decline in inflow to or increase in extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	1	3	1	1	1	1	1	1	1	1					
	Salinity		3					1	1	1	1	1	1	1	1	1
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Timing and location of demands	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		0					0	0	0	0	0	0	0	0	0
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Earth resources development	Decline in inflow to or increase in extraction from aquifer	1	4	1	1	1	1	1	1	1	1					
	Change to the seasonal pattern of inflow to or extraction from aquifer	1	4	1	1	1	1	1	1	1	1					
	Salinity		4					1	1	1	1	1	2	2	1	2
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		4									2	2	2	1	2
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		4									1	1	1	2	1
	Structual form of aquifer		4	1	1	1	1	1	1	1	1					
Point source discharges	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		3					1	1	1	1	1	2	1	1	2
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		3									2	2	2	1	2
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		3									1	1	1	1	1
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Major asset failure	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		0					0	0	0	0	0	0	0	0	0
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					
Pest and weeds	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		0					0	0	0	0	0	0	0	0	0
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structual form of aquifer		0	0	0	0	0	0	0	0	0					

Legend

5	Very high risk
4	High risk
3	Moderate risk
2	Low risk
1	Very low risk
0	No plausible risk

Table 14: Wimmera–Mallee (groundwater) water resource plan area – Level of confidence

		Condition & Asset		Availability								Condition - Water Quality				
		Environment		Environment				Consumptive				Consumptive				
	Wimmera Mallee WRPA - Groundwater Level of confidence in risk assessment	Rec. & amenity	Aborig. culture	Basin Margin Deep	Basin Margin Shallow	Upland Layered Valley	Uplands	Basin Margin Deep	Basin Margin Shallow	Upland Layered Valley	Uplands	Human drink	Ag & irrig	Aqua-culture	Industry / commerc't	Fish crust'ns consum'n
Climate change	Decline in inflow to or increase in extraction from aquifer	7	6	7	7	7	7	7	7	7	7					
	Change to the seasonal pattern of inflow to or extraction from aquifer	7	6	7	7	7	7	7	7	7	7					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Extreme drought	Decline in inflow to or increase in extraction from aquifer	7	6	7	7	7	7	7	7	7	7					
	Change to the seasonal pattern of inflow to or extraction from aquifer	7	6	7	7	7	7	7	7	7	7					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Extreme wet period	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		6					7	7	7	6	6	6	6	6	6
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Flooding and overbank inundation	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		6					7	7	7	6	6	6	6	6	6
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		6									6	6	6	6	6
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		6									6	6	6	6	6
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Bushfires	Decline in inflow to or increase in extraction from aquifer	5	4	5	5	5	5	5	5	5	5					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		4					4	5	5	4	4	4	4	4	4
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		4									4	4	4	4	4
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		4									4	4	4	4	4
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Land use change (variability)	Decline in inflow to or increase in extraction from aquifer	6	5	6	6	6	6	6	6	6	6					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Land use change (cumulative)	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		4					5	5	5	4	4	4	4	4	4
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		4									4	4	4	4	4
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		4									4	4	4	4	4
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Bushfire impacts on practices	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Pest plants	Decline in inflow to or increase in extraction from aquifer	6	5	6	6	6	6	6	6	6	6					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Pest animals	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Pest animals impacts on practices	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Human activities with the water access rights	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Increase in the number of earthworks leading to increased take	Decline in inflow to or increase in extraction from aquifer	6	5	6	6	6	6	6	6	6	6					
	Change to the seasonal pattern of inflow to or extraction from aquifer	6	5	6	6	6	6	6	6	6	6					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
New surface with the water access right	Decline in inflow to or increase in extraction from aquifer	7	6	7	7	7	7	7	7	7	7					
	Change to the seasonal pattern of inflow to or extraction from aquifer	6	5	6	6	6	6	6	6	6	6					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Timing and number of diversions	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		0					0	0	0	0	0	0	0	0	0
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Surface water development	Decline in inflow to or increase in extraction from aquifer	7	6	7	7	7	7	7	7	7	7					
	Change to the seasonal pattern of inflow to or extraction from aquifer	7	6	7	7	7	7	7	7	7	7					
	Salinity		6					7	7	7	6	6	6	6	6	6
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		6									6	6	6	6	6
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		6									6	6	6	6	6
	Structural form of aquifer		6	7	7	7	7	7	7	7	7					
Point source discharges	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		5					6	6	6	5	5	5	5	5	5
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		5									5	5	5	5	5
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		5									5	5	5	5	5
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					
Major asset failure	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		0					0	0	0	0	0	0	0	0	0
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structural form of aquifer	0	0	0	0	0	0	0	0	0	0					
Pest animals	Decline in inflow to or increase in extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Change to the seasonal pattern of inflow to or extraction from aquifer	0	0	0	0	0	0	0	0	0	0					
	Salinity		0					0	0	0	0	0	0	0	0	0
	Suspended sediment & nutrients		0									0	0	0	0	0
	Toxicants		0									0	0	0	0	0
	Pathogens		0									0	0	0	0	0
	Other water quality impacts		0									0	0	0	0	0
	Structural form of aquifer		0	0	0	0	0	0	0	0	0					

Legend

8	High confidence
7	Moderate - High confidence
6	Moderate confidence
5	Low - Moderate confidence
4	Low confidence
0	No plausible risk

4. Description of risks (10.42)

Under the provisions of the Basin Plan, water resource plans are required to address medium or higher-level risks.

In addressing the risks, water resource plans must describe the risk and factors that contribute to those risks. Adequate information must be captured in the data-gathering process to enable the development of a description of the risk and the factors contributing to risks for the Risk Register and the risk assessment.

Water resource plans must describe a strategy to address medium and high risks, or explain why any such risk cannot be addressed in a water resource plan (e.g. out of scope).

The following tables provide a description of risks for the water resource plan area defined in accordance with sub-section 10.41(6) as having:

- a medium or higher-level of risk (10.42(a))
- the factors that contribute to those risks (10.42(b))
- the quantified uncertainties in the level of risk attributed to each risk by way of sensitivity analysis (10.41(8)).

The following statements are provided to meet these requirements.

4.1 Risk categories

Risks statements of medium to very high-level risks are provided below under the following categories (10.42(a)):

- availability of the water resource
- condition of the water resource
- priority environmental assets (structural form).

Risks are also presented to meet Basin Plan requirements for specific risks identified in the plan and for risks that are of particular interest to communities.

- consumptive uses
- environmental uses
- Aboriginal uses of water and objectives
- recreational/social uses
- extreme events
- environmental water requirements for priority environmental assets and ecosystem functions (10.17 and 10.22(b))
- groundwater-related risks (10.18, 10.19, 10.20, 10.21 and 10.22(b))
- interception activities (10.23)
- non-compliance with the Victorian Water Act.

Description of risks (10.42)(a)(b)

Risk statements are structured to include the factors that contribute to the risk namely its 'cause', the 'threat' it poses, the impact is has on the user/uses of water and the level of confidence (quantified uncertainty) in the assessment of that risk (10.41(8)).

The risks assessment identified a number of causes of risk to the availability, condition, or to priority environmental assets (structural form). These causes have been broadly grouped into macro cause categories:

- climate change
- extreme events
  - bushfires
  - extreme drought
  - extreme wet periods
  - flooding and overbank inundation
  - major asset failure
  - point-source discharges
- land use and interception
  - earth resource development
  - failure to continue to invest in best practice land use initiatives
  - increase in farm dams
  - land use change (affecting water availability)
  - land use change (affecting water condition)
  - pests and weeds
- non-compliance
  - non-compliance with the Victorian Water Act
- water access, take, utilisation and location
  - increase in the number of rights and volume of entitlements
  - increased utilisation of water access rights
  - timing and location of demands.

Strategies to address each identified risk are named in the tables below and descried in detail in **Table 78** and are assigned to each risk identified and medium or higher-level in risk as per section 10.43 of the Basin Plan.

Section 4.2 identifies the medium or higher-level risks, confidence level and the strategies to address the risk for the Wimmera–Mallee (surface water) water resource plan area.

- consumptive:
  - **Table 15**: Medium or higher-level availability risks to consumptive uses from climate change (surface water)
  - **Table 16**: Medium or higher-level availability risks to consumptive uses from extreme events (surface water)
  - **Table 17**: Medium or higher-level availability risks to consumptive uses from land use and interception (surface water)
  - **Table 18**: Medium or higher-level condition risks to consumptive uses from climate change (surface water)
  - **Table 19**: Medium or higher-level condition risks to consumptive uses from extreme events (surface water)
  - **Table 20**: Medium or higher-level condition risks to consumptive uses from land use and interception (surface water)
  - **Table 21**: Medium or higher-level condition risks to consumptive uses from non-compliance (surface water)
  - **Table 22**: Medium or higher-level condition risks to consumptive uses from water access, take, utilisation and location (surface water)

- environmental:
  - **Table 23**: Medium or higher-level availability risks to environmental uses from climate change (surface water)
  - **Table 24**: Medium or higher-level availability risks to environmental uses from extreme events (surface water)
  - **Table 25**: Medium or higher-level availability risks to environmental uses from land use and interception (surface water)
  - **Table 26**: Medium or higher-level condition risks to environmental uses from climate change (surface water)
  - **Table 27**: Medium or higher-level condition risks to environmental uses from extreme events (surface water)
  - **Table 26**: Medium or higher-level condition risks to environmental uses from land use and interception (surface water)
  - **Table 29**: Medium or higher-level condition risks to environmental uses from non-compliance (surface water)
  - **Table 30**: Medium or higher-level condition risks to environmental uses from water access, take, utilisation and location (surface water)
- Aboriginal:
  - **Table 31**: Medium or higher-level availability risks to Aboriginal uses from climate change (surface water)
  - **Table 32**: Medium or higher-level availability risks to Aboriginal uses from extreme events (surface water)
  - **Table 33**: Medium or higher-level availability risks to Aboriginal uses from land use and interception (surface water)
  - **Table 34**: Medium or higher-level availability risks to Aboriginal uses from non-compliance (surface water)
  - **Table 35**: Medium or higher-level availability risks to Aboriginal uses from water access, take, utilisation and location (surface water)
  - **Table 36**: Medium or higher-level condition risks to Aboriginal uses from climate change (surface water)
  - **Table 37**: Medium or higher-level condition risks to Aboriginal uses from extreme events (surface water)
  - **Table 38**: Medium or higher-level condition risks to Aboriginal uses from land use and interception (surface water)
  - **Table 39**: Medium or higher-level condition risks to Aboriginal uses from non-compliance (surface water)
  - **Table 40**: Medium or higher-level condition risks to Aboriginal uses from water access, take, utilisation and location (surface water)
- recreational/social:
  - **Table 41**: Medium or higher-level availability risks to recreational/social uses from climate change (surface water)
  - **Table 42**: Medium or higher-level availability risks to recreational/social uses from extreme events (surface water)
  - **Table 43**: Medium or higher-level availability risks to recreational/social uses from land use and interception (surface water)
  - **Table 44**: Medium or higher-level condition risks to recreational/social uses from climate change (surface water)
  - **Table 45**: Medium or higher-level condition risks to recreational/social uses from extreme events (surface water)

  - **Table 46**: Medium or higher-level condition risks to recreational/social uses from land use and interception (surface water)
- critical human water needs (extreme events):
  - **Table 47**: Medium or higher-level availability risks to critical human water needs (surface water)
  - **Table 48**: Medium or higher-level condition risks to critical human water needs (surface water)
- priority environmental assets:
  - **Table 49**: Medium or higher-level risks to environmental water requirements for priority environmental assets and ecosystem functions from climate change (surface water)
  - **Table 50**: Medium or higher-level risks to environmental water requirements for priority environmental assets and ecosystem functions from extreme events (surface water)
  - **Table 51**: Medium or higher-level risks to environmental water requirements for priority environmental assets and ecosystem functions from land use and interception (surface water)
- interception:
  - **Table 53**: Medium or higher-level risks from interception activities to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses (surface water)
  - **Table 54**: Medium or higher-level risks from interception activities to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses (surface water)
- non-compliance:
  - **Table 55**: Medium or higher-level risks from non-compliance to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses
  - **Table 56**: Medium or higher-level risks from non-compliance to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses

Section 4.3 identifies with the medium or higher-level risks, confidence level and identifies the strategies to address the risk for the Wimmera–Mallee (groundwater) water resource plan area.

- consumptive:
  - **Table 57**: Medium or higher-level availability risks to consumptive uses from climate change (groundwater)
  - **Table 58**: Medium or higher-level condition risks to consumptive uses from climate change (groundwater)
  - **Table 59**: Medium or higher-level condition risks to consumptive uses from land use and interception (groundwater)
- environmental:
  - **Table 60**: Medium or higher-level availability risks to environmental uses from climate change(groundwater)
- Aboriginal:
  - **Table 61**: Medium or higher-level availability risks to Aboriginal uses from climate change (groundwater)
  - **Table 62**: Medium or higher-level availability risks to Aboriginal uses from extreme events (groundwater)
  - **Table 63**: Medium or higher-level availability risks to Aboriginal uses from land use and interception (groundwater)
  - **Table 64**: Medium or higher-level availability risks to Aboriginal uses from non-compliance (groundwater)

  - **Table 65**: Medium or higher-level availability risks to Aboriginal uses from water access, take, utilisation and location (groundwater)
  - **Table 66**: Medium or higher-level condition risks to Aboriginal uses from climate change (groundwater)
  - **Table 67**: Medium or higher-level condition risks to Aboriginal uses from extreme events (groundwater)
  - **Table 68**: Medium or higher-level condition risks to Aboriginal uses from land use and interception (groundwater)
  - **Table 69**: Medium or higher-level condition risks to Aboriginal uses from non-compliance (groundwater)
  - **Table 70**: Medium or higher-level condition risks to Aboriginal uses from water access, take, utilisation and location (groundwater)
- recreational/social:
  - **Table 71**: Medium or higher-level availability risks to recreational/social uses from climate change (groundwater)
- groundwater special category risks:
  - **Table 72**: Medium or higher-level risks to environmental water requirements for priority environmental assets dependent on groundwater (10.18) groundwater and surface water connections (10.19) and environmental outcomes relating to groundwater (10.21) from climate change (groundwater)
- interception:
  - **Table 74**: Medium or higher-level risks from interception activities to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater)
  - **Table 75**: Medium or higher-level risks from interception activities to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater)
- non-compliance:
  - **Table 76**: Medium or higher-level risks from non-compliance to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater)
  - **Table 77**: Medium or higher-level risks from non-compliance to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater).

4.2 Wimmera–Mallee (surface water) water resource plan area

4.2.1 Consumptive users

4.2.1.1 Availability of the water resource

Table 15: Medium or higher-level availability risks to consumptive uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **consumptive - high-reliability bulk entitlements and water shares** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	6. Greater flexibility for taking water under winter-fill licences 8. Improving our understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: User-focused information and reporting 10. Improving rural water supply planning 11. Improving state-wide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13.Leading climate change adaptation across Victoria's water system 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 35. Water resource information supports planning and decisions
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **consumptive - high-reliability bulk entitlements and water shares** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **consumptive - low-reliability bulk entitlements and water shares** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **medium risk**	that **climate change**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **consumptive - low-reliability bulk entitlements and water shares** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **very high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **consumptive - low-reliability bulk entitlements and water shares** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **high risk**	that **climate change**	leads to a **reduction in volume of water available**	which results in **adverse impacts on consumptive - section 51 take and use licences** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **changes to the inter-annual pattern of water available**	which results in **adverse impacts on consumptive - section 51 take and use licences** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving state-wide water resource planning and risk assessment 14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **very high risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in **adverse impacts on consumptive - section 51 take and use licences** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **high risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **consumptive - section 8 domestic and stock rights** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **consumptive - section 8 domestic and stock rights** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **medium risk**	that **climate change**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **consumptive - section 8 domestic and stock rights** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **consumptive - system operation** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **medium risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **consumptive - system operation** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	
There is a **medium risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **consumptive - very high reliability water (urban bulk entitlements)** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **consumptive - very high reliability water (urban bulk entitlements)** water uses/users.	This risk has a **moderate** level of confidence in its assessment.	6. Greater flexibility for taking water under winter-fill licences 8. Improving our understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: User-focused information and reporting 10. Improving rural water supply planning 11. Improving state-wide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13.Leading climate change adaptation across Victoria's water system 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 35. Water resource information supports planning and decisions

Table 16: Medium or higher-level availability risks to consumptive uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **a major asset failure**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure)
There is a **medium risk**	that **a major asset failure**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **section 51 take and use licences** water uses/users.	**Moderate**	
There is a **medium risk**	that **bushfire**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure)

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **high-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	4. Emergency water supply 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 35. Water resource information supports planning and decisions
There is a **high risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **low-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	
There is a **high risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **section 51 take and use licences** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **section 51 take and use licences** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **section 51 take and use licences** water uses/users.	**Moderate**	
There is a **high risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **section 8 domestic and stock rights** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **section 8 domestic and stock rights** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **section 8 domestic and stock rights** water uses/users.	**Moderate**	

Table 17: Medium or higher-level availability risks to consumptive uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Risk confidence	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 23. Maximising the effectiveness of the grid and markets across the state 35. Water resource information supports planning and decisions
There is a **medium risk**	that **an increase in farm dams**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

4.2.1.2 Condition of the water resource

Table 18: Medium or higher-level condition risks to consumptive uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 14. Maintain compliance with *Safe Drinking Water Act 2003* 22. Managing water quality events 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low–moderate**	
There is a **very high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **aquaculture** water uses/users.	**Moderate–high**	
There is a **very high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 14. Maintain compliance with *Safe Drinking Water Act 2003* 22. Managing water quality events 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **high risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 14. Maintain compliance with *Safe Drinking Water Act 2003* 22. Managing water quality events 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	

Table 19: Medium or higher-level condition risks to consumptive uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **a major asset failure**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	4. Emergency water supply 14. Maintain compliance with *Safe Drinking Water Act 2003* 16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **an extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **an extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **high risk**	that **an extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **an extreme wet period**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **high risk**	that **an extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **an extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **bushfire**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	4. Emergency water supply 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure).
There is a **medium risk**	that **bushfire**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **bushfire**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	4. Emergency water supply 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 14. Maintain compliance with *Safe Drinking Water Act 2003* 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	4. Emergency water supply 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 14. Maintain compliance with *Safe Drinking Water Act 2003* 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	4. Emergency water supply 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 14. Maintain compliance with *Safe Drinking Water Act 2003* 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	

Table 20: Medium or higher-level condition risks to consumptive uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	1. Better recording, monitoring and accounting for significant uses of water 14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **aquaculture** water uses/users.	**Moderate–high**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	1. Better recording, monitoring and accounting for significant uses of water 14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	14. Maintain compliance with *Safe Drinking Water Act 2003* 20. Managing risks from earth resources development 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low–moderate**	14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **very high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **aquaculture** water uses/users.	**Moderate–high**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **consumptive—aquaculture** water uses/users.	**Low**	
There is a **very high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **very high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low–moderate**	14. Maintain compliance with *Safe Drinking Water Act 2003* 18. Managing invasive species in waterways 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **medium risk**	that **pests and weeds**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **high risk**	that **pests and weeds**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **aquaculture** water uses/users.	**Moderate–high**	
There is a **medium risk**	that **pests and weeds**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **high risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **pests and weeds**	Lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	14. Maintain compliance with *Safe Drinking Water Act 2003* 18. Managing invasive species in waterways 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **medium risk**	that **pests and weeds**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

Table 21: Medium or higher-level condition risks to consumptive uses from non-compliance (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low–moderate**	14. Maintain compliance with *Safe Drinking Water Act 2003* 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 32. Strengthening and modernising compliance arrangements 35. Water resource information supports planning and decisions
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **aquaculture** water uses/users.	**Moderate–high**	
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	

Table 22: Medium or higher-level condition risks to consumptive uses from water access, take, utilisation and location (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increased utilisation of water access rights**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	10. Improving rural water supply planning 23. Maximising the effectiveness of the grid and markets across the state 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 35. Water resource information supports planning and decisions

4.2.2 Environmental users

4.2.2.1 Availability of the water resource

Table 23: Medium or higher-level availability risks to environmental uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **controlled water (passing flows)** water uses/ users.	**Moderate**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 23. Maximising the effectiveness of the grid and markets across the state 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **medium risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **controlled water (passing flows)** water uses/ users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **high-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **high-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	

continued

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Moderate**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 23. Maximising the effectiveness of the grid and markets across the state 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **very high risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Moderate**	

Table 24: Medium or higher-level availability risks to environmental uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **a major asset failure**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure)
There is a **medium risk**	that **a major asset failure**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Moderate**	
There is a **medium risk**	that **a major asset failure**	leads to **a reduction in volume of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Low**	
There is a **medium risk**	that **bushfire**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure)
There is a **medium risk**	that **bushfire**	leads to **a reduction in volume of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **controlled water (passing flows)** water uses/ users.	**Moderate**	3. Deliver long-term watering plans 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater- dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 23. Maximising the effectiveness of the grid and markets across the state 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 16. Managing exceptional circumstances 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **high-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **high risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **high risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Moderate**	
There is a **high risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Moderate**	

Table 25: Medium or higher-level availability risks to environmental uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	1. Better recording, monitoring and accounting for significant uses of water. 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 23. Maximising the effectiveness of the grid and markets across the state 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **an increase in farm dams**	leads to **a reduction in volume of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Low**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **low-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **uncontrolled water (above-cap water)** water uses/ users.	**Low**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

4.2.2.2 Condition of the water resource

Table 26: Medium or higher-level condition risks to environmental uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate–high**	
There is a **high risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	

Table 27: Medium or higher-level condition risks to environmental uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate–high**	3. Deliver long-term watering plans 11. Improving statewide water resource planning and risk assessment 16. Managing exceptional circumstances 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 35. Water resource information supports planning and decisions
There is a **medium risk**	that **an extreme wet period**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	3. Deliver long-term watering plans 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate–high**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	

Table 28: Medium or higher-level condition risks to environmental uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **pests and weeds**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	18. Managing invasive species in waterways 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **high risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	
There is a **very high risk**	that **failure to continue to invest in best practice land use initiatives**	lead to **elevated levels of salinity**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate–high**	17. Managing groundwater related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 35. Water resource information supports planning and decisions

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

Table 29: Medium or higher-level condition risks to environmental uses from non-compliance (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 32. Strengthening and modernising compliance arrangements 35. Water resource information supports planning and decisions

Table 30: Medium or higher-level condition risks to environmental uses from water access, take, utilisation and location (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increased utilisation of water access rights**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	10. Improving rural water supply planning 23. Maximising the effectiveness of the grid and markets across the state 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 35. Water resource information supports planning and decisions

4.2.3 Aboriginal uses of water and objectives

4.2.3.1 Availability of the water resource

Table 31: Medium or higher-level availability risks to Aboriginal uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **climate change**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **very high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **very high risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 32: Medium or higher-level availability risks to Aboriginal uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **a major asset failure**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **a major asset failure**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **an extreme wet period**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **medium risk**	that **an extreme wet period**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **bushfire**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 31. Recognising and managing for Aboriginal values
There is a **high risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **high risk**	that **extreme drought**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 33: Medium or higher-level availability risks to Aboriginal uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **an increase in farm dams**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving our understanding of climate science and how it applies to water management 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 23. Maximising the effectiveness of the grid and markets across the state 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **high risk**	that **an increase in farm dams**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

Table 34: Medium or higher-level availability risks to Aboriginal uses from non-compliance (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the *Water Act 1989***	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 33. Strengthening the water entitlement framework 35. Water resource information supports planning and decisions

Table 35: Medium or higher-level availability risks to Aboriginal uses from water access, take, utilisation and location (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Risk confidence	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **increased utilisation of water access rights**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water metering 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 23. Maximising the effectiveness of the grid and markets across the state 31. Recognising and managing for Aboriginal values 33. Strengthening the water entitlement framework 32. Strengthening and modernising compliance arrangements 35. Water resource information supports planning and decisions
There is a **medium risk**	that **increased utilisation of water access rights**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **increased utilisation of water access rights**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

4.2.3.2 Condition of the water resource

Table 36: Medium or higher-level condition risks to Aboriginal uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **climate change**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater- dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **very high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 37: Medium or higher-level condition risks to Aboriginal uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **a major asset failure**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure). 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **an extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 11. Improving statewide water resource planning and risk assessment 16. Managing exceptional circumstances 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **medium risk**	that **an extreme wet period**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **an extreme wet period**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **an extreme wet period**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **bushfire**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 9. Improving public reporting on water availability and use: user-focused information and reporting 11. Improving statewide water resource planning and risk assessment 16. Managing exceptional circumstances 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **medium risk**	that **bushfire**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **bushfire**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **bushfire**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 4. Emergency water supply 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue green algae blooms, flooding, major asset failure) 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **high risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **point-source discharges**	lead to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 19. Managing pollution-related events (e.g. point-source discharge) 22. Managing water quality events 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **point-source discharges**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **flooding and overbank inundation**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **flooding and overbank inundation**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **flooding and overbank inundation**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **flooding and overbank inundation**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 38: Medium or higher-level condition risks to Aboriginal uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **an increase in farm dams**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **high risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **earth resources development**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	20. Managing risks from earth resources development 25. Planning for supply challenges by urban water corporations 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values
There is a **high risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **very high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **land use change which affect water condition**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values
There is a **high risk**	that **land use change which affect water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affect water condition**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affect water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **pests and weeds**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	18. Managing invasive species in waterways 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values
There is a **high risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high.

Table 39: Medium or higher-level condition risks to Aboriginal uses from non-compliance (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 35. Water resource information supports planning and decisions
There is a **medium risk**	that **non-compliance with the *Water Act 1989***	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **non-compliance with the *Water Act 1997***	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 40: Medium or higher-level condition risks to Aboriginal uses from water access, take, utilisation and location (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Risk confidence	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **the increased utilisation of water access rights**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water metering 3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving our understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 23. Maximising the effectiveness of the grid and markets across the state 26. Planning the take of Victoria's Share Guidance – Consideration of climate change and climate variability in setting groundwater resource limits 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 33. Strengthening the water entitlement framework 35. Water resource information supports planning and decisions
There is a **medium risk**	that **the increased utilisation of water access rights**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **the increased utilisation of water access rights**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

4.2.4 Recreational/social uses

4.2.4.1 Availability of the water resource

Table 41: Medium or higher-level availability risks to recreational/social uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **recreational/ social bulk entitlement** water uses/users.	**Moderate**	3. Deliver long-term watering plans 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 15. Managing availability risks to recreational water users 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **very high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **recreational/ social bulk entitlement** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **recreational/ social and amenity** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **recreational/ social and amenity** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **a reduction in volume of water available**	which results in adverse impacts on **recreational/ social and amenity** water uses/users.	**Moderate**	

Table 42: Medium or higher-level availability risks to recreational/social uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **a major asset failure**	leads to **a reduction in volume of water available**	which results in adverse impacts on **recreational/ social bulk entitlement** water uses/users.	**Moderate**	15. Managing availability risks to recreational water users 16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure)
There is a **high risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **recreational/ social bulk entitlement** water uses/users.	**Moderate**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 15. Managing availability risks to recreational water users 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **recreational/ social bulk entitlement** water uses/users.	**Moderate**	

Table 43: Medium or higher-level availability risks to recreational/social uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **a reduction in volume of water available**	which results in adverse impacts on **recreational/ social bulk entitlement** water uses/users.	**Moderate**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 15. Managing availability risks to recreational water users 23. Maximising the effectiveness of the grid and markets across the state 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **recreational/ social bulk entitlement** water uses/users.	**Moderate**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

4.2.4.2 Condition of the water resource

- Primary contact recreation (e.g. swimming)
- Secondary contact recreation (e.g. boating)
- Aesthetic enjoyment

Table 44: Medium or higher-level condition risks to recreational/social uses from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	3. Deliver long-term watering plans 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**High**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	
There is a **high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of pathogens (Giardia, cyanobacteria)**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**High**	3. Deliver long-term watering plans 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **social–aesthetic enjoyment** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **social–aesthetic enjoyment** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–aesthetic enjoyment** water uses/users.	**Low**	
There is a **medium risk**	that **climate change**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **social–aesthetic enjoyment** water uses/users.	**Low**	

Table 45: Medium or higher-level condition risks to recreational/social uses from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Low**	3. Deliver long-term watering plans 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	

Table 46: Medium or higher-level condition risks to recreational/social uses from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Low**	20. Managing risks from earth resources development 29. Protecting water quality-implementing the State Environment Protection Policy (Waters)
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Moderate**	21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **social–aesthetic enjoyment** water uses/users.	**Moderate**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social—aesthetic enjoyment** water uses/users.	**Low**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Moderate**	21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **pests and weeds**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Low**	18. Managing invasive species in waterways 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 30. Provide long-term investment to improve waterway health
There is a **medium risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–primary contact recreation (e.g. swimming)** water uses/users.	**Moderate**	
There is a **medium risk**	that **pests and weeds**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	
There is a **medium risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–secondary contact recreation (e.g. boating)** water uses/users.	**Low**	
There is a **medium risk**	that **pests and weeds**	lead to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **social–aesthetic enjoyment** water uses/users.	**Low**	

4.2.5 Extreme events impacting on critical human water needs

Under the Basin Plan, water resource plans must describe how the water resources of the water resource plan area will be managed during extreme events (10.51) which include:

- extreme dry periods (drought)
- extreme water quality events
- other events that compromise the ability to meet critical human needs.

These types of events (extreme drought, major asset failure, bushfire and flooding, point-source discharge and overbank inundation) have been included in the risk assessment and are assessed as a combination of their impact in terms of:

- availability:
  - water for consumptive purposes of very high-reliability bulk entitlement
  - system operating water required to deliver the water
  - section 8 domestic and stock rights
- condition:
  - human drinking
  - agriculture and irrigation.

4.2.5.1 Availability of the water resource to meet critical human water needs

Table 47: Medium or higher-level availability risks to critical human water needs (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **extreme drought**	leads to **changes to the inter-annual pattern of water available**	which results in adverse impacts on **section 8 domestic and stock rights** water uses/users.	**Moderate**	4. Emergency water supply 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 25. Planning for supply challenges by urban water corporations 35. Water resource information supports planning and decisions
There is a **medium risk**	that **extreme drought**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **section 8 domestic and stock rights** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **a reduction in volume of water available**	which results in adverse impacts on **section 8 domestic and stock rights** water uses/users.	**Moderate**	

4.2.5.2 Condition of the water resource for critical human water needs

- Human drinking
- Agricultural and irrigation

Table 48: Medium or higher-level condition risks to critical human water needs (surface water)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **a major asset failure**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	4. Emergency water supply 14. Maintain compliance with *Safe Drinking Water Act 2003* 16. Managing exceptional circumstances 22. Managing water quality events 25. Planning for supply challenges by urban water corporations 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 29. Protecting water quality—implementing the State Environment Protection Policy
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **a major asset failure**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **bushfire**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	4. Emergency water supply 16. Managing exceptional circumstances 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 29. Protecting water quality—implementing the State Environment Protection Policy

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	4. Emergency water supply 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13. Leading climate change adaptation across Victoria's water system 14. Maintain compliance with *Safe Drinking Water Act 2003* 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 35. Water resource information supports planning and decisions
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **high risk**	that **extreme drought**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **extreme drought**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	

4.2.6 Environmental water requirements for priority environmental assets and ecosystem functions (10.17 and 10.22(b))

These assets are identified in the long-term environmental watering plans and were assessed under the separate risk category—structural form of surface water resources based on categories that reflect priority assets, namely wetlands and rivers. The risks to the assets and the ecosystem function that underpins them was assessed in terms of:

- loss or decline in longitudinal connectivity—such as barriers to fish passage and vegetation
- loss or decline in lateral connectivity—defined to comprise the loss or decline in condition of instream physical habitat such as sedimentation, erosion, loss of large wood
- loss or decline in instream physical habitat—defined to comprise the loss or decline in condition of instream physical habitat such as sedimentation, erosion, loss of large wood

They were also assessed in terms of the condition of the water resource (under SEPP beneficial use category) for environment/aquatic ecosystems.

Table 49: Medium or higher-level risks to environmental water requirements for priority environmental assets and ecosystem functions from climate change (surface water)

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **climate change**	leads to **a loss or decline in lateral connectivity**	which results in adverse impacts on **river** water uses/users.	**Moderate**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **very high risk**	that **climate change**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **a loss or decline in lateral connectivity**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	

Table 50: Medium or higher-level risks to environmental water requirements for priority environmental assets and ecosystem functions from extreme events (surface water)

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an extreme wet period**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **river** water uses/users.	**Moderate**	3. Deliver long-term watering plans 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **medium risk**	that **an extreme wet period**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **medium risk**	that **extreme drought**	leads to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **medium risk**	that **flooding and overbank inundation**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **medium risk**	that **flooding and overbank inundation**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	

Table 51: Medium or higher-level risks to environmental water requirements for priority environmental assets and ecosystem functions from land use and interception (surface water)

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **river** water uses/users.	**Moderate**	3. Deliver long-term watering plans 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 11. Improving statewide water resource planning and risk assessment 17. Managing groundwater related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 18. Managing invasive species in waterways 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in lateral connectivity**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in lateral connectivity**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	

continued

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **river** water uses/users.	**Moderate**	3. Deliver long-term watering plans 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 11. Improving statewide water resource planning and risk assessment 17. Managing groundwater related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 18. Managing invasive species in waterways 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in instream physical habitat**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in lateral connectivity**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **high risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **a loss or decline in lateral connectivity**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **medium risk**	that **pests and weeds**	lead to **a loss or decline in instream physical habitat**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **medium risk**	that **pests and weeds**	lead to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **river** water uses/users.	**Moderate**	
There is a **medium risk**	that **pests and weeds**	lead to **a loss or decline in instream physical habitat**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	
There is a **medium risk**	that **pests and weeds**	lead to **a loss or decline in longitudinal connectivity**	which results in adverse impacts on **wetland** water uses/users.	**Moderate**	

4.2.7 Interception activities (10.23)

Section 10.24(c) of the Basin Plan notes the following types of interception that may have the potential to significantly impact water resources.

Table 52: Types of interception in the Basin Plan

	Related cause and scenario in risk assessment
(a) runoff dams	Farm dams
(b) commercial plantations	Land use change (affecting availability) Land use change (affecting condition)
(c) interception by mining activities, including coal seam gas mining	Earth resource development
(d) interception by floodplain harvesting	N/A

Victoria's risk assessment also included the impact of bushfire as a potential risk to the availability and condition of the resource due to the water requirements of re-growth after bushfire and the water quality impacts on the resource (this is included in the extreme event category).

Addendum: Further research on farm dams since the Risk Assessment

Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. The above risk assessment was based on the adopted scenario that identifies an increase of 4 gigalitres in the volume of farm dams in rural-residential developments over a period of 10 years to supply water for domestic and stock consumption within the Wimmera-Mallee (surface water) water resource plan area. This was considered the best available information at the time of conducting the risk assessment.

Studies conducted after the completion of the risk assessment have shown the scenario and calculation methods used in this risk assessment to be conservatively high and that the more likely scenario is an increase of 2 gigalitres rather than 4 gigalitres. This estimated growth is estimated to result in an increase in the long-term average annual take from runoff dams of less than 1 gigalitre and possibly as low as 0.25 gigalitres. Based on this information, interception is no longer considered to be likely to have a significant impact on water resources. However, the uncertainty associated with estimating future growth of runoff dams and take from runoff dams is considerable. The risk assessment provided above will be updated when the associated uncertainty can be improved.

Table 53: Medium or higher-level risks from interception activities to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **an increase in farm dams**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving our understanding of climate science and how it applies to water management 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 15. Managing availability risks to recreational water users 23. Maximising the effectiveness of the grid and markets across the state 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **high risk**	that **an increase in farm dams**	leads to **changes to seasonal pattern of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **(environment) low-reliability bulk entitlement** water uses/users.	**Moderate**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **(environment) uncontrolled water (above-cap water)** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **(consumptive) low-reliability bulk entitlements and water shares** water uses/users.	**Moderate**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **(social) recreation bulk entitlement** water uses/users.	**Moderate**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

Table 54: Medium or higher-level risks from interception activities to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses (surface water)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on (**consumptive**) **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **land use change which affects water condition**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on (**consumptive**) **agriculture and irrigation** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on (**consumptive) human consumption after appropriate treatment** water uses/users.	**Low**	14. Maintain compliance with *Safe Drinking Water Act 2003* 20. Managing risks from earth resources development 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values
There is a **high risk**	that **earth resources development**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality-implementing the State Environment Protection Policy (Waters) 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **(consumptive) industrial and commercial use** water uses/users.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 14. Maintain compliance with *Safe Drinking Water Act 2003* 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **(consumptive) human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **(consumptive) human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **(consumptive) fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **(consumptive) fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **(consumptive) aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **(consumptive) aquaculture** water uses/users.	**Moderate–high**	
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **(consumptive) agriculture and irrigation** water uses/users.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on (**consumptive**) **agriculture and irrigation** water uses/users.	**Low–moderate**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 14. Maintain compliance with *Safe Drinking Water Act* 2003 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions
There is a **high risk**	that **an increase in farm dams**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **an increase in farm dams**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high.

4.2.8 Non-compliance with the Victorian Water Act

Non-compliance with the Victorian Water Act includes the unauthorised take and/or use of water or the constructing or altering of works without consent.

The Water Compliance Report 2016–17 (DELWP 2017), reported 1,117 cases of compliance breaches of the Victorian Water Act in non-urban systems across Victoria. Among others, this included 426 advisory letters and 607 warning notices for taking water without authorisation. Four prosecutions were made for wrongful taking of water, two of which were completed. In the Wimmera–Mallee water resource plan area, three alleged breaches were recorded in 2016–17.

Taking water without authorisation has a higher likelihood of occurrence and a greater impact in times of water shortage. In some instances, unauthorised take is described as 'overuse' where water users take more water than authorised, often gambling on increased allocations later in the season.

For surface water the risk assessment has been based on an additional five per cent of consumptive demand being extracted without authorisation.

Unauthorised works in a waterway may lead to increased contaminants in the water through discharge of contaminants.

Table 55: Medium or higher-level risks from non-compliance to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **a reduction in volume of water available**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water metering 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 33. Strengthening the water entitlement framework 35. Water resource information supports planning and decisions

Table 56: Medium or higher-level risks from non-compliance to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses

Risk level	Risk cause	Risk threat	Risk impact	Risk confidence	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on (**consumptive**) **agriculture and irrigation** water uses/users.	**Low–moderate**	17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 35. Water resource information supports planning and decisions
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on (**consumptive**) **aquaculture** water uses/users.	**Moderate–high**	
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on (**consumptive**) **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low–moderate**	
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on (**consumptive**) **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **environmental values/aquatic ecosystems of Wimmera–Mallee** water uses/users.	**Moderate**	
There is a **high risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of suspended sediment and/or nutrients**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

4.3 Wimmera–Mallee (groundwater) water resource plan area

Statements of medium to very high risks to groundwater are provided below under the following categories (10.42(a)):

- availability of the water resource for consumptive and environmental uses
- condition of the water resource.

Risks are also presented to meet Basin Plan requirements for specific risks identified in the Basin Plan, and for risks that are of particular interest to communities:

- Aboriginal uses of water and objectives
- recreational uses
- extreme events
- environmental water requirements for priority environmental assets and ecosystem functions (10.17 and 10.22(b))
- groundwater-related risks (10.18, 10.19, 10.20, 10.21 and 10.22(b))
- interception activities (10.23)
- non-compliance with the Victorian Water Act.

Description of risks (10.42)(a)(b)

Risk statements are structured to include the factors that contribute to the risk (namely its cause), the threat it poses, the impact it has on the uses/users of water, and the level of confidence (quantified uncertainty) in the assessment of that risk (10.41(8).

4.3.1 Consumptive users

4.3.1.1 Availability of the water resource

Table 57: Medium or higher-level availability risks to consumptive uses from climate change (groundwater)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (deep, S/R 20–40)** water uses/users.	**Moderate**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: User-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13.Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (shallow, S/R 10–20)** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (shallow, S/R 10–20)** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of uplands GCS (S/R <10)** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of uplands GCS (S/R <10)** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of upland layered valley (S/R 10–20)** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of upland layered valley (S/R 10–20)** water uses/users.	**Moderate**	

continued

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of uplands GCS (S/R <10)** water uses/ users.	**Moderate**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: User-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13.Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks
There is a **very high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of uplands GCS (S/R <10)** water uses/ users.	**Moderate**	22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement

4.3.1.2 Condition of the water resource

Risks arising from elevated salinity and other types of water quality degradation (10.31 and 10.41(2)(d))

Table 58: Medium or higher-level condition risks to consumptive uses from climate change (groundwater)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 25. Planning for supply challenges by urban water corporations 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **industrial and commercial use** water uses/users.	**Low**	

Table 59: Medium or higher-level condition risks to consumptive uses from land use and interception (groundwater)

Risk level	Risk cause	Risk threat	Risk impact on consumptive uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **human consumption after appropriate treatment** water uses/users.	**Low**	

4.3.2 Environmental users

4.3.2.1 Availability of the water resource

Table 60: Medium or higher-level availability risks to environmental uses from climate change (groundwater)

Risk level	Risk cause	Risk threat	Risk impact on environmental uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of upland layered valley (S/R 10–20)** water uses/users.	**Moderate**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **very high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of upland layered valley (S/R 10–20)** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (shallow, S/R 10–20)** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (shallow, S/R 10–20)** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (deep, S/R 20–40)** water uses/users.	**Moderate**	
There is a **medium risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (deep, S/R 20–40)** water uses/users.	**Moderate**	

4.3.3 Aboriginal uses of water and objectives

4.3.3.1 Availability of the water resource

Table 61: Medium or higher-level availability risks to Aboriginal uses from climate change (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 24. Monitoring and reporting on the benefits of environmental watering 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **very high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 62: Medium or higher-level availability risks to Aboriginal uses from extreme events (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **bushfires**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	16. Managing exceptional circumstances 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 31. Recognising and managing for Aboriginal values
There is a **medium risk**	that **extreme drought**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders
There is a **medium risk**	that **extreme drought**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement

Table 63: Medium or higher-level availability risks to Aboriginal uses from land use and interception (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **an increase in farm dams**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **earth resources development**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	20. Managing risks from earth resources development 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high. This work is ongoing across Victoria and the risk assessment will be updated once it is finalised.

Table 64: Medium or higher-level availability risks to Aboriginal uses from non-compliance (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water metering 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 33. Strengthening the water entitlement framework 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 65: Medium or higher-level availability risks to Aboriginal uses from water access, take, utilisation and location (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **increase in the number of entitlements leading to increased take**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water 3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 23. Maximising the effectiveness of the grid and markets across the state 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 24. Monitoring and reporting on the benefits of environmental watering 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 33. Strengthening the water entitlement framework 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **increase in the number of entitlements leading to increased take**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **increased utilisation of water access rights**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **increased utilisation of water access rights**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

4.3.3.2 Condition of the water resource

Table 66: Medium or higher-level condition risks to Aboriginal uses from climate change (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 24. Monitoring and reporting on the benefits of environmental watering 25. Planning for supply challenges by urban water corporations 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement

Table 67: Medium or higher-level condition risks to Aboriginal uses from extreme events (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **bushfires**	lead to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 9. Improving public reporting on water availability and use: user-focused information and reporting 11. Improving statewide water resource planning and risk assessment 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **bushfires**	lead to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **bushfires**	lead to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **extreme drought**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 4. Emergency water supply 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 22. Managing water quality events 23. Maximising the effectiveness of the grid and markets across the state 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **extreme wet period**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	3. Deliver long-term watering plans 11. Improving statewide water resource planning and risk assessment 16. Managing exceptional circumstances 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **extreme wet period**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **extreme wet period**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **flooding and overbank inundation**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 25. Planning for supply challenges by urban water corporations 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **flooding and overbank inundation**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **flooding and overbank inundation**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **point-source discharges**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	4. Emergency water supply 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 16. Managing exceptional circumstances 19. Managing pollution-related events (e.g. point-source discharge) 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 22. Managing water quality events 27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure) 25. Planning for supply challenges by urban water corporations 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **point-source discharges**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **point-source discharges**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 68: Medium or higher-level condition risks to Aboriginal uses from land use and interception (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 11. Improving statewide water resource planning and risk assessment 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **high risk**	that **earth resources development**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	20. Managing risks from earth resources development 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement
There is a **high risk**	that **earth resources development**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **earth resources development**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **earth resources development**	leads to **the loss of structural form of aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 25. Planning for supply challenges by urban water corporations 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **failure to continue to invest in best practice land use initiatives**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—implementing the State Environment Protection Policy 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement
There is a **high risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **land use change which affects water condition**	leads to **other water quality impacts (water temperature, pH and/or dissolved oxygen)**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 69: Medium or higher-level condition risks to Aboriginal uses from non-compliance (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 29. Protecting water quality—implementing the State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement

Table 70: Medium or higher-level condition risks to Aboriginal uses from water access, take, utilisation and location (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **increase in the number of entitlements leading to increased take**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water metering 3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 12. Investigating increased flexibility and choice for licence-holders 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 23. Maximising the effectiveness of the grid and markets across the state 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 29. Protecting water quality—reviewing State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 33. Strengthening the water entitlement framework 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **increased utilisation of water access rights**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

4.3.4 Recreational/social uses

4.3.4.1 Availability of the water resource

Table 71: Medium or higher-level availability risks to recreational/social uses from climate change (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **recreational/ social and amenity uses** water uses/users.	**Moderate**	3. Deliver long-term watering plans 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 15. Managing availability risks to recreational water users 24. Monitoring and reporting on the benefits of environmental watering 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from an aquifer**	which results in adverse impacts on **recreational/ social and amenity uses** water uses/users.	**Moderate**	

4.3.5 Extreme events impacting on critical human water needs

Under the Basin Plan, a water resource plan must describe how the water resources of the water resource plan area will be managed during extreme events (10.51) which include:

- extreme dry periods
- extreme water quality events
- other events that compromise the ability to meet critical human needs.

These types of extreme events (extreme drought, major asset failure, bushfire and flooding, point-source discharge and overbank inundation) have been included in the risk assessment and are assessed as a combination of their impact in terms of:

- availability—availability of groundwater for environmental purposes from the following aquifers:
  - Basin margin deep
  - Basin margin shallow
  - Upland layered valley
  - Uplands
- condition:
  - human drinking
  - agriculture and irrigation.

4.3.5.1 Availability of the water resource for critical human water needs

No medium or higher-level risks were identified in relation to extreme events impacting on groundwater resources.

4.3.5.2 Condition of the water resource for critical human water needs

- human drinking
- agriculture and irrigation

No medium or higher-level risks were identified in relation to extreme events impacting on groundwater resources.

4.3.6 Groundwater-related risks (10.18, 10.19, 10.20, 10.21 and 10.22(b))

4.3.6.1 Environmental water requirements for priority environmental assets dependent on groundwater (10.18), groundwater and surface water connections (10.19) and environmental outcomes relating to groundwater (10.21).

These assets were assessed under risk categories in terms of:

- Availability of groundwater for environmental purposes from the following aquifers:
  - Basin margin deep
  - Basin margin shallow
  - Upland layered valley
  - Uplands

Table 72: Medium or higher-level risks to environmental water requirements for priority environmental assets dependent on groundwater (10.18), groundwater and surface water connections (10.19) and environmental outcomes relating to groundwater (10.21) from climate change (groundwater)

Risk level	Risk cause	Risk threat	Risk impact on environment uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (deep, S/R 20–40)** water uses/users.	**Moderate**	3. Deliver long-term watering plans 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 23. Maximising the effectiveness of the grid and markets across the state 24. Monitoring and reporting on the benefits of environmental watering 26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (deep, S/R 20–40)** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (shallow, S/R 10–20)** water uses/users.	**Moderate**	
There is a **high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of Basin margin GCS (shallow, S/R 10–20)** water uses/users.	**Moderate**	

continued

Risk level	Risk cause	Risk threat	Risk impact on environment uses	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **very high risk**	that **climate change**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **users of upland layered valley (S/R 10–20)** water uses/users.	**Moderate**	
There is a **very high risk**	that **climate change**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **users of upland layered valley (S/R 10–20)** water uses/users.	**Moderate**	

4.3.6.2 Risks to the productive base of groundwater systems (10.20)

This is assessed in terms of the ability of the aquifer to provide water for environmental and consumptive purposes in the context of damage to the structural form of the aquifer arising from take across environmental or consumptive users.

No medium or higher-level risks associated with changes to the structural form

4.3.7 Interception activities (10.23)

10.24(c) notes the following types of interception that may have the potential to significantly impact water resources.

Table 73: Types of interception in the Basin Plan

	Related cause and scenario in risk assessment
(a) runoff dams	Farm dams
(b) commercial plantations	Land use change (affecting availability) Land use change (affecting condition)
(c) interception by mining activities, including coal seam gas mining	Earth resource development
(d) interception by floodplain harvesting	N/A

Victoria's risk assessment also included the impact of bushfire as a potential risk to the availability and condition of the resource due to the water requirements of re-growth after bushfire and the water quality impacts on the resource (this is included in extreme events).

Table 74: Medium or higher-level risks from interception activities to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **an increase in farm dams**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 5. Environmental water management in a changing climate 7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems 8. Improving understanding of climate science and how it applies to water management 11. Improving statewide water resource planning and risk assessment 13. Leading climate change adaptation across Victoria's water system 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 23. Maximising the effectiveness of the grid and markets across the state 28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **an increase in farm dams**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **high risk**	that **earth resources development**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	20. Managing risks from earth resources development 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement

Table 75: Medium or higher-level risks from interception activities to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **(consumptive) human consumption after appropriate treatment** water uses/users.	**Low**	1. Better recording, monitoring and accounting for significant uses of water. 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 28. Protecting our waterways and their catchments by strengthening integrated catchment management across Victoria 29. Protecting water quality—reviewing State Environment Protection Policy 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **(consumptive) agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **(consumptive) agriculture and irrigation** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **(consumptive) aquaculture** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of salinity**	which results in adverse impacts on **(consumptive) fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **land use change which affects water condition**	leads to **elevated levels of toxicants (pesticides, herbicides, heavy metals, hydrocarbons)**	which results in adverse impacts on **(consumptive) fish, crustaceans and molluscs for human consumption** water uses/users.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **an increase in farm dams**	leads to **decline in inflow to, or increase in extraction from an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	
There is a **medium risk**	that **land use change which affects water availability**	leads to **decline in inflow to, or increase in extraction from an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

continued

Risk level	Risk cause	Risk threat	Risk impact	Confidence in risk assessment	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **high risk**	that **earth resources development**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	20. Managing risks from earth resources development 29. Protecting water quality—reviewing State Environment Protection Policy 31. Recognising and managing for Aboriginal values 36. Continued implementation of the Border Groundwaters Agreement

Note: Recent work completed by DELWP modelling the impact of farm dams as part of the delivery of Strategy 1 has shown that the level of expected development is considered conservatively high.

4.3.8 Non-compliance with the Victorian Water Act

Non-compliance with the Victorian Water Act includes the unauthorised take and/or use of water or the constructing or altering of works without consent.

The Water Compliance Report 2016–17 (DELWP 2017), reported 1,117 cases of compliance breaches of the Victorian Water Act in non-urban systems across Victoria. Among others, this included 426 advisory letters and 607 warning notices for taking water without authorisation and four prosecutions were made for the wrongful taking of water, two of which were completed. In the Wimmera–Mallee water resource plan area three alleged breaches were recorded in 2016–17.

Taking water without authorisation has a higher likelihood of occurrence and a greater impact in times of water shortage. In some instances, unauthorised take is described as 'overuse' where water users take additional water than otherwise authorised, often gambling on increased allocations later in the season.

For groundwater, the risk scenario is focused on the impacts on shallow aquifers and associated surface water resources. For the purpose of the risk assessment, an additional 10 per cent of domestic and stock bore use being extracted for non-compliant purposes has been adopted.

Unauthorised works in a waterway may lead to increased contaminants in the water through discharge of contaminants.

Table 76: Medium or higher-level risks from non-compliance to water resource availability for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Risk confidence	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **adverse change to the seasonal pattern of inflow to, or extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	2. Continuously improving non-urban water metering 9. Improving public reporting on water availability and use: user-focused information and reporting 10. Improving rural water supply planning 11. Improving statewide water resource planning and risk assessment 17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 33. Strengthening the water entitlement framework 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **decline in inflow to, or increase in extraction from, an aquifer**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	

Table 77: Medium or higher-level risks from non-compliance to water resource condition for consumptive, environmental, Aboriginal and recreational/social water uses (groundwater)

Risk level	Risk cause	Risk threat	Risk impact	Risk confidence	Strategies to address risk (see Table 78 for an explanation of each strategy)
There is a **medium risk**	that **non-compliance with the Victorian Water Act**	leads to **elevated levels of salinity**	which results in adverse impacts on **all aspects of Aboriginal uses of water**.	**Low**	17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks 21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period 29. Protecting water quality—reviewing State Environment Protection Policy 30. Provide long-term investment to improve waterway health 31. Recognising and managing for Aboriginal values 32. Strengthening and modernising compliance arrangements 35. Water resource information supports planning and decisions 36. Continued implementation of the Border Groundwaters Agreement

5. Strategies to address risk (10.43)

5.1 Basin Plan requirements

Section 10.43 of the Basin Plan requires a risk strategy to be developed and described as part of the management of the water resources in the water resource plan area. This strategy is required for risks assessed as medium or high level, and for them to be managed in a manner commensurate with the level of risk. This includes identifying strategies that already exist as part of a Basin state's water management arrangements to manage risk.

Strategies for addressing risks may include:

- avoiding the risk by not doing the activity that gives rise to the risk
- removing the risk cause
- reducing the likelihood
- minimising the consequences
- sharing the risk
- making an informed decision to accept the risk.

The risk strategies must be stated in water resource plans in a way that demonstrates that regard was had to those listed in section 4.03(3) of the Basin Plan (by, for example, providing an explanatory statement supported by evidence).

The strategies in section 4.03(3) include implementation of formal or semi-formal instruments, monitoring and more general approaches such as improving knowledge. Given the broad range of strategies that are relevant, all risks identified are associated with some level of management and mitigation. Where any management or mitigation is considered disproportionate to the risk level, the water resource plan may include an explanation as to why strategies to address that risk are not included. All risks identified have a number of corresponding categories that will ensure they are managed.

If the strategy in the water resource plan is not able to reduce the risk to a tolerable level, an explanation should be given for why this is the case. In some cases, the relevant strategy may be outside the water planning framework. In the case of future risks that are beyond the life of the accredited water resource plan, appropriate strategies may focus on monitoring and review.

5.2 Victoria's strategies for addressing risk

Based on the themes identified in the risk assessment, the medium to high-level risks identified will be addressed through the ongoing development and implementation of existing broad-scale policies and improvement programs identified through *Water for Victoria* and existing policies and programs. Risks will be addressed through state-based policy and program development, collaboration with regional water managers and engagement with regional stakeholders and interstate water planning agencies.

Examples of such planning and policy development include:

- review and enhancement of climate change adaption policy and practice
- review and enhancement of drought management policy and practice
- review and enhancement of statewide water quality policy
- reaffirmation of commitment to continue supporting programs of best practice including management of waterways, soil conservation, forestry, dairy, grazing and irrigation.

Almost 40 strategies were identified as part of Victoria's water and catchment management framework that will address risks to the availability and condition of water resources. These strategies are a combination of the policy directions contained and reinforced in *Water for Victoria* and existing regulations and guidelines.

A note on the presentation of risk strategies

The section below identifies the strategies to address the identified medium to high-level risks.

Victoria's risk assessment was comprehensive and considered all entitlement types under the Victorian Water Act in terms of impacts on availability and on all beneficial uses of water under State Environment Protection Policy. Impacts on priority environmental assets were also considered.

This approach has led to the generation of a large number of risks across entitlement and beneficial use types, which makes the presentation of risk strategies challenging. Strategies also rarely relate to a particular entitlement type or beneficial use but to broader water availability, water condition or priority environmental asset levels and ongoing planning and management.

Risk causes are also most often managed through strategies that affect broader causes and have been consolidated. For example, extreme event management in Victoria encompasses a number of risk causes and is managed under a single framework.

For the purpose of the identification of strategies, risks have been consolidated, where appropriate, by broader cause categories:

- climate change
- extreme events (extreme drought, extreme wet period, flooding and overbank inundation, bushfire, major asset failure, point-source discharge)
- land use and interception (land use change affecting availability, land use change affecting condition, failure to continue to invest in best practice land use initiatives, farm dams, pests and weeds, earth resources development)
- non-compliance with the Victorian Water Act
- water access, take, utilisation and location (increased utilisation of water access rights, increases in the number of entitlements leading to increased take, timing and locations).

Impacts have been consolidated across:

- availability: consumptive, environment, Aboriginal, recreational/social
- condition: consumptive, environment, social and Indigenous
- environmental water requirements for priority environmental assets and ecosystem functions
- priority environmental assets and ecosystem functions dependent on groundwater.

All identified risks assessed as medium or higher-level require ongoing management, planning and/or responses if they materialise.

Table 78 key

Macro risk cause:	
CC	Climate change
EE	Extreme events
LUI	Land use and interception
NC	Non-compliance
WA	Water access, take, utilisation and location
Applies to:	
(A)	Availability of the water resource
(C)	Condition of the water resource
PEA	Priority environmental assets
(SF)	Structural form
Uses:	
E	Environmental
C	Consumptive
S	Recreational/Social
A	Aboriginal/Indigenous

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Table 78: Identified strategies for addressing risk

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
1. Better recording, monitoring and accounting for significant uses of water.			X			A number of emerging significant water uses are not accurately accounted for, monitored or reported. As competition for water increases, managing efficient allocation of water in the system becomes more critical. Under the section 8 private rights provisions of the Victorian Water Act, water can be taken and used for domestic and stock purposes. Currently there are limited ways to monitor and report on the volume of water used under these rights. The introduction of 'reasonable use' limits would improve accountability for the volume of water taken from the system under this right. The volume of water taken under the section 8 private rights provisions is growing and this trend will continue with the growth in population, subdivisions, and farm dams and bores. This can impact on water availability for existing water users and the environment. Water use for plantations is not included in the water entitlement framework. Plantation establishment is an 'as of right' development in the farming zone of the Victoria Planning Provisions (VPPs), meaning a planning permit is not required to establish a plantation in a farming zone unless a particular provision or overlay is triggered. A planning permit for tree planting may be required in zones other than the farming zone within the VPP. Large-scale changes in land use can also affect water availability by intercepting water that would otherwise reach streams and aquifers. This can affect the water resource, entitlement holders and the environment. Better information and data about domestic and stock water use under the section 8 rights and land use changes will inform the reviews of long-term water resource assessments and sustainable water strategies about the risks to water resources and whether action is required to mitigate impacts. This action could range from better recording to increased regulation. These reviews will need to take into account Victoria's commitments under the Murray-Darling Basin Plan to ensure that Victoria complies with its requirements.	**Action 8.4—Better record and report on emerging significant uses of water** The Department of Environment, Land, Water and Planning will: • investigate the introduction of a reasonable use limit for domestic and stock rights under section 8 of the Victorian Water Act to ensure consistency and fairness in access to water resources in consultation with the community and relevant stakeholders • monitor and report on the impact of water use on other users and the environment, and report on significant uses of water in the annual Victorian Water Accounts • periodically review the long-term risks to Victoria's water resources through mechanisms such as long-term water resource assessments and sustainable water strategies.	A C	A C		A C	SF
2. Continuously improving non-urban water metering				x	x	Non-urban water metering is an important tool for managing Victoria's water entitlements. It helps ensure fair and equitable sharing of water resources, and provides vital information for planning and allocation decisions.	**Action: Continuously improving non-urban water metering** Victoria's policy on non-urban water metering states that where a delegate issues, renews or approves the transfer of a licence to take water in a non-urban situation, the following conditions apply: • all new licences where the water taken under the licence is to be used for irrigation or commercial purposes must be metered. Existing licensed extraction sites must be metered if the licensed volume is: • 10 ML or greater for surface water • 20 ML or greater for groundwater. The obligations above do not apply if, in the view of the delegated authority, a meter would be impractical or can be exempted according to the following criteria: • cost of metering can be shown to significantly outweigh the benefits • resource management objectives can still be achieved without impacting negatively on the resource, the environment or other users • an exemption exists according to the Victorian Water Act. In these cases, the delegate must document clearly the reasons for its view and: • identify a substitute method for estimating the volume of water taken to meet state and federal water accounting and reporting requirements. • The above requirements do not preclude a delegate from requiring more extensive metering.	A	A	A	A	A

continued

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
3. Deliver long-term watering plans (LTWPs)	x	x	x		x	The requirements for LTWPs are outlined in Chapter 8 of the Basin Plan. Environmental watering will not return rivers and wetlands to their pre-European condition. Many rivers and wetlands are so modified that this is not feasible. However, environmental watering can help to minimise some of the impacts of these modifications on rivers and wetlands while still being a shared resource that meets economic, cultural and recreational needs. A LTWP must have regard to the Basin-Wide Environmental Watering Strategy (MDBA, 2014a) and be consistent with the principles the Basin Plan sets out for environmental watering. Victoria's LTWPs also recognise there are Basin-wide obligations to take account of cultural outcomes. LTWPs have been prepared by the Victorian Government in accordance with its obligations under the Basin Plan for the water resource plan area. LTWPs describe ecological objectives and targets for priority water-dependent assets (rivers and wetlands) in water resource plan areas, and corresponding environmental watering requirements for these objectives. Key elements of LTWPs are identifying priority assets, priority ecosystem functions and water-dependent ecological values, and setting objectives related to the ecological values and functions.	**Action: Deliver long-term watering plans** Victoria's LTWPs are developed using a bottom-up approach, and with regard to the Basin-wide environmental watering strategy building on considerable environmental water planning work undertaken at the regional and asset scale by catchment management authorities (CMAs) in their regional catchment strategies, regional waterway strategies and environmental water management plans (EWMPs). LTWPs will be used to assist planning for environmental water outcomes in order to meet Basin Plan objectives and targets, and the overall environmental objectives for water-dependent ecosystems outlined in Chapter 8 of Basin Plan. While LTWPs are written for surface water water resource plans areas only their development considers groundwater dependent ecosystems (GDEs). Further work will be pursued in the years between now and the LTWP review and update to better understand groundwater requirements for GDEs. The Victorian LTWPs have collated long-term environmental water planning information for priority rivers, wetlands and ecosystem functions in the water resource plan area (surface water) and inform: • Victoria's annual watering priorities • Basin-wide watering strategy and Basin annual watering priorities • water resource plans, particularly the environmental watering requirements • long-term outcomes and environmental water demands in the Commonwealth Environmental Water Holder's (CEWH) portfolio management plans • decisions for environmental watering by the Southern Connected Basin Environmental Watering Committee (SCBEWC) • the Murray Coordination Plan, developed by SA, VIC, NSW and MDBA in 2016.	A C		A C	A C	SF
4. Emergency water supply		X				One of the key principles of the water entitlement framework is that individual entitlement holders are responsible for managing the risks of water scarcity within their own contexts and systems. When water is limited for availability or quality-related reasons, affected farmers may sometimes need to cart water from distant sources to care for their animals. Local government authorities and water corporations own and manage water supply points to provide water supplies for water carting during drought. Some of these supply points have not been maintained between droughts and require costly refurbishment at the start of each drought. Ongoing work is needed so that water carting supply points have a basic care and maintenance program or are mothballed so they can be cost-effectively recommissioned when the next drought occurs.	**Action 4.9—Improve management of emergency water supply** The government, in partnership with local government and water corporations, will improve information on the availability of emergency water supply points. This will require: • clarifying the roles and responsibilities of local government and water corporations in the management and communication of emergency water supply points • clarifying pricing principles for emergency water supplies with local government and water corporations • evaluating the emergency water supply point network and, where necessary, working with emergency water supply point managers to upgrade and taking ongoing responsibility for sites, consistent with roles and responsibilities.		A C			

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
5. Environmental water management in a changing climate	x		x		x	In the future, Victoria is likely to see less runoff entering our waterways. This will affect the availability of environmental water and the ecological objectives Victoria can achieve. Similar to water users in the urban and rural water sectors, there are a range of tools that environmental water managers can use to help manage variable water availability. Tools such as carryover, trade and structural works to improve efficiency will become increasingly important in responding to climate change impacts, reduce the risks of low environmental water availability and improve environmental outcomes. In some waterways, we may need to recover more environmental water as a result of climate change. We are already starting to collect the information we need to understand change to water availability by updating our water models to include future climate change scenarios. We are also looking into climate change impacts for environmental water availability and meeting ecological objectives. Works and measures are vital to make the best use of existing environmental water entitlements. The Murray–Darling Basin Plan provides an opportunity to invest in more environmental works in the southern-connected Basin. Victoria has developed nine proposals for environmental works under the Basin Plan. These proposals build on The Living Murray program, which uses environmental works and water to achieve environmental outcomes at six icon sites, including the Gunbower Forest and Hattah Lakes. Environmental works such as pumps, regulators and pipes help to water sites in the absence of natural floods. This means that less water is needed to connect the river to its floodplain. Works also provide a way to target sites that cannot be watered due to the risk of third-party impacts. When there is limited environmental water available, environmental works can enable this water to be used more effectively to protect high-value floodplains and wetlands. Environmental water must be managed together with other complementary works such as protecting drought refuges, improving habitat connectivity for fish, improving landholder management practices and stronger integrated catchment management. This will help achieve improvements in waterway health, especially in a predicted drier and warmer future climate. Modelling can combine information about predicted species distributions, climate and the costs and benefits of management activities to make decisions about trade-offs and investment. Monitoring of the benefits of environmental water is detailed in Action 24. This information can also help set achievable objectives or provide evidence for when objectives might need to be changed.	Environmental water is critical to protect the plants, animals and overall health of rivers, wetlands, floodplains and estuaries. It also has social, cultural and economic benefits. Environmental watering can increase recreational activities, sustain healthy Country for Traditional Owners and improve water quality for farmers. **Action 3.5—Improve environmental water management in a changing climate** The government will continue to invest in environmental works and measures for priority watering sites to better use existing environmental water. The government will look into the need for future environmental water recovery through sustainable water strategies, taking into account the findings of long-term water resource assessments. Sustainable water strategies will rely on evidence-based principles, priorities and community input. The Department of Environment, Land, Water and Planning will review and strengthen the Victorian Environmental Water Holder to build on achievements made in the first five years of operation and secure future environmental outcomes in the face of climate change.	A C	C	A C	A C	SF
6. Greater flexibility for taking water under winter-fill licences	x	x	x	x	x	Since 2004, all new licences to take water from unregulated water systems have required landowners to harvest all their water between July and October. This arrangement is based on historical rainfall patterns and environmental needs. Victoria needs to continually monitor and periodically review these rules given changes in rainfall patterns resulting from climate change. Victoria has experienced a seasonal shift with less rainfall during the cool season when dams and storages usually fill. The challenge is to provide flexible management options that do not adversely impact the environment or third parties. The long-term water resource assessment and reviews of sustainable water strategies provide an opportunity to review water harvesting arrangements. One immediate option in unregulated surface water systems is to change when water is taken under winter-fill licences. Opportunities may exist to provide controlled access to high flows outside the traditional winter-fill period but still within current entitlement volumes. This could increase the reliability of supply to individuals. Key considerations include the potential adverse impacts on the environment or third parties, administrative costs and long-term viability.	**Action 8.3—Investigate increased flexibility for taking water under winter-fill licences** The Department of Environment, Land, Water and Planning will explore opportunities for individuals with winter-fill licences to extract water during high-flow periods in some systems within the sustainable limits of the resource. This option will not increase entitlement volumes but may increase the reliability of supply based on when water is taken.		A			

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
7. Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems					x	These guidelines apply to high-value ecosystems that are recognised by state and national governments as being significant for their environmental values including but not limited to: • Ramsar-listed wetlands • heritage rivers under schedule 1 of the *Heritage Rivers Act* 1992 • species and communities listed under the *Flora and Fauna Guarantee Act* 1988 (Vic) or the *Environment Protection and Biodiversity Conservation Act* 1999 (Cwlth) • priority environmental values set by waterway managers, including those identified in regional waterway strategies or their relevant sub-strategy. When an application is made for a licence to take and use groundwater or transfer a groundwater licence in an area not managed under an approved management plan	**Action: Implement Ministerial Guidelines for groundwater licensing and the protection of high-value groundwater-dependent ecosystems** The guidelines require a risk assessment of the impact of granting the groundwater licence application on high-value ecosystems, having regard to the need to protect those ecosystems. If a risk is high, the Minister's delegate must either: • identify treatment options to be developed to reduce the risk to medium • make a decision to accept the risk and fully document the reasons • refuse the groundwater licence application. The delegate must also refer the application to the relevant catchment management authority for comment for a licence greater than 20 ML or greater than 10 ML if risks are identified as high or medium.	A C				SF
8. Improving understanding of climate science and how it applies to water management	x	x	x		x	Government has a key role in applying research to water management policy, planning and practice. Victoria's investment in the Victorian Climate Initiative, in partnership with the Bureau of Meteorology and CSIRO, means that understanding of climate change and its impacts on water resources has grown substantially in recent years. Victoria will build on this understanding by continuing to invest in research and working with partners including community groups, local government, Traditional Owners, research organisations and the water sector. Improving our ability to apply this research to water management policy, planning and practice is also vital. Tools for modelling and scenario planning will help inform decisions about options for action in a future with climate change.	**Action 2.2—Understand and apply climate science to water management** The Department of Environment, Land, Water and Planning will continue to assess and report on changes in water resources, including changes in rainfall, streamflow and groundwater, to inform adaptation and evaluation of actions. Victoria will continue to build our understanding of how climate change will affect our water resources. The government will invest $2.23 million to improve Victoria's preparedness and response to climate change and the impacts of drought. The Department of Environment, Land, Water and Planning will build partnerships with communities, local government, Traditional Owners, research institutions and the water sector to share knowledge and apply research to policy, planning and practice. This initiative is taking action to mitigate climate change and provide policy direction, tools and support for water resource managers and users to adapt to changing conditions. The initiative supports implementation of Chapter 2, Chapter 4 and Chapter 8 of *Water for Victoria*, including establishing a knowledge hub for climate science and water resource research, implementing a process to reduce emissions in the water sector, and implementing measures to improve water security in drought-prone regions of Victoria.	A C	A C	A C	A C	SF
9. Improving public reporting on water availability and use: User-focused information and reporting	X	x		x	x	The current reporting on water availability and use is trusted and accurate but it is not widely available or easy to understand for general audiences. The government is committed to improving the clarity and transparency of information about the condition and use of Victoria's water resources. Improved public reporting on Victoria's water availability and use will be supported by accurate, user-friendly, readily available information.	**Action 8.10—Provide clear information about water resources to the community** The Department of Environment, Land, Water and Planning will provide clear and transparent information on the condition and use of Victoria's water resources through accurate, trusted and timely information that is widely accessible and targeted to user needs. This will be done by: • working across government to improve and coordinate public reporting on the condition and use of Victoria's water resources • using new technologies and pathways for providing timely, targeted and fit-for-purpose water resource information • improving comprehensive water resources reporting through accessible weekly and monthly updates on the resource, aligning long-term trend reporting with user needs.	A C	A C	A C	A C	SF

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
10. Improving rural water supply planning	x	x		x	x	In regulated water systems, system operators are responsible for managing the available water resource on behalf of entitlement holders: the urban water corporations, the Victorian Environmental Water Holder and individuals. Each year, system operators plan for the management of their systems to supply the specified entitlements. In future, they will be required to consult more broadly in the development of these plans, and to consider the potential for shared benefits for Traditional Owners and recreational uses. Early reserve policies in some systems are used to manage the risk of not being able to operate irrigation systems because of insufficient reserves. System operators must also develop low-flow contingency plans for managing severe water shortages. These plans must be developed in consultation with urban water corporations. System operators will be required to consult more broadly with all entitlement holders and the community in developing and reviewing these contingency plans. System operators provide regular information to entitlement holders to assist with their planning. In future, this information will need to be easier to understand and available to the broader community. This will help different groups understand the opportunities that may be available through shared benefits, and it will also help to inform the newly created grid oversight function. Planning in unregulated surface and groundwater systems generally involves developing management arrangements so that available resources are managed equitably and sustainably. The management arrangements set out the triggers for rosters, restrictions and bans on extractions during low-flow periods. Processes for statutory planning for unregulated streams and groundwater set out in the Victorian Water Act are complex, resource intensive and frustrate stakeholders. A single planning process for unregulated surface water and groundwater would significantly reduce red tape and unnecessary delays, while ensuring appropriate consultation requirements and ministerial oversight. Historically, the planning for groundwater and unregulated surface water resources has taken place separately while still taking into account the known interactions between the resources. The government will continue to invest in work to better understand the interactions, to inform future combined planning. Development of a streamlined process will facilitate future combined planning for groundwater and surface water resources.	**Action 8.9—Improve rural water supply planning** The government will improve rural water supply planning processes by: • as part of the review of the sustainable water strategies, examining the early reserve rules to ensure they continue to meet the needs of the system and entitlement holders • requiring system operators to develop low-flow contingency plans in consultation with other entitlement holders and the community, and considering shared benefits • ensuring that guidelines for the development of low-flow contingency plans include an appropriate range of climate scenarios • requiring rural water corporations to improve the provision of water resource availability information to all water entitlement holders and make regular water outlooks easier to understand and available to the broader community • seeking amendments to legislation to enable development of streamlined unregulated surface water and groundwater management plans ensuring that adequate consultative processes and ministerial oversight are retained • continuing to invest in understanding where groundwater and surface water interactions have a significant impact to inform future combined management plans.	A C	A C	A C	A C	SF

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
11. Improving statewide water resource planning and risk assessment	X	x	x	x	x	Victoria's water resource regulations and planning processes operate across various landscape scales and timeframes with many organisations and stakeholders. Responsibility for implementing the framework lies with water corporations or government, depending on the function of the planning process. Good quality and timely water resource management information provides a strong foundation for the planning framework. Urban water corporations will develop urban water strategies every five years that incorporate sewerage strategies and drought preparedness planning, and link to local integrated water management plans. The community will be consulted about opportunities to achieve shared benefits for Traditional Owners and recreational users. For example, planning processes will include Traditional Owners. The government will maintain the integrity of the statewide planning process and ensure that the process is streamlined and avoids 'consultation fatigue'. Important elements of this framework include: • long-term water resource assessment and planning at the state and regional scale via long-term water resource assessments and sustainable water strategies • water planning by rural water corporations focusing on water resource management and supply • water planning focusing on urban water supply and waste disposal • environmental water planning and resource management. Victoria's long-term planning arrangements as set out in the Victorian Water Act have been designed to: • provide stable and secure water supplies over time • acknowledge and cater for regional variability in water supplies and water sources • ensure stakeholders have tools available to make the most effective decisions about their water resources and to allow intervention if assumptions about water supply are no longer valid • ensure appropriate governance for independent oversight of resource assessment and the need for any corrective action • involve community and stakeholders in all stages of long-term planning.	The Victorian Government will make sure the current planning framework remains adaptive and robust to respond to the challenges ahead. Victoria's framework for statewide water resource planning has two key elements: **Action 8.6—Commence the long-term water resource assessment process** Long-term water resource assessments are broader in scale and determine whether resource availability has changed and, if so, the severity of the impact on consumptive and environmental use. The assessments may determine that waterway health has declined for flow-related reasons. A review is required if an assessment identifies that either of these issues has occurred. This open, consultative review must consider social, environmental and economic matters, and determine how to restore the balance between consumptive and environmental use. This may include a permanent qualification of rights, which is a provision in the Victorian Water Act for the Minister to change water-sharing arrangements under existing entitlements in a given area. The government will ensure that permanent qualifications of rights will be used only as a last resort. Long-term water resource assessments are required every 15 years. Since they were established in legislation, the north of the state has undergone significant rebalancing of entitlements as part of the implementation of the Murray—Darling Basin Plan and state-initiated programs to return water to the environment. These processes must complement each other and avoid duplication. The government will: • commence a long-term water resource assessment for southern Victoria in 2018 • amend legislation to align the long-term water resource assessment for northern Victoria with the Murray-Darling Basin Plan review, scheduled to take place in 2026. **Action 8.7—Commence sustainable water strategy reviews** Sustainable water strategies, which are regionally focused and identify and manage threats to the supply and quality of water resources, ensure entitlement holders have the tools including trade and carryover to manage their own risks and identify the potential to improve waterway health. The process provides a mechanism for methodical and thoughtful engagement to set priorities and directions in the regions. Between 2006 and 2011, four sustainable water strategies were developed across the state in the central, northern, Gippsland and western regions. The Victorian Water Act requires the strategies to be comprehensively reviewed at least every 10 years. The reviews of the sustainable water strategies will be informed by an appropriate range of climate change scenarios. A sustainable water strategy's consultative committee, with participation of Traditional Owners, will ensure that the reviews consider opportunities for achieving shared benefits for Aboriginal values of water. The consultative committee will also consider the recreational values of water. The government will: • begin the review of the Central Region Sustainable Water Strategy in late 2016 • undertake the five-yearly assessments of the sustainable water strategies, beginning in 2017 with the Gippsland and Western sustainable water strategies. The Department of Environment, Land, Water and Planning will: • ensure an appropriate range of climate change scenarios are used to inform future sustainable water strategies • consider opportunities for achieving shared benefits, including those related to recreational values, in reviews of sustainable water strategies • include representation of Traditional Owners in consultative committees for sustainable water strategies.	A C	A C	A C	A C	SF

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
12. Investigating increased flexibility and choice for licence-holders	x	x	x	x	x	Victoria has undertaken significant reform of water entitlements in most regulated water systems. In these systems, water rights have been converted into water shares, delivery shares and water-use licences and registrations. This provides more flexibility and choice for entitlement holders on how they use and manage their water. Entitlement holders may mortgage or lease their water share, and trade more efficiently. This flexibility helped some entitlement holders get through the Millennium Drought. In future, climate change means less rainfall and more frequent droughts. Victoria will have to do more with less water at different times. Take and use licences in unregulated surface water systems or groundwater systems have not been converted into water shares and associated products. Conversion of these licences could provide similar flexibility and trade opportunities, enabling users to better respond to the challenges of climate change. Issues specific to unregulated surface water and groundwater systems will need to be resolved before making a decision to convert take and use licences into water shares in any particular water system. However, given the potential benefits, this issue deserves further investigation.	**Action 8.2—Provide greater flexibility and choice for licence-holders** The Department of Environment, Land, Water and Planning will investigate the merits of converting take and use licences (section 51 licences under the Water Act) in unregulated surface water and groundwater systems into water shares and other related products. The department will work with key stakeholders to investigate this proposal, and further work will depend on the outcome.		A			
13. Leading climate change adaptation across Victoria's water system	x	x	x		x	*Water for Victoria* is the Victorian Government's adaptation response to the impacts of climate change on our water resources and the availability of water in the future. Victoria's temperature has steadily increased since the 1970s and overall streamflows have decreased by about 50 per cent or more over the past 20 years. In recent years, Victoria has had low rainfall overall and catchments are dry. The Millennium Drought brought with it a seasonal shift in rain towards less rainfall during the cooler months (April to October), when runoff is greatest and storages usually fill. Climate science predicts this is the new reality, with more extreme events such as floods, droughts and bushfires also likely to occur. Higher temperatures increase evaporation rates. These changes may impact water demands and water use in catchments. Farmers may need more water for stock and to irrigate crops to offset increased evaporation. The amount of rainfall needed by catchment vegetation is likely to increase, causing reduced streamflows into storages. Demand for human uses is also expected to increase as the temperature rises, including through higher peak demands during heatwaves. The water sector has a long history of dealing successfully with the resource challenges of a variable and sometimes extreme climate. But adaptation is related to much more than water availability. For example, Victoria may need to alter design and requirements for new infrastructure to account for increased flooding. Victoria must make sure our water planning, assets and services are able to adapt quickly to changes in conditions as a result of climate change. The sector will consider climate change adaptation across all operations including resource, asset and risk management. Evidence-based decision making and monitoring will be important in leading climate change adaptation.	Climate change adaptation is a priority so that Victorians can continue to have safe and reliable water systems, and to optimise our investments in environmental outcomes. The actions in *Water for Victoria* set the direction for the water sector's climate change adaptation for the coming decades. Although the body of scientific knowledge on climate change continues to evolve, future climate projections remain uncertain. It is therefore important that a range of possible climate futures are considered when planning for the sustainability of Victorian water resources. **Action 2.3—Lead climate change adaptation across Victoria's water system** *Water for Victoria* sets the direction for the water sector's climate change adaptation for the coming decades. The water sector will lead climate change adaptation actions arising from Victoria's second Climate Change Adaptation Plan and review of the *Climate Change Act 2010*. The Government will monitor and evaluate climate change adaptation measures and report on progress as set out throughout *Water for Victoria*. Water corporations will apply the guidelines for assessing the impact of climate change on water supplies in Victoria developed by the Department of Environment, Land, Water and Planning when undertaking water supply planning. The guidelines help assess the impact of climate change on groundwater resources, extreme events such as drought and operational planning, alternative water supply projects and demand projections. The guidelines outline how climate change projections can be applied for water resource planning in Victoria. As most of Victoria's water sources are climate-dependent, planning for future climate variability and climate change is important for water resource planners. Techniques are presented to extend this baseline using the full historic climate record to incorporate a wider range of natural climate variability. Four climate change scenarios are presented in a risk-based framework that considers the vulnerability of supply systems to climate variability and climate change. Victoria's water corporations are required to apply the guidelines when modelling for climate change and supply forecasting under section 6-A of the Statement of Obligations issued by the Water Minister under the *Water Industry Act* 1994.	A C	A C	A C	A C	SF
14. Maintain compliance with *Safe Drinking Water Act 2003*		x				The Department of Health and Human Services safeguards Victoria's drinking water supplies to protect and enhance public health and wellbeing. To achieve this, the department ensures drinking water is delivered to Victorians by water businesses in accordance with the requirements of the *Safe Drinking Water Act 2003* and the Safe Drinking Water Regulations 2015.	**Action: Maintain compliance with *Safe Drinking Water Act 2003*** The *Safe Drinking Water Act 2003* regulates drinking water quality. It places obligations on water suppliers and water storage managers to provide safe, high-quality drinking water. It provides a regulatory framework that includes: • a risk management framework 'from catchment to tap' • a set of standards for key water quality criteria • information disclosure requirements for water businesses' community consultation processes. The Act applies to a range of designated water businesses (water suppliers and water storage managers) and other statutory authorities that supply drinking water to the public, including Parks Victoria and alpine resort management boards. The Department of Health and Human Services supports and works with these key stakeholders to ensure the Act is upheld across Victoria.		C			

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
15. Managing availability risks to recreational water users	x	x	x		x	Connection to nature through water storages, lakes, wetlands, rivers and streams is important for health and wellbeing and the social fabric of communities, as well as regional tourism and jobs. Visitors appreciate and seek these benefits through swimming, fishing, water skiing, rowing, camping, walking, birdwatching, sporting events, social gatherings and other activities on or near waterways. Water has recreational values that depend on the type of activities possible at a waterway, the environmental health of the waterway, water quality, accessibility, facilities and safety. Victorians are preparing for a warmer, drier future with less water available, and more extreme events. Dry conditions regularly affect the north and west of the state. In dry conditions and in drought, less water is available for all uses and recreational uses of waterways can be restricted. Yet it is at these times that the presence of water and recreational opportunities provide relief and can become even more important for communities. Understandable concern can arise when water is scarce. In regulated water systems, water is captured and held for entitlement holders in storages, and moved to where it is needed via rivers and channels. In these systems, water may be able to be moved in a way that provides recreational benefits without affecting existing entitlement holders. But this cannot be guaranteed, especially in dry times. In unregulated systems, how water moves cannot be controlled. This means that recreation is significantly impacted in dry conditions. While there are many activities at waterways that people can enjoy regardless of water levels, some activities such as boating and fishing require a minimum water level or a consistent presence of water. There will be times when not enough water is available to support all recreational activities at all locations. This is likely to happen more often with climate change. There are already limits to some activities such as boating on some water storages to maintain safety and security of supply. Victoria needs to manage access to water storages according to risk, particularly at storages used for drinking water supply, which will continue to be managed in accordance with the requirements of the *Safe Drinking Water Act 2003*. Recreational users and regional communities often want to improve certainty of water supply, create new facilities or expand access to favourite sites. They may have a clear objective, but require support to make it happen.	Water management in Victoria provides significant recreational benefits but Victoria is not always able to provide them because of limits on the water available. *Water for Victoria* commits the government to supporting the wellbeing of rural and regional communities who enjoy the recreational benefits provided by regional waterways. Victoria will consider these values in the way we manage water. We can increase the likelihood of achieving shared benefits by improving the way we consider recreational values. **Action 7.1—Include recreational values in water and waterway planning** • the government will explicitly incorporate recreational values in statewide and regional water planning processes. • water corporations, catchment management authorities and the Victorian Environmental Water Holder will plan for and provide water services that explicitly consider recreational values within our existing frameworks and with awareness of the realities of dry conditions and climate change. • water corporations, catchment management authorities and the Victorian Environmental Water Holder will engage with the community to identify and prioritise opportunities to deliver recreational outcomes. They will seek input from recreational users and regional and rural community members and report back on what is agreed and what has been done. • for recreational values to be appropriately considered, Victoria will invest to understand what those values are, including their social and economic value. • Victoria will provide easily accessible and user-friendly information to recreational users on river, storage and lake conditions to help them plan activities. **Action 7.2—Help communities understand how to achieve their recreational objectives** People may have new ideas about how to meet their recreational objectives that cannot be achieved in the day-to-day management of water and waterways. For example, recreational users could buy entitlements to improve the certainty of having water for recreation or by completing works such as building a bridge or removing rubbish to improve enjoyment of activities, or develop tourism strategies to attract visitors. But they may not know how to progress their ideas or who can assist. • Public land managers will help recreational users connect with the right people including local government, tourism boards and potential investing bodies to progress actions relating to visitor experience at valued waterways for water storages, water corporations are the right organisation to lead this • The water sector will share knowledge, user-friendly information and expertise with community members, land managers and potential investors to help achieve recreational objectives • The sector will also share information about community recreational objectives relating to waterways with organisations seeking to prioritise investment in regional development, recreation, community wellbeing and tourism objectives. **Action 7.3—Support recreation at water storages through infrastructure and better information** Water corporations can provide infrastructure and facilities at water storages that are a priority site for recreational users. First, water corporations need to understand the recreational objectives for these sites and the benefits for communities. Water corporations will prepare land and recreation management plans for all major water storages of recreational value. In preparing and implementing the plan they will: • work closely with the community and stakeholders • consider the short-, medium- and long-term water resource management purposes and arrangements for the storage • define agreed actions including the responsible agency and funding arrangements • provide public progress reporting on the implementation of these plans and actions.			A		

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
16. Managing exceptional circumstances		x				The government is moving to implement an 'all-hazards, all-agencies' approach to emergency management. Water corporations and catchment management authorities are a key part of the emergency response and recovery framework. The Government will work with water corporations and catchment management authorities to clarify their role in emergency response and recovery to make sure it is consistent with their skills, resources and capabilities. The government will strengthen risk management arrangements and assurance processes to support water sector business continuity and manage the risks and challenges of emergencies and extreme events.	**Action 10.12—Improve emergency management capability** The government will improve the emergency management capability and resilience of the water sector by: • making relevant legislative changes to clarify the roles of water corporations and catchment management authorities in emergency management • continuing to work with the water sector to enhance capacity and capability building • enhancing information systems and processes to monitor, evaluate, communicate and continuously improve the management of water sector risks.	A C	A C	A C	A C	
17. Managing groundwater-related risks (including groundwater and surface water connectivity) through Victorian planning and implementation frameworks	X	x	X	x	x	Groundwater-related risks are considered in the groundwater management plans and local management rules developed for groundwater management areas (GMAs) and water supply protection areas (WSPAs) across the state. These discrete boundaries represent areas of high-value groundwater that have been identified through many decades of groundwater management. Groundwater connection to rivers plays a major role in the health and function of riverine environments in groundwater-dependent wetland ecosystems. It also plays a primary role in stream water quality through the delivery of salt and other constituents (e.g. nitrate) to streams. Management plans seek to ensure the hydraulic relationships and properties between groundwater and surface water systems, and between and within groundwater systems, are maintained. Development of these plans is risk-based and intrinsically deals with the threat of a reduction in groundwater volume associated with climate change, extreme drought, land use change and bushfire. The plans incorporate groundwater level management and actions because each of the aforementioned causes will ultimately lead to a change in the rate of recharge to the groundwater resource, which is evidenced by a change in groundwater level. These plans also detail the threat of elevated levels of salinity, and these are also represented by groundwater level triggers.	**Action: Delivering and updating groundwater management plans** Water corporations responsible for licensing (as delegates of the Minister for Water) unregulated surface water and groundwater are responsible for the development approval, implementation, reporting and review of a local management plan (LMP). The objective of an LMP is to ensure the equitable sharing of available water between licensed water users, to protect the environment and ensure the sustainability of the water resource in the applicable area. An LMP will be prepared where required by government policies to help meet requirements of the Murray–Darling Basin Plan or where the delegate decides that specific arrangements are needed for equitable sharing of the water resource. This may occur when: • there are competing demands for water • there is risk from licensed water use to significant environmental values • there is a need to manage the system (i.e. surface water and groundwater resources) as a whole (e.g. due to significant inter-connection). LMPs describe how delegates will manage the taking of unregulated surface water and groundwater licensed under section 51 of the Victorian Water Act, using the powers delegated under the Act and in accordance with the policies for managing take and use licences. Where groundwater contributes to a high-value surface feature (e.g. a stream, spring or wetland), the threat is again managed via the licensing assessment process, application of statewide policies and local groundwater management plans. Reporting is required to demonstrate the delegate is acting in accordance with the LMP including monitoring the resource condition, and that the resource condition is consistent with objectives of the plan. The LMP should define the reporting period and method for reporting, and be produced annually. Reporting may be on a Basin or catchment scale with sections pertaining to each area with an LMP. At a minimum, reports must include information on periods when rosters or restrictions were in place, compliance and enforcement action taken for non-compliance and monitoring data relied on to introduce, enforce and lift rosters or restrictions or alter allocations.	A C	A C	A C	A C	SF

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Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
18. Managing invasive species in waterways			x			Invasive species in waterways and along riparian land are an increasing threat to the health of rivers, estuaries and wetlands in Victoria. Invasive species occur as a result of human activities and beyond their natural range, threatening valued environmental, agricultural or other social resources by the damage they cause. Such species can include organisms endemic to a country other than Australia, or translocated native species. The establishment and spread of invasive species is often a symptom of broader land use change and disturbance. Compared to most land, waterways (including riparian land) appear to be especially vulnerable to invasive species. Riparian land is prone to invasion due to high productivity and frequent disturbances. The spread of invasive species through waterways and riparian land is assisted by high connectivity as a result of water flowing downstream, or laterally to the floodplain and associated wetlands. It is common for significant movement of invasive species to occur during floods. Invasive species affect waterway conditions and have the potential to threaten environmental, social, cultural and economic values. Environmental impacts may include predation on, or competition with, native species, loss of habitat and changes to water quality or sediment, nutrient levels and the transmission of disease. The impacts associated with invasive species are often underestimated as there may be a time lag between their introduction and their effects being noticed, or it may be difficult to calculate the costs associated with the damage caused. Some invasive species can pose a risk to environmental values, but at the same time support social and economic values, such as recreational fishing. A balanced management approach is required to reduce the impacts of invasive species that cause substantial harm, while continuing to acknowledge that in some limited cases invasive species may provide other benefits valued by the community.	**Action: Managing invasive species in Victorian waterways** Management of invasive species is complex and requires a high degree of cooperation between international, national, state and regional agencies. The Victorian Government's environmental partnerships and the invasive plants and animals policy framework provides the strategic approach for managing invasive species across the whole of Victoria. The Victorian Waterway Management Strategy sets out the policy direction for issues affecting waterway health, including the threat from invasive species. The management of invasive species in waterways needs to be holistic and integrated with other waterway management activities, other pest plant and animal control work, and fisheries management activities. It is often impossible to eradicate invasive species in waterways; therefore, management activities to prevent their introduction and establishment are critical. Prevention provides a higher return for investment than eradication, containment or managing impacts across widespread areas. Coordinated action across government agencies and working with the community is necessary to integrate environmental programs and achieve multiple outcomes for land, water and biodiversity. Victoria is a signatory to the National Environmental Biosecurity Response Agreement. This agreement sets out emergency response arrangements, including cost-sharing arrangements, for responding to biosecurity incidents that primarily impact the environment and/or social amenity and where the response is for the public good. A national biosecurity incident response under the agreement would be considered for new incursions of invasive species in waterways if such incursions were assessed as being of national significance and the invasive species was likely to be eradicable. Current research programs include: *Risk management of aquatic invasive species* The project assesses the risk of spread of selected high-priority freshwater aquatic invasive species through the Victorian water grid, and identifies pathways leading to the introduction, establishment and spread of invasive species in Victoria. Project outputs will allow informed decision to be made regarding monitoring and management of invasive species and the pathways leading to their establishment and spread. *Development of education and awareness raising material for aquatic invasive species* This project involves developing education and awareness-raising material for invasive species that affect waterways that specifically target community and industry stakeholders. *Management of invasive species in wetlands* Wetland managers seek guidance and support regarding which species should be the focus of management effort, and how they can be most effectively managed to minimise their impacts on wetlands. This project involves the development of: • a training course for the management of rabbits, foxes, pigs and carp • fact sheets outlining the impacts of these four species on wetlands • a process to prioritise 174 weeds currently known from Victorian wetlands • information on the impacts of 28 priority wetland weeds • fact sheets, reports and training details on managing wetlands. *Managing willows in Victoria* Exotic species such as willows were historically planted along waterways for erosion control and aesthetic purposes. The spread of these species over time has degraded riparian land. Consequently, over the past 20 years or so, catchment management authorities have been removing willows along many Victorian waterways. These willow management programs have sometimes caused concern from the public, particularly landholders and recreational fishers, who have a strong interest in the health of our waterways. A brochure has been developed to acknowledge those concerns, improve communication and raise awareness of the 'why, what and how' about willow management in Victoria.	A C	A C	A C	A C	SF

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
19. Managing pollution-related events (e.g. point-source discharge)		X	x			A key role of EPA Victoria, under the *Environment Protection Act* 1970, is to minimise the pollution of water environments. A particular focus for EPA is the control of point sources of waste and wastewater, with a priority on avoiding the generation of wastewater. This is important because pollutants such as toxicants, nutrients and sediment can become concentrated in point-source discharges, leading to significant impacts on receiving waters. Point-source discharges considered in the risk assessment include a continuation of existing licensed discharges, urban stormwater runoff and accidental spills. The EPA has the power to issue remedial notices during certain types of pollution events. A remedial notice is a written statutory direction that requires, by law, that a recipient undertake specific works or activities—for example, to conduct a clean-up, stop works, install controls or change a process or activity. Remedial notices are served to prevent or remedy a range of non-compliances or likely non-compliances.	**Action: Managing pollution-related events (e.g. point-source discharge)** In Victoria, the discharge of wastes or wastewater from significant point sources (e.g. wastewater treatment plants and industries) to surface waters (including stormwater drains) is licensed by the EPA. EPA has a robust framework for licensing, monitoring and auditing wastewater discharges to surface waters (this process includes detailed provisions for protecting beneficial uses and the environment). Unlicensed activities may also discharge wastewater to surface waters and these need to be managed to ensure that they do not impact on beneficial uses. The disposal of wastes and wastewater to water, without approval from EPA, is already prohibited under the *Environment Protection Act 1970*. If a licence is issued to discharge wastewater, EPA will ensure it is consistent with the revised State Environment Protection Policies and includes an environment improvement plan that drives the progressive reduction of the impact of wastewater discharges on beneficial uses, and a monitoring program to assess the impact of the discharge on beneficial uses. **Pollution abatement notices** Pollution abatement notices are issued under section 31A of the EP Act. These notices aim to prevent further occurrence of pollution or potential environmental risk through installation of risk controls and changes to on-site processes and practices. If found guilty of contravening a requirement of a pollution abatement notice, the recipient may be ordered by a court to pay a fine of up to 2,400 penalty units and an additional penalty of up to 1,200 penalty units for each day the offence continues. **Clean-up notices** Clean-up notices are issued under section 62A of the EP Act. They aim to prevent further contamination and impact on beneficial uses through: • removal of waste • undertaking clean-up activities • ongoing management of pollution • altered handling, storage or location of industrial or prescribed industrial waste. If found guilty of contravening a requirement of a clean-up notice, the recipient may be ordered by a court to pay a fine of up to 2,400 penalty units. **Directions** Directions are issued under section 62B of the EP Act to immediately stop an activity, address an incident, or undertake an activity to prevent imminent danger to life, limb or the environment. Directions can be verbal or written, and must be followed immediately. A direction may be used when: • pollutants have been or are being released • pollution is likely to happen • industrial waste or potentially hazardous material has been abandoned or dumped • industrial waste or potentially hazardous material is being handled. Failing to comply with a direction is a criminal offence and attracts a substantial fine. In 2015–16, non-compliance with a direction could result in a maximum court penalty of up to 2,400 penalty units. There is no right to request a review of a direction. However, if someone who did not cause or permit the incident to occur is issued a direction, EPA must reimburse the costs incurred from following that direction. EPA can in turn recover costs from a person who is responsible for the incident.	C	C	C	C	C

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Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
20. Managing risks from earth resources development		x	x			A range of Victorian legislation applies directly or indirectly to the management of water at a mine site or quarry including: • *Mineral Resources Development Act 1990* • *Extractive Industries Development Act 1995* • *Environment Protection Act 1970, state environment protection policies* • *Environment Protection (Scheduled Premises and Exemptions) Regulations 1996* • *Industrial waste management policies* • *Catchment and Land Protection Act 1994* • Victorian Water Act. Included in these Acts are requirements for industry operators to prepare and seek approval for a work plan. As the main guidance document, the work plan describes the management of onsite water use and its context through operation, progressive rehabilitation and closure. The work plan also outlines monitoring and auditing requirements for each site that will contribute to the water management strategy. Once approved, the work plan imposes conditions on the activities undertaken in relation to water. The work plan may also include offsite disposal of wastewater with the relevant EPA Victoria approvals and licences in place. A number of additional guidelines providing information about work plans and onsite tailings storage management for mining and extractive industries can be found on the DEDJTR Earth Resource Regulation website. Water conservation is part of any sound resource management practice. Whenever possible, a mine or quarry should attempt to close the loop of water use so that a discharge is not required. If a discharge is required, the quality must comply with the applicable legislation. Careful planning and development of an appropriate water management strategy benefits the proponent for a successful mining or quarry project. Discharge from a mine or quarry must be managed in an effective and responsible manner, resulting in minimal impact on the environment and other beneficial uses.	**Action: Managing risks from earth resources development** Mine wastewater may have a number of contaminants. The discharge of low-quality mine wastewater to surface waters will have undesirable consequences such as detrimentally affecting human health, the aquatic ecosystem and agricultural interests. When considering groundwater use, consideration must be given to adverse effects on the water table caused by: • onsite groundwater extraction (dewatering) with consequent drawdown • mounding through excessive recharge of mine water to an aquifer. A discharge proposal will be based on the demonstrated application of waste minimisation principles and the capacity to comply with quality parameters outlined by the licensing authority. This means that the proponent will have to design the most appropriate disposal system for the particular operation and environmental circumstances. A mine wastewater disposal feasibility study should also inform the decision regarding which method of disposal is most appropriate for a particular site. Water management may change over time depending on the amount of inflow to the mine, the level of use, evaporation from process dams and unpredictable weather. These variables must be incorporated into the strategy, particularly related to the choice of disposal method. The quality and quantity of all discharges must be measured, recorded and reported to the appropriate authorities in accordance with licence and work plan requirements. A mine water management plan will often be required as part of the environmental management plan or work plan for the mine operations. All mining work plans are required to incorporate an environmental monitoring program. This normally includes monitoring surface and groundwater parameters, demonstrating compliance with the legislation relevant to water management at the site. Typically, a wastewater discharge monitoring program will include taking samples of the discharge wastewater as well as samples of the receiving water (from surface and groundwater), both upstream and downstream of the discharge point. Sediment samples from upstream and downstream of the discharge point will also be required. Samples will need to be collected before, during and after the life of the mine operation. Salinity is one of the most serious and widely recognised forms of land degradation in Victoria. As a result, salinity management plans have been developed through consultation between the government and community. Any saline water discharges to land or waterways will come under the control of such plans. If a proponent is planning a mine wastewater disposal scheme in Northern Victoria, additional consultation with the salinity management plan coordinators from DELWP or the local catchment management authority will be necessary to determine whether a salinity management plan is affected. Salinity is a key issue for mining and extractive industries. State Environment Protection Policies require that the discharge of saline wastewater, including discharges from groundwater pumping and irrigation drains, should not pose an environmental risk to beneficial uses. Where discharge of saline wastewater cannot be practically avoided, reused or recycled, the impact on surface waters needs to be minimised by discharging to artificial drains, evaporation basins or through treatment. This will reduce risks posed to beneficial uses of the environment. Any discharge of saline water must also be in accordance with government-approved salinity plans and strategies and the Murray–Darling Basin Agreement. Additionally, EPA Victoria will not normally approve a saline discharge without a biological assessment of the receiving waters. The EPA will assess the specific environment, hydrological regime and water quality and set discharge limits accordingly. Limits set for the licence may take into account factors such as the beneficial uses, contaminant loads and background concentrations.	C	C	C	C	x

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Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
21. Managing salinity, waterlogging and water quality including issues arising from an extreme wet period		x	x	x		Agricultural activities have the potential to cause salinity and water quality problems in neighbouring areas. Victoria's management responses have made significant progress, particularly in irrigation areas, which has supported agricultural development. Continued government investment is needed to manage the ongoing risks. This gives developers the confidence to invest, and supports the environmental credentials of Victorian agriculture in global markets. It is important that farmers understand and manage their drainage risks. Rural water corporations also need to manage their surface and sub-surface irrigation drainage networks to deal with excess water when on-farm management systems are overwhelmed by extreme rainfall. The Victorian Irrigation Drainage Program has successfully mitigated the most severe waterlogging, salinity, water quality and drainage risks in irrigation landscapes. The floods of 2010–11 demonstrated the need for an ongoing program when heavy rain caused rapid increases in groundwater levels and renewed salinity threats. The program is moving away from extending irrigation drainage networks and is focusing on farm drainage measures and coordination activities and ensuring that natural drainage courses are not inadvertently blocked. The salinity and water quality risks of agricultural intensification in existing areas and development in new areas must be managed. New problems can be prevented by guiding new developments to appropriate sites and the use of best management practices. Under the Victorian Water Act, the offsite impacts of irrigation activities are regulated through water-use licences or take and use licences. These licences are tied to the land and set out the conditions to minimise the effects of water use on others. Irrigation practices have changed significantly since water-use licences were introduced in 2007. For example, farmers have greatly increased water use efficiency. There are trends towards growing higher value crops, and the intensification of agriculture, such as glasshouse developments. Understanding of the risks to third parties and the environment from irrigation has also continued to improve. Irrigation development guidelines need to be contemporary to provide streamlined risk management of emerging trends in irrigation development. Water-use licences can be cancelled when irrigation properties have dried off for a lengthy period. A review of the timeframe for cancellation of a water-use licence will consider the rapid pace of agricultural change and opportunities for significant redevelopment of irrigation properties.	Victoria has been working with local communities for almost 30 years to manage and reduce salinity in the rivers and catchments of the Murray–Darling Basin. Salinity, however, remains a management challenge and represents an ongoing environmental, social and economic risk. Through *Water for Victoria*, the government has committed to managing the impacts of waterlogging and water quality including issues arising from extreme wet periods through the following actions: **Action 4.6—Manage salinity, waterlogging and water quality** The Government, in partnership with water corporations and catchment management authorities, will: • invest in water quality and salinity management and monitoring activities in irrigation and dryland farming areas • develop priorities for the Victorian Irrigation Drainage Program for the next five years in consultation with landholders and other stakeholders • ensure Victoria complies with its interstate salinity and water quality commitments set out in the Murray–Darling Basin Agreement (Basin Salinity Management 2030) and the Murray–Darling Basin Plan. **Action 4.7—Manage irrigation development** Over the next four years, the government, in partnership with water corporations and catchment management authorities, will: • ensure that regional irrigation development guidelines are contemporary to emerging knowledge and risks, and are applied across the state to new irrigation developments and significant redevelopments • ensure water-use licence conditions remain relevant to current and future risks at a regional level, and are effectively enforced to manage the potential offsite impacts of irrigation • review the timeframe when water-use licences may be cancelled or modified. **Action 4.8—Improve salinity management in the Mallee** Uncontrolled irrigation in the Mallee region can force saline groundwater into the River Murray, causing unacceptable increases in salinity. After consulting the local community, a salinity impact zoning policy was introduced in 1994. Salinity charges are designed to steer development from high- to low-impact zones. Revenue raised is used to fund initiatives that support agricultural water use and offset the salinity impact. The government will update the setting of salinity charges to make it consistent with the new salinity management framework, Basin Salinity Management 2030. The government will continue to improve the current approach to managing salinity in the Mallee and will: • invest revenue from salinity charges annually to update contemporary knowledge of the Victorian Mallee salinity impacts and the cost of offsets consistent with Basin Salinity Management 2030 • establish an independent review process to oversee how salinity charges are set by 2019 • review policies for the high-impact zone in the Mallee to support modernisation of the Sunraysia Irrigation District by December 2019 • work with the Murray–Darling Basin Authority to ensure a level playing field across Basin states in the joint management of salinity.	C	C	C	C	C

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
22. Managing water quality events	X	X	X			Increased temperatures and less water flowing in our waterways may cause more harmful algal blooms in waterways. Along with blackwater events, this could affect the safety of water supplies for drinking, supporting stock and recreation. The risk of water supply contamination may also increase with water shortages and increased flooding. Warmer and drier conditions means the bushfire threat is constantly increasing. As the climate continues to change, Victoria can expect more severe bushfires. Bushfires threaten the safety of communities and can also affect the quantity and quality of water flowing into storages for many years after they occur. Cyanobacteria (blue-green algae) are a common seasonal occurrence in Victoria and a natural component of most aquatic systems, including streams, lakes, estuaries and the sea. Individual cells are very small and are normally not visible in a waterbody. But numbers can increase rapidly and blooms, or scums, become easily visible across the water surface. Blooms can be triggered by nutrient levels, low inflows, lower storage volumes and warmer weather conditions. Blooms can be unsightly, ranging in colour from dark green to yellowish-brown. They develop a paint-like consistency as they dry out and often have a pungent smell. Large numbers of blue-green algae in waterbodies can produce toxins that can affect the health of humans, animals, birds and livestock as well as harm the environment. In Victoria, blue-green algae are monitored regularly by water corporations and local waterway managers through sampling and testing. An algae outbreak is managed based on the use of the waterbody and the density and nature of the bloom. The Blue-green Algae Circular informs local water managers about algal bloom coordination within Victoria. The circular has a bio-volume calculator to determine the level of cell count at which a response may be required. The circular also has a blue-green algae notification form. The Department of Health and Human Services provides advice about the potential public health impacts of blue-green algal blooms and administers the *Safe Drinking Water Act 2003*.	**Action: Blue-green algae risk management plans** Local water managers develop blue-green algae risk management plans for waterbodies under their responsibility and monitor these waterbodies for blue-green algae to ensure early detection and management of blooms. Local water managers should update their blue-green algae risk management plans annually and take into account any changes to organisations within and outside the water sector and linkages to statewide and municipal emergency management planning strategies and developments. They should also consider the best way for their blue-green algae risk management plans to be linked to the Emergency Management Manual Victoria and to municipal emergency management plans and any other related planning instruments. Blue-green algae incident management is based on emergency management principles described in the Emergency Management Manual Victoria in terms of prevention, response and recovery and is classified as a Class 2 emergency. During a substantial regional blue-green algal bloom, regional emergency arrangements will be implemented in managing the incident by DELWP. Management of the River Murray falls under the jurisdiction of NSW. However, as the River Murray is the water supply source to many Victorian towns and regional cities and receives flows from Victorian waterways, the NSW Murray and Sunraysia Regional Algal Coordinating Committees include representatives from regional coordinators in Victoria. Likewise, if a blue-green algal bloom in Victoria poses a risk to the River Murray, the relevant agencies in NSW should be included in the Regional Response Group. NSW has produced guidelines to the management response to harmful algal blooms for application in the Murray Region. When blue-green algae levels in the River Murray are above the trigger level, Water NSW will inform all stakeholders. Consequence management of a blue-green algal bloom in the River Murray in Victoria will be managed through the declaration of an Area of Operation within the Victorian emergency management arrangements. Appendix B—River Murray Regional BGA Response Arrangements—Lead Agency Water NSW describes the proposed incident management arrangement. If a blue-green algal bloom is likely to impact on South Australian waters, relevant water managers should notify SA Health through public.health@health.sa.gov.au. **Action: Blue-green algae in drinking water supplies** Where a waterbody is used to supply drinking water, blue-green algae risk management plans should interface with, or be included in the risk management plan that has been developed to comply with the *Safe Drinking Water Act 2003*. Blue-green algal blooms in drinking water supplies that may pose a risk to public health or may result in widespread public complaint, for example through taste and odour issues, must be notified to the Department of Health and Human Services using the notification arrangements under section 22 of the *Safe Drinking Water Act 2003*. **Action: Blue-green algae in recreational water** Notifications are required when a blue-green algal bloom poses a public health risk in waterbodies used for primary contact recreation. Blue-green algal blooms in recreational waterbodies are considered to pose a potential public health risk, for primary contact recreation. When a bloom is detected, the Department of Health and Human Services must be notified along with recreational users of the waterbody (e.g. through signage) or media (as appropriate), and stakeholders such as local government, tourism bodies and recreation clubs. **Action: Blue-green algae in other water supplies** Currently there is insufficient data to set risk-based trigger levels for blue-green algae in waterbodies used for other purposes, such as domestic and stock supplies or irrigation water. Local water managers should undertake a risk assessment for blue-green algal blooms in these waterbodies to determine whether the water is potentially hazardous. If it is considered that a risk may be posed due to the presence of blue-green algae, all relevant users of the water should be notified. For untreated domestic water uses (such as showering and bathing, cooking or other kitchen purposes and domestic garden watering), the use of the drinking water trigger levels for blue-green algae are recommended. While this is likely to be conservative, it can be used in the absence of a more detailed risk assessment for the specific scenario in question. Less conservative approaches can be adopted if a detailed risk assessment is completed.	C	A C	A C	A C	SF

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
23. Maximising the effectiveness of the grid and markets across the state					x	The regulated surface water market operating in northern Victoria is the longest established market in the state. The northern Victoria water market is valued at more than $4 billion and is highly complex, with interstate considerations. The water grid and markets in northern Victoria are part of the Murray–Darling Basin and the southern-connected Murray system. Water trade occurs across the southern-connected market including with NSW and Victoria. For six of the past eight years, Victoria has been a net importer of water. The Murray–Darling Basin Plan trading rules, which came into effect in July 2014, apply to water markets in northern Victoria. In this context, the government facilitates and resolves water resource planning and investment decisions between broader Murray–Darling Basin considerations and regional water corporations and their local communities. The agricultural landscape in northern Victoria has changed markedly in recent years. Individuals and businesses have responded to commodity prices, export arrangements, consumer demand and other economic factors coupled with scarcer water resources. From 2010-15, about 600 GL of high-reliability water shares in northern Victoria were traded from irrigation holdings to environmental holdings as part of the Murray–Darling Basin Plan. Over the same period, the volume of water allocation traded doubled, from about 400 GL to more than 800 GL per year. Within the interstate water market in northern Victoria, as water movement increases, pressure on different parts of the grid can change. Trading rules may need to be refined over time to reflect this. The government will continue to examine broader system operational issues, including changes resulting from environmental water holdings and delivery, and changing patterns of land and water use in the agricultural sector.	**Action 9.6—Improve trading rules in northern Victoria** The Department of Environment, Land, Water and Planning will: • ensure trading rules in northern Victoria are appropriate given physical and operational constraints • work with the Murray–Darling Basin Authority to: • provide appropriate and timely information for northern Victorian water users about the risk of congestion in the southern-connected Murray system • improve transparency in applying water trading rules in the southern connected system. **Action 9.7—Develop trading rules in other water systems** In most groundwater systems, each water market has relatively few buyers and sellers, low demand and the economic value of water is low. In the Campaspe and Loddon systems in northern Victoria and in parts of the south-west, management plans support trade between groundwater trading zones. Demand in these areas is driven by a significant reduction in regulated surface water availability and recognition of the greater reliability of groundwater. This demand has led to vibrant groundwater markets. However, in most other groundwater systems there are limited markets due to factors including conditions on the use of the resource and relatively few buyers and sellers. The government, in close consultation with water corporations and key stakeholders, will examine the factors limiting groundwater market development. This will not impact on existing entitlement holders, the environment and groundwater resources. This review will investigate the merits of converting take and use licences to water shares and opportunities to streamline groundwater management plans. In some groundwater systems, the total licensed volume is still less than the cap (generally also known as permissible consumptive volumes). In these systems, water users can apply to the relevant rural water corporation for new entitlements. Again, long-term water resource assessments can improve understanding of the potential impact of climate change on water resources in these systems. The Department of Environment, Land, Water and Planning will: • continue to refine trading rules and explore opportunities to further develop markets in western Victoria • review statewide unregulated surface water trading rules to improve trading opportunities • develop policy to facilitate trade in groundwater systems and investigate the potential for trade where groundwater and surface water are connected.	A C	A C		A C	
24. Monitoring and reporting on the benefits of environmental watering	x	x			x	The primary objective of environmental water entitlements is to protect the environment. The way Victoria manages environmental water provides shared or complementary benefits for other water users. Environmental watering may support Aboriginal values with water that can be used for cultural purposes, and may increase opportunities for recreational activities including fishing and boating. In regulated water systems, storage managers can provide shared benefits by releasing water in ways to optimise other uses. Victoria will continue to look for opportunities to provide shared benefits through environmental watering. Better monitoring and reporting will provide communities with information about outcomes they value.	**Action 3.6—Better monitor and report on the benefits of environmental watering** The government will increase monitoring and reporting back to communities on progress towards expected environmental outcomes from environmental watering, with a focus on digital reporting from 2017. The Victorian Environmental Water Holder will report annually on where environmental watering has achieved shared benefits. The Commissioner for Environmental Sustainability will: • report on the outcomes of environmental watering in Victoria, as part of the five-yearly State of the Environment Report (a requirement under section 8 of the *Commissioner for Environmental Sustainability Act 2003*) • recommend ways to improve future public reporting, consistent with the objectives of the Commissioner set out in section 7 of the *Commissioner for Environmental Sustainability Act 2003*.	A C	C	A C	A C	SF

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	CC	EE	LUI	NC	WA			E	C	S	A	SF
25. Planning for supply challenges by urban water corporations	X	X				Urban water corporations have a vital role in urban water security to manage the supply of water to meet the needs of their customers. Urban water corporations must develop an urban water strategy based on an outlook of 50 years that looks at a range of climate change scenarios and future demands. The urban water strategies, which include drought preparedness planning, recognise that they must actively prepare for drought, not just respond to it. In developing these plans, water corporations will work with their communities to find the best way of securing supply for each system during drought. By being involved, the community will better understand the likely water security risks over coming years. Urban water corporations will continue to track the status of water supplies and demands as well as their projections for the year ahead. This information is released each year on 1 December in an annual water resource outlook. The Department of Environment, Land, Water and Planning will prepare a statewide outlook drawing on water corporation outlooks. The newly developed water grid oversight role will inform the urban water strategies and statewide outlook. These will provide valuable information on supply and demand, and guide integrated water management.	**Action 5.2—Better urban water planning to address key challenges** Urban water corporations will develop urban water strategies that include: • climate and population projections that are comparable across water corporations • drought preparedness planning • drinking and non-drinking water sources and the appropriate use of each source to protect human health.		A C			
26. Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits	x					This document provides guidance for use by Victoria's rural water corporations and the Department of Environment, Land, Water and Planning. It provides tools to assist with risk assessments that inform groundwater resource share decision-making and supports groundwater management planning. The guidance supports the Minister responsible for administering the Victorian Water Act and delegates when managing groundwater resources. Section 22 of the Act provides that the Minister must undertake: • a continuous program of assessment of the state's water resources • a program of long-term water resources assessments in accordance with the Act • a program of sustainable water strategies for the state in accordance with the Act. Subject to and in accordance with the Act, the Minister may also allocate the available water resources. The guidance supports the outcomes sought by the policy paper (2011), Improving management of Victoria's groundwater resources, and is consistent with the principles of the National Water Initiative and the Victorian Waterway Management Strategy. The guidance recognises that under global climate models, worst-case dry scenario catchments in the Victorian Murray Basin are predicted to vary from 10 to 30 per cent additional recharge, to 35 to 45 per cent less recharge, with a median of 10 to 15 per cent less recharge (Crosbie et. al., 2011). Overall analysis suggests a reduction in recharge is most likely, although the degree of change is variable, as is the nature of the change. For example, the intensity of events and seasonality of rainfall may vary.	**Action: Planning the take of Victoria's Share Guidance—Consideration of climate change and climate variability in setting groundwater resource limits** In considering climate change, a key planning tool is the recognition that the climate will change, and that planning has to adapt to change in a timely manner. It is difficult to make decisions today for resource use conditions in 25 or 50 years' time, however it is reasonable to expect change. Water resource planning can respond to the impacts of climate change through changing the total available resource, as expressed by a permissible consumptive volume, for example, or through changing assumptions about the reliability of the resource. This emphasises the importance of understanding the reliability of the resource in planning. Victoria's Share Guidance contains the following considerations to assist resource planners: • Water-sharing arrangements should acknowledge that climate change is likely to occur. An evaluation of the best available assessment of the impacts of climate change should be included, with a description of the likely impacts on groundwater resources. • Ensure water-sharing instruments have a clear process for how climate variability will be considered in the context of the available resource (entitlement) and/or reliability of the resource. A factor in determining the frequency of review should be information about how rapidly climate change may impact, to ensure that review is undertaken with sufficient time to amend the water-sharing instrument. • Resource planning will explicitly consider climate variability, that is the already observed wet and dry cycles. This will inform understanding of how resource share decisions may vary under wet and dry conditions.	A C	A	A	A	SF

continued

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
27. Preparing for and responding to extreme events (bushfire, failure to meet critical human water needs, blue-green algal blooms, flooding, major asset failure)		x				In Victoria, a multi-agency framework is responsible for emergency management. This enables the exercise of roles and responsibilities, and the capacity to adapt to new or changed circumstances, within a systematic framework. Some elements of the structure are legislated and others have been established by agreement. Victoria's emergency management arrangements are set out in the *Emergency Management Act 1986*, supported by the Emergency Management Manual Victoria (EMMV). Together these documents establish the 'all-hazards, all-agencies' approach underpinning Victoria's emergency management arrangements. Bushfires, floods, storms and other hazards can have significant impacts on communities, the economy, environment and essential services, including water and wastewater services. The EMMV nominates DELWP as the control agency for a range of emergencies including disruption to water and wastewater services and dam safety. In order to meet its obligations under the EMMV, DELWP has developed emergency management documents to help mitigate the impact of these events. DELWP works with support agencies and relevant organisations in managing such incidents. In particular, DELWP works in close partnership with water corporations to maintain public safety and the continuity of essential water and wastewater services. The Water Security and Continuity Network provides an 'all-hazards' planning forum for water corporations and DELWP to share ideas, identify emerging issues and agree on improved practices.	**Action: Preparing for and responding to extreme events** Recovery and rehabilitation of essential water supply after extreme events is undertaken by number of agencies. DELWP is the control agency for: • fire in state forest, national parks and protected public land • water and wastewater service disruption. DELWP is a support agency for: • fire on private land • electricity disruption (issues affecting water supply to generators) • blue-green algal blooms • drinking water contamination • floodplain management/flood. DELWP is responsible for relief coordination of: • drinking water for households. DELWP is responsible for recovery functional area coordination of: • water and wastewater • natural environment, public land and waterways. *DELWP event/asset-specific responsibilities* Blue-green algal bloom: • provides advice to government and emergency management agencies regarding the impacts of algal blooms on drinking water supplies and recreational waterbodies. Dam safety, water and wastewater services: • prevention/mitigation/risk reduction activities • formulation of policy and regulation for dam safety, water and wastewater services • administration of dam safety provision in the Victorian Water Act and water corporation obligations in the Statements of Obligations • manages escalated response activities to minimise the impact on the community and the environment from dam safety, water and wastewater service-related incidents. Fire: • prevention/mitigation/risk reduction activities • formulation of policy and regulation for bushfire management in state forest, national parks and protected public lands • planning and delivery of programs to reduce the risk of bushfire. • control agency for bushfires in state forest, national parks, and protected public lands in accordance with the State Bushfire Plan and the State Emergency Response Plan • support agency for other fires on private land. Floodplain management/flood: • prevention/mitigation/risk reduction activities • formulation of policy and regulation for floodplain management • planning and delivery of management programs to reduce the risk of major flood • provides real-time access to streamflow data collection for flood warnings • provides flood mapping information and flood advice • provides a coordinated response to manage any residual water after major flooding.	A C	A C	A C	A C	SF

continued

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
28. Protecting waterways and their catchments by strengthening integrated catchment management across Victoria	x	x	x			The health of waterways across Victoria has been affected by inappropriate, historical land use. Climate change and drought, along with extreme events, such as floods, bushfires and heatwaves, are also likely to impact waterway health. The trend of decreasing cool season rainfall is likely to continue and in some catchments Victoria may see average annual streamflow reductions of about 50 per cent by 2065. Integrated catchment management is a holistic way of managing land, water and biodiversity from the top to the bottom of a catchment. Improving integrated catchment management will provide significant benefits for waterways. Released in 2017, *Our Catchments, Our Communities* is the first statewide strategy for integrated catchment management in Victoria. The strategy will achieve more effective community engagement, better connections between levels of planning, and strengthened regional catchment strategies. The strategy will also clarify roles, strengthen accountabilities and coordination, and improve monitoring, evaluation and reporting. Catchment management authorities will lead 10 integrated catchment management projects across the state from 2016 to 2019, in collaboration with catchment management partners. Projects are under development in each region. Protecting and improving the health of waterways and their catchments is a critical task for the decades to come. Investing in protection is more cost-effective than paying to restore health. Over the next four years, the Victorian Government will invest $200 million to improve waterway health and $22 million to strengthen catchment management. As Victoria prepares for a warmer and drier future, Victoria needs to find the best investment opportunities to improve waterway health. We can do this by increasing our capability to do predictive modelling and scenario planning and ensuring we have the best information ready to make future decisions. Making the best use of water recovered for the environment will become even more important. Victoria is already making a major investment in riparian restoration to connect and increase resilience of waterways.	Under the Victorian Water Act, Victoria has a water entitlement framework that limits how much water Victoria can take for human use. It also requires licences for works on waterways. Where applicable, planning controls are used to define the way land may be used or developed. Within a planning scheme, overlays can be used to show land that has particular values, such as significant environmental features. The *Environment Protection Act 1970* protects water quality for surface and groundwater. Regional waterway strategies and regional catchment strategies identify environmental, social, cultural and economic values in partnership with communities to achieve common objectives. Regional catchment strategies guide strategic land use planning to protect and improve catchment values. In urban and regional areas, Victoria needs to better align planning to achieve common objectives. There are opportunities to use planning tools, such as Environmental Significance Overlays, to protect areas with riparian vegetation and other native plants and animals that support land and water habitat and quality. **Action 3.3—Invest in integrated catchment management** The government will invest $22 million over four years to strengthen integrated catchment management across Victoria and implement the actions in *Our Catchments, Our Communities* by 2019. Catchment management authorities will lead 10 new integrated catchment management projects across the state from 2016 to 2019. The first projects to be developed are: • Mallee-Lake Tyrrell to Birchip in the Southern Mallee waterways • Wimmera—enhancing the health, environment and liveability of the Wimmera catchment • Goulburn Broken—resilient landscapes, vibrant communities • North Central—leveraging integrated catchment management.	A C	A C	A C	A C	X
29. Protecting water quality-implementing the State Environment Protection Policy (Waters)	x	x	x	x	x	Water quality supports a range of different uses, such as water for drinking, water for recreation and water suitable for native plants and animals. The Environment Protection Act requires policies to set out specific values or beneficial uses, and related water quality objectives and indicators for protecting those values across Victoria's diverse environments. *Salinity* In terms of condition, salinity was found to be a common threat across the water resource plan areas. Salinity was found to be an issue associated with both extreme wet periods (rising salinity) and extreme dry periods (saline pools in river systems). *Suspended sediment and nutrients* Suspended sediments and nutrients were identified as a common threat to the water resources of the water resource plan areas (surface water). The threat arises from multiple causes including climate change, extreme wet periods, extreme drought, and land use change. *Toxicants* Increasing toxicant levels has been identified as a potential risk to the groundwater resources. The risks could arise from earth resource development, point-source discharges, and changes to land use.	**Action 3.2—Protect water quality through the State Environment Protection Policy** The new State Environment Protection Policy (Waters) will provide a modern risk-based approach to protect water quality. The government will protect beneficial uses of water across Victoria through the policy that is consistent with the government's response to the independent inquiry into EPA Victoria by: • confirming the beneficial uses of Victorian groundwater and surface water, and where these uses apply • setting water quality indicators and objectives to protect beneficial uses • establishing a modern, risk-based framework to manage unlicensed point and diffuse pollution sources in rural and urban areas • developing regional target settings and plans to improve water quality • ensuring water quality offsets can be used within catchments to maintain regulatory compliance within waterways. The Department of Environment, Land, Water and Planning and EPA Victoria will work with water corporations to look into using water quality offsets more broadly to achieve better environmental outcomes for least community cost by 2018.	C	C	C	C	SF

continued

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
30. Provide long-term investment to improve waterway health	x	x	x		X	The Victorian Waterway Management Strategy (VWMS) provides the framework for the government, in partnership with the community, to maintain or improve the condition of rivers, estuaries and wetlands. The framework is based on regional planning processes and decision making, within the broader system of integrated catchment management in Victoria. The vision for Victoria's waterways is: Victoria's rivers, estuaries and wetlands are healthy and well-managed; supporting environmental, social, cultural and economic values that are able to be enjoyed by all communities. The strategy addresses the obligations for waterway management described in the Victorian Water Act and *Catchment and Land Protection Act 1994* as well as other relevant legislation and international agreements. Regional water strategies, required under the Victorian Water Act, provide a single planning document for river, estuary and wetland management for each catchment management authority region. They drive the implementation of the statewide management approach developed in the VWMS, and are consistent with the objectives for waterways described in the regional catchment strategies. The regional water strategies identify high-value waterways and priority management activities over an eight-year period. They are based on a transparent, regional priority-setting process and have been developed in close consultation with key partners, including regional agencies and boards, Traditional Owners and the regional community. This process ensures that investment in on-ground works and environmental water management is targeted at priority waterways to achieve the greatest community gain. The strategies build on the success of the previous regional river health strategies by expanding their scope to include wetlands and estuaries (where applicable). They also comprehensively integrate priorities for environmental water management with other waterway management activities. The regional water strategies include a regional work program of management activities for priority waterways. They guide investment into multi-year projects and annual work programs.	**Action 3.4—Provide long-term investment to improve waterway health** The government is investing $90 million over four years to implement regional waterway strategies and improve waterway health by focusing on large-scale projects for 36 waterways. The government is investing $30 million over four years to implement the Regional Riparian Action Plan and speed up riparian works across regional Victoria. The management approach for waterways is implemented through the Victorian Waterway Management Program. The Department of Environment, Land, Water and Planning is responsible for overseeing the program and for establishing the state policy framework for waterway management. The program's regional implementation is led by the waterway managers (the catchment management authorities). This program is an eight-year adaptive management cycle. The approach for managing waterways involves: • recognising the importance of waterways with formal international, national and state significance • implementing and maintaining on-ground works and managing environmental water in priority waterways • fostering strong community partnerships • using regulation (legislation and statutory processes). Aspirational targets are included for long-term resource condition outcomes (eight-plus years) and management outcomes (one to eight years). Targets for outputs are developed as part of the regional water strategies. The long-term resource condition outcome targets are to maintain or improve the condition of: • priority river reaches • high-value wetlands • high-value estuaries. Policy directions and specific actions for more effective and efficient management of waterways are provided in the VWMS for: • recreational use of waterways • environmental water management • riparian management • water quality • river channels • wetlands • estuaries • waterways in urban areas • extreme events of flood and bushfire • invasive species management in waterways.	A C	C	A C	A C	SF

continued

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
31. Recognising and managing for Aboriginal values	x	x	x	x	x	Victorian Traditional Owners have cultural, spiritual and economic connections to land, water and resources through their associations and relationship with Country. They have managed land and water sustainably over thousands of generations. Connectedness to land, waters and resources on Country is important for Aboriginal health and wellbeing. In *Water for Victoria*, for the first time there is a clear roadmap to deliver water for Aboriginal cultural, spiritual and economic values. The environmental and consumptive uses of water are relatively well understood as water resource planning concepts. However, Aboriginal uses of water are not as well understood. This is reflected in the results of the risk assessment which identified a wide array of risks to Aboriginal uses of water, significantly more so than on any other use or user. This conservative assessment reflected the current low level of knowledge of Aboriginal water use requirements by water planners and the 'poor level of confidence' identified for the risks associated with Aboriginal water use. In addition, the assessment reflects the fact that there are currently no Aboriginal water allocations in Victoria. Cultural benefits may be achieved as a secondary outcome from the management of water systems and water entitlements. Water access has been provided primarily through the Native Title process; however, only rights to use water for domestic and personal purposes have been recognised. To date Victoria's Traditional Owners and Aboriginal Victorians have had limited involvement in decision making in Victoria's water planning and management framework. There are many reasons why these processes have not been accessible to Aboriginal people, including historical factors and cycles of intergenerational trauma, and past and present experiences of Aboriginal people with mainstream services. As a result, Aboriginal water values and uses have not always been protected, and traditional ecological knowledge has not benefited Victoria's water management and planning. Victoria's water management framework, including existing instruments and processes, may be used to address both aspects of Aboriginal Water. An evidence-based approach is necessary to identify the appropriate implementation options. It is expected these will be different in different locations.	*Water for Victoria* commits the Victorian Government to: recognise the values that water has for Traditional Owners and Aboriginal Victorians. The water sector will support Aboriginal participation in Victorian water planning and management frameworks through consultative structures that address the rights and interests of Victoria's Traditional Owners. The government is investing $9.7 million to support Aboriginal participation in water management and improve outcomes for Aboriginal Victorians. **Action 6.1—Recognise Aboriginal values and objectives of water** The government is investing $4.7 million over four years to establish the Aboriginal Water Program, a statewide approach to incorporate Aboriginal values and expertise into water management. The Department of Environment, Land, Water and Planning and the Aboriginal Water Reference Group will co-design the Aboriginal Water Program. This will include investment in local projects across the state to identify local Aboriginal water values, uses and objectives. **Action 6.2—Include Aboriginal values and traditional ecological knowledge in water planning** The water sector will partner with Traditional Owners to include Aboriginal values and knowledge in water resource planning. To do this, the sector will: • make sure that the legislated objectives of the Victorian Environmental Water Holder consider identified Aboriginal water-related environmental outcomes • incorporate traditional ecological knowledge into water planning and management using Aboriginal Waterway Assessments and other tools developed by Traditional Owners • notify and engage with Traditional Owners to achieve shared benefits • establish Aboriginal water officers in regional Victoria. **Action 6.3—Support Aboriginal access to water for economic development** The government will invest $5 million and work in partnership with Traditional Owners and Aboriginal Victorians to develop a roadmap for access to water for economic development. Water corporations will notify Traditional Owners when opportunities to access water entitlement arise. Sustainable water strategies will consider opportunities for access to water for economic development for Aboriginal Victorians. The government will continue to partner with Traditional Owners and Aboriginal Victorians to identify seed funding and seek business finance opportunities for Aboriginal enterprises to invest in water. **Action 6.4—Build capacity to increase Aboriginal participation in water management** The Department of Environment, Land, Water and Planning and the Aboriginal Water Reference Group will co-design a capacity-building program to increase Aboriginal participation and inclusive practices in water management, as part of the Aboriginal Water Program. The water sector and Traditional Owners will look for opportunities to trial different ways of providing access to water and shared benefits.	A C		A	A C	SF
32. Strengthening and modernising compliance arrangements				x	x	Victoria's water resource compliance and enforcement framework is designed to protect the environment and existing entitlement holders from illegal take and use of water. Compliance with conditions of water entitlements is vital to maintain entitlement reliability and market integrity and to give stakeholders and the community confidence in how water is being managed. Victoria's water corporations are responsible for managing compliance of individuals; approaches to compliance vary across the state. The compliance and enforcement regime in the Victorian Water Act is outdated. The government will modernise the enforcement regime to align with best practice regulation.	**Action 8.5—Ensure a modern compliance regime that works** Water corporations will adopt a consistent risk-based approach to manage compliance and enforcement with improved oversight and reporting. The government will modernise the compliance and enforcement regime for water corporations to reflect best practice regulation.	A C	A C	A C	A C	SF

continued

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
33. Strengthening the water entitlement framework				x	x	Victoria's water resource and system management arrangements, as set out in the Victorian Water Act, have developed over time in response to specific needs and increased complexity in the roles of water corporations. No single organisation in a given area draws together all relevant rules and obligations. Arrangements are spread across multiple regulatory instruments, such as bulk entitlements, trading rules and storage and resource management appointments. There are now inconsistencies and duplication in the obligations, roles and responsibilities of water corporations. This limits the transparency of water resource management and makes it difficult for water managers, water users and the community to understand the arrangements, and rights and obligations. This makes it difficult to get the community involved in improving water resource management.	**Action 8.1—Ensure a strong and responsive water entitlement system** The Department of Environment, Land, Water and Planning will work with water corporations and the Victorian Environmental Water Holder to review and streamline regulatory instruments to improve transparency, and clarify roles and responsibilities to reduce red tape and improve water literacy. The first phase of this work is to: • clarify roles and responsibilities set out in bulk entitlements and associated instruments for the management of water systems, and ensure consistency, transparency and accountability to water users and the community • rationalise and simplify existing regulatory instruments • investigate opportunities to increase community involvement in system management arrangements and achieve shared benefits for Traditional Owners and recreational users.	A C	A C	A C	A C	SF
34. Traditional Owner engagement in groundwater planning						Where the take and use of groundwater may significantly impact rivers or surrounding vegetation, engagement with Traditional Owners is needed so that Aboriginal cultural values can be identified.	**Action: Traditional Owner engagement in groundwater planning** Victoria's groundwater-sharing guidance document outlines the principles for identifying Aboriginal values and considering these when planning resource arrangements for groundwater (see below). Victoria will continue to engage with Aboriginal stakeholders in groundwater planning. Principles for engagement with Aboriginal stakeholders: • consider the rights and interests of Traditional Owners regarding the management of waterways, including the right to speak for Country and how it is managed • identify the correct representatives to speak for a particular Country before undertaking engagement processes or activities. Advice may be sought from organisations such as the Victorian Aboriginal Heritage Council or Native Title Services Victoria. Where Traditional Owner corporations exist, these bodies should be approached rather than individual Traditional Owners • recognise that Traditional Owners have a long history of managing landscapes, and can have valuable traditional knowledge to contribute to waterway and groundwater management. Consider that there may be existing protocols about using this knowledge that must be adhered to • seek the approval and consent of Country representatives before gathering or using traditional knowledge • take into account Traditional Owner objectives for waterways where whole-of-Country and/or joint/cooperative management plans exist and include specific objectives for waterways.	A C		A C		SF
35. Water resource information supports planning and decisions	x	x	x	x	x	Water resource information includes basic water quality and quantity data from Victoria's key surface and groundwater collection networks. This ongoing monitoring from Victoria's key gauging stations and groundwater observation bores improves understanding of long-term trends in the state's water resources. It is vital for long-term and short-term planning and licensing decisions, compliance and enforcement. Water resource modelling and analysis provides water managers with crucial insights for making operational and policy decisions. Modelling and analysis are fundamental tools to ensure water resource decisions are made in an objective and informed way. These tools provide water managers and water users with insights that are essential for understanding the resource, including longer-term water availability outlooks and climate change projections. One of the key principles of the water entitlement framework is that individual entitlement holders are responsible for managing the risks of water scarcity within their own contexts and systems. Victoria's water markets allow farmers, the Victorian Environmental Water Holder and water corporations to buy and sell water entitlements and seasonal allocations, so they can manage their own risk according to their willingness to pay. The water markets allow us to share water security benefits in ways that are equitable, responsive and transparent.	**Action 8.11—Improve water resource information to support planning and decisions** The Department of Environment, Land, Water and Planning will work with water corporations and catchment management authorities to: • continue to invest in ongoing statewide surface water and groundwater monitoring networks • improve the quality and accuracy of monitoring data through investment in infrastructure upgrades and new technologies to receive more timely data • strengthen water resource assessments and modelling by including up-to-date information on catchment characteristics to better understand water availability, use and climate change. This Action underpins many others that require water resource information, particularly those related to climate change, water entitlements and planning, and realising the potential of the grid and markets.	A C	A C	A C	A C	SF

continued

Title	Macro risk cause applicable					Description	*Water for Victoria* action/s or alternative	Use applies to (A) and/or (C)				PEA
	CC	EE	LUI	NC	WA			E	C	S	A	SF
36. Continued implementation of the Border Groundwaters Agreement	x	x	x	x	x	In most areas close to the South Australian–Victorian State border, groundwater is the only reliable source of water. It is used for irrigation and for industrial, stock and domestic supplies. Many towns close to the border also rely on groundwater for their public water supply. Large groundwater withdrawals on one side of the border could affect users on the other side, possibly interfering with their long-term supplies. In addition, groundwater salinity increase can occur due to excessive use of groundwater. To prevent this, the Governments of South Australia and Victoria entered into an agreement for the management of the groundwater resource. The Groundwater (Border Agreement) Act 1985 came into effect in January 1986 to cooperatively manage the groundwater resources along the state border of South Australia and Victoria. As understanding of the resource improved and the demand for water increased, there was a need to manage the resource in a more targeted way to take account of aquifer characteristics and specific circumstances. The agreement was therefore amended in 2005 and both states have passed legislation to give effect to the Amendment Agreement. The Agreement establishes the Border Groundwaters Agreement Review Committee, with membership from both states, as the body responsible for jointly managing these groundwater resources in the two states within a defined area called the Designated Area. The Designated Area, a 40 kilometre wide strip centred on the border and extending for its full length, is divided into 22 Zones with 11 zones in each state.	**Action: Continued implementation the Border Groundwaters Agreement** The Agreement sets out the framework for groundwater management in the Designated Area. Each state is responsible for water allocation planning and water licensing which need to be consistent with the provisions and management settings established under the Agreement. In Victoria this is done by the Rural Water Corporations under delegation from the Minister. Key features of the Agreement are: ***Permissible Annual Volumes*** The Agreement allows for a Permissible Annual Volume to be set for each aquifer in a zone. Each state can allocate groundwater for licensed use up to a limit specified as the Permissible Annual Volume in each Zone of the Designated Area. The amount of groundwater available in each Zone has been calculated taking into account the local hydrogeology. ***Allowable Annual Volumes*** The Agreement allows for an Allowable Annual Volume of extraction to be set for any sub-zone or aquifer within a sub-zone in the Designated Area. **Permissible Rate of Groundwater Level Lowering** The Agreement provides for a rate of drawdown that must not be exceeded. ***Permissible Distance from the Border*** The Agreement allows for a distance from the border to be set and, within this area in each state, the Review Committee must agree to any proposed licensed withdrawals of groundwater or bore construction excluding stock and domestic bores. ***Permissible Level of Salinity*** A level of salinity can also be specified for each Zone to safeguard groundwater quality. At this stage, no salinity levels have been set for any of the Zones due to the general variation in salinity through the Zones and the difficulty in selecting an appropriate level. ***Bore Construction*** The Agreement allows for conditions to be set for the construction of bores to prevent inter-aquifer contamination. ***Five Yearly Management Review*** The Agreement specifies that the Review Committee review, at not more than five yearly intervals, the Permissible Annual Volume in relation to each Zone, the Allowable Annual Volume for each sub-zone or aquifer within a sub-zone, and the Permissible Distance from the border. There is also provision to review the Permissible Rate of Groundwater Level Lowering and the Permissible Levels of Salinity (if set) and to recommend any changes to the Ministers in both states.	A C	A C	A C	A C	SF

6. Conclusion

The risk assessment conducted by Victoria meets Basin Plan requirements as defined in the Basin Plan—Approaches to addressing risks to water resources (Chapter 10, Part 9).

This includes:

- 10.41—Risk identification and assessment methodology
- 10.42—Description of risks
- 10.43—Strategies for addressing risks.

As per section 10.41(1), Victoria's water resource plans will be prepared having regard to the current and future risks to the condition and continued availably of the water resources in each water resource plan area.

Schedule 1: Data used (10.41(7))

1. Guidance documents

Alluvium 2016. Water resource plan preliminary risk assessment: Risk register, Microsoft Excel spreadsheet, prepared for DELWP

Commonwealth *Water Act 2007*

DELWP 2015. Context paper for the development of water resource plan Risk Assessments. DELWP Water Resource Plan Working Group 2015

MDBA 2012. Basin Plan. Commonwealth of Australia, 22 November 2012

MDBA 2013. Handbook for Practitioners—Water resource plan requirements. Commonwealth of Australia (Murray–Darling Basin Authority) October 2013

Peters, G., Doeg, T. & Heron, S. 2009. Aquatic Value Identification and Risk Assessment (AVIRA) Risk Assessment Process, Report for the Victorian Government Department of Sustainability and Environment by Riverness, April 2009

Standards Australia 2009. AS/NZS ISO 31000:2009 Risk management—Principles and guidelines

2. Relevant policies and strategies

2.1 Statewide strategies

Victorian Waterway Management Strategy (DEPI 2013)

Environmental Guidelines: Management of Water in Mines and Quarries (DEDJTR 2015)

Guidelines for the development of a water supply-demand strategy (Moran and Sharples 2011)

Victorian regulatory framework relating to farm dams, groundwater and afforestation (DSE 2008)

Manual for Victoria' Salinity Accountability in the Murray–Darling Basin (DSE 2011)

Victorian Long-Term Watering Plan—Northern Victoria; Victorian Murray and Wimmera–Mallee (DELWP 2015)

Resource Share Guidance, Planning the take of Victoria's groundwater resources (DELWP 2015)

2.2 Regional strategies

Gippsland Sustainable Water Strategy (DSE 2011) and supporting technical reports:

- Bushfire impacts on water quality and quantity (DEPI 2011).

Northern Region Sustainable Water Strategy (DSE 2009) and background reports:

- Impact of future water availability scenarios on reliability of supply in regulated systems (SKM 2008)
- Farm dam interception in the Campaspe Basin under climate change (SKM 2008)
- Reliability of supply in unregulated catchments under climate change (SKM 2008)

- Protecting water users and the environment from uncontrolled growth in domestic and stock water use (SKM 2009)
- Indigenous Engagement Project (Goulding Heritage Consulting 2009)

Western Region Sustainable Water Strategy (DSE 2011) and supporting technical reports:

- Managing adverse water resource impacts of land use changes (DSE 2011)

2.3 Catchment strategies

Wimmera Regional Catchment Strategy 2013–2019

Wimmera Water Quality Strategy (WCMA 2002)

Wimmera Waterway Strategy 2014–2022

Mallee Waterway Strategy 2014–2022

Mallee Regional Catchment Strategy 2013–2019

North Central Waterway Strategy 2014–2022

Goulburn Broken Regional Catchment Strategy 2013–2019

Goulburn Broken Waterway Strategy 2014–2022

Goulburn Broken Water Quality Strategy 1996–2016

North East Waterway Strategy 2014–2022

North East Regional Catchment Strategy 2013–2019

2.4 Water supply strategies

Water Supply Demand Strategy. Grampians Wimmera Mallee Water (2012)

Victorian Mallee Irrigation Region Land and Water Management Plan (MCMA 2011)

Loddon Campaspe Irrigation Region Land & Water Management Plan (NCCMA 2007)

Mid Goulburn Broken and Upper Goulburn Sustainable Irrigation Action Plan (GBCMA 2008)

2.5 Groundwater supply strategies

Katunga Water Supply Protection Area Groundwater Management Plan (GMW 2006)

Mid-Loddon Groundwater Management Area Local Management Rules (GMW 2009)

Upper Ovens River Water Supply Protection Area Water Management Plan (GMW 2011)

Lower Campaspe Valley Water Supply Protection Area Groundwater Management Plan (GMW 2012)

Loddon Highlands Water Supply Protection Area Groundwater Management Plan (GMW 2012)

Lower Ovens Groundwater Management Area Local Management Plan (GMW 2012)

Upper Goulburn Groundwater Management Area Local Management Plan (GMW 2013)

Strathbogie Groundwater Management Area Local Management Plan (GMW 2013)

Central Victorian Mineral Springs GMA Local Management Plan (GMW 2013)

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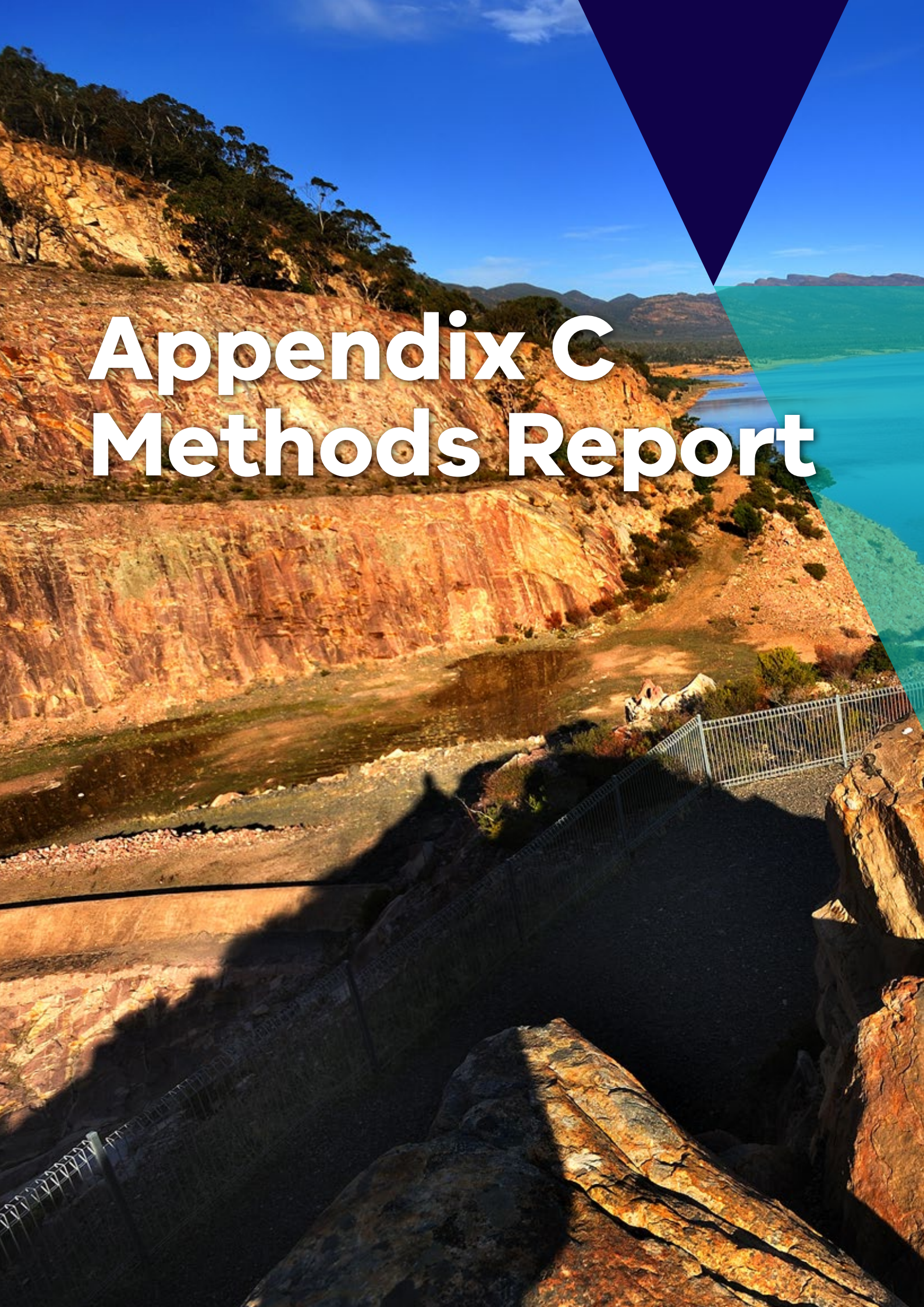


Appendix C Methods Report

Contents

Summary of methods

Permitted take in the Wimmera–Mallee (surface water) water resource plan area and the Wimmera–Mallee (groundwater) water resource plan area is either calculated or estimated based on the best available information for that form of take and the water resources in the water resource plan area.

Actual take is the volume of water actually taken from the system within an accounting period. At the end of each water accounting period, actual take is subtracted from the annual permitted take. The difference is recorded as either an annual debit or credit, as outlined in section 6.11 of the Basin Plan. To remain compliant with sustainable diversion limits (SDL), cumulative debit cannot be equal to or greater than 20 per cent of the SDL (Basin Plan section 6.12). A summary of whether permitted take and actual take is estimated or calculated is shown in **Table 1**.

Where the form of take relates to take under an entitlement, the method relies on information on entitlement volumes recorded in the Victorian Water Register (VWR). The VWR provides the most up-to-date information regarding entitlement volumes for an area or resource.

Where there is no recorded entitlement data or the water available in the resource unit is not fully allocated under entitlements, an estimate is required to determine the permitted take for the accounting period. Equally, where there is no recorded entitlement data for a form of take, an estimate will be required to determine actual take.

Table 1: Summary of permitted take and actual take methods

Form of take	Method	
	Permitted take	Actual take
Surface water		
Take from a regulated river (excluding basic rights)	Calculated using the water resource plan model	Calculated using usage data on the Victorian Water Register
Take from a regulated river under basic rights	Estimated based on best available hydrological model information	Estimated based on best available hydrological model information
Take from a watercourse (excluding basic rights)	Calculated using usage data on the Victorian Water Register	Calculated using usage data on the Victorian Water Register
Take from a watercourse under basic rights	Determined by actual take	Calculated using usage data on the Victorian Water Register
Take by runoff dams (excluding basic rights)	Calculated based entitlement data on the Victorian Water Register	Calculated based entitlement data on the Victorian Water Register
Take by runoff dams under basic rights	Estimated based on best available water user information	Estimated based on best available water user information
Net take by commercial plantations	Estimated using the SoilFlux model	Estimated using the SoilFlux model
Groundwater		
Take from groundwater (excluding basic rights)	Determined as the relevant SDL	Calculated using entitlement data on the VWR
Take from groundwater (basic rights)	Estimated	Estimated

1. Background Information

1.1 Basin Plan requirements

Division 2—Take for consumptive use

Note: This Division sets out the principal provisions for how a water resource plan incorporates and applies the SDL for each SDL resource unit. The SDLs take effect from 1 July 2019. Water resource plans may be accredited before then and ordinarily have effect for 10 years: see section 64 of the Commonwealth Water Act.

10.10 Annual determinations of water permitted to be taken

(1) For each SDL resource unit in a water resource plan area, and for each form of take, the water resource plan must set out the method for determining the maximum volume of water that the plan permits to be taken for consumptive use during a water accounting period.

(2) The method for subsection (1) may include modelling, and must be designed to be applied after the end of the relevant water accounting period, having regard to the water resources available during the period.

(3) The method must:

(a) account for the matters in subsection 10.12(1); and

(b) be consistent with the other provisions of the water resource plan.

(4) The plan must also set out a demonstration that the method relates to the SDL of each resource unit in such a way that, if applied over a repeat of the historical climate conditions, it would result in meeting the SDL for the resource unit, including as amended under section 23B of the Act.

Note 1: Under the Basin Plan, the SDL is the same as the long-term annual diversion limit because the temporary diversion provision for each SDL resource unit is zero. Section 6.04 and Schedules 2 and 4 set out the SDLs for each SDL resource unit.

Note 2: Amendments under section 23B of the Act are made following proposals for adjustment under Chapter 7.

(5) If, as a result of an amendment under section 23B of the Act, the SDL for a surface water SDL resource unit is expressed as a formula that changes with time, the SDL for subsection (4) is taken to be:

(a) for a water accounting period beginning on or after 1 July 2019—the SDL as it stood on 30 June 2019; and

(b) for a water accounting period beginning on or after 1 July 2022—the SDL as it stood on 30 June 2022; and

(c) for a water accounting period beginning on or after 1 July 2024—the SDL as it stood on 30 June 2024.

10.12 Matters relating to accounting for water

(1) For paragraph 10.10(3)(a), the following matters must be accounted for:

(a) all forms of take from the SDL resource unit and all classes of water access right;

(b) water allocations that are determined in one water accounting period and used in another, including water allocations that are carried over from one water accounting period to the next;

(c) for a surface water SDL resource unit—return flows, in a way that is consistent with arrangements under the Agreement immediately before the commencement of the Basin Plan;

(d) subject to subsection (3)—trade of water access rights;

(e) water resources which have a significant hydrological connection to the water resources of the SDL resource unit;

(f) circumstances in which there is a change in the way water is taken or held under a water access right;

(g) changes over time in the extent to which water allocations in the unit are utilised;

Note: Paragraph (g) includes what is commonly known as a growth-in-use strategy.

(h) water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water;

(i) water resources which are used for the purpose of managed aquifer recharge.

(2) Subject to this section, the method may account for other matters.

(3) For paragraph (1)(d), the water resource plan must account for the disposal and acquisition of held environmental water separately and in a way that does not affect the method under section 10.10.

Division 3—Actual take

10.15 Determination of actual take must be specified

(1) A water resource plan must set out how the quantity of water actually taken for consumptive use by each form of take from each SDL resource unit will be determined after the end of a water accounting period using the best information available at the time.

*Note: The **annual actual take** for the SDL resource unit is the sum of the quantity of water actually taken by each form of take for consumptive use: see subsection 6.10(2). Paragraph 71(1)(c) of the Act requires the annual actual take to be set out in a report to the Authority within 4 months after the end of the water accounting period.*

(2) For a particular form of take, and subject to the requirement that a determination use the best information available at the time, a determination may be made by:

(a) measuring the quantity of water actually taken; or

(b) estimating the quantity of water actually taken; or

(c) a combination of the above.

(3) Where a determination for a form of take is made by estimating the quantity of water actually taken, the water resource plan must provide for the estimate to be done consistently with the method under subsection 10.10(1) that relates to that form of take.

(4) The quantity of water actually taken must:

(a) include water that was held environmental water which was disposed of and then used in the SDL resource unit for consumptive use; and

(b) exclude water sourced from the Great Artesian Basin and released into and taken from a Basin water resource.

1.2 Best available information summary

In developing the models and methods in this report Victoria has used the best available information. The information is considered the best available on the following basis:

- it is the most current at the time at which the model or method must account for water taken from the system
- it is based on an updated model and more accurately reflects the management of Victoria's water resources
- it is obtained in a manner that is cost effective and fit for purpose
- the Victorian Water Register (VWR) holds the most accurate and up to date information regarding water entitlements.

It is not proposed to use methods of obtaining information to assess consumptive water take from the system where the cost and effort involved in obtaining the information is not commensurate to the benefit (or increased certainty) achieved by the inclusion of the data.

For the purposes of determining take by entitlement holders, the VWR is the most accurate means of determining the number of entitlements and the total volume authorised to be taken under those entitlements. All entitlements issued in Victoria are recorded on the VWR in accordance with the requirements in the Victorian Water Act.

1.3 Utilisation

The SDL represents the long-term average of the environmentally sustainable limit on the volume of water that can be taken from the Basin resource. In Victoria, water entitlements (water access rights) are not issued above the sustainable limit for the relevant resource. This sustainable limit will now be represented by the SDL in Victoria's water resource plan areas.

In determining whether entitlements can be issued, there is an assumption of full use of an entitlement. This means that in considering whether a new entitlement can be issued in respect of a resource or system, consideration is given to the total volume of water authorised to be taken from that resource or system under existing entitlements.

In circumstances where water users are not using the total volume of water allocated under their entitlement, it is not assumed that water is available to new water users. Victoria's commitment to secure entitlement to water is underpinned by water management decisions that promote (to the extent possible) continued availability of water under a user's entitlement.

As a result, there may be circumstances where the total volume of water allocated under entitlements is higher than the volume of water actually taken by the entitlement holders in a system. This, however, will not result in allocation of new entitlements to take up the unused water.

2. Baseline Diversion Limit and Sustainable Diversion Limit models

2.1 Surface water models

A Resource Allocation Model (REALM) computer simulation model has been developed for the Wimmera–Mallee system covering all take from a regulated river (excluding basic rights). The Wimmera–Mallee system model represents:

- system waterways
- historical recorded and estimated streamflow and climate data from January 1891 to June 2015
- system infrastructure including reservoirs, diversion weirs and transfer channels and the pipeline delivery network
- system operating rules as specified in the bulk entitlements and storage management rules as at 31 October 2010
- rural, urban and environmental demand groupings with climate-varying demands applied, including a mechanism to simulate entitlement carried over to another accounting period
- evaporation and transfer and delivery losses.

The REALM simulation model estimates allocations for entitlement holders throughout the accounting period. The storage manager uses identical rules to determine allocations in practice.

The Wimmera–Mallee Baseline Diversion Limit (BDL) and Sustainable Diversion Limit (SDL) models have been developed in the following manner:

- Wimmera–Mallee BDL Model—this model represents infrastructure, operational rules and entitlements to water as at 31 October 2010. This represents the point in time when entitlements were created to distribute the final water savings from the Wimmera–Mallee Pipeline.
- Wimmera–Mallee SDL Model—this model represents infrastructure, operational rules and entitlements to water as in the BDL model, with the exception of transfer of the 19 GL of former irrigation entitlement and the associated distribution losses of 9 GL to the Commonwealth Environmental Water Holder.

The BDL and SDL models were run over the Basin Plan historic climate period of July 1985 to June 2009 and estimated the long-term BDL and SDL (for take from a regulated river (excluding basic rights)) to be 66,874 ML per year and 43,842 ML per year. These values are broadly consistent with the corresponding Murray–Darling Basin caps (MDB caps) of 66,899 ML per year and 44,185 ML per year respectively. These MDB caps were estimated using the previously accredited Wimmera–Mallee post-pipeline and post-irrigation cap models. Importantly, the revised modelling has also confirmed the volume of water recovery achieved in the (surface water) water resource plan area as 23,032 ML (the difference between the BDL and SDL volumes).

The models used for estimating Victoria's SDLs are shown in **Table 2**.

Table 2: Model runs documented in the modelling technical report

Run description	Key files	Consumptive demands	Model run period	Analysis period
SDL model	HW04.sys SDL2.scn SDL2.log	Representative of full use of entitlements to water as at 11 April 2013	Jan 1891–June 2016	July 1895–June 2009
BDL model	HW05.sys BDL2.scn BDL2.log	Representative of full use of entitlements to water as at 31 October 2010	Jan 1891–June 2016	July 1895–June 2009

2.2 Comparison to Basin Plan estimates of BDL and SDL

This section provides a brief discussion and comparison of Victoria's estimates of BDL and SDL provided in **Table 3** and **Table 4**, compared to the estimates of these numbers provided in schedules 2–4 of the Basin Plan. In each case the revised estimated is based on the same level of development as specified in the Basin Plan, e.g. 30 June 2009 or 31 October 2010 as applicable. Refer to **Part 3** of this report for more detailed discussion of the method used to determine the SDL in each case. Overall, the total surface water BDL was estimated to be 129 GL in the Basin Plan compared to 99 GL in Victoria's estimate, while the corresponding SDL estimate was 106 GL in the Basin Plan compared to 76 GL by Victoria. The difference between the total surface water BDL and SDL is the same, 23 GL.

For take from a watercourse (excluding basic rights), early discussions with the MDBA identified a revised method of total entitlement volume as the method for determining BDL, SDL and permitted take. This would have increased the BDL and SDL to 5,790 ML. In late 2018 the MDBA advised that this would not be an acceptable method. Victoria proposes to use a similar method as that used for Basin Cap for determining BDL and SDL for take from a watercourse (excluding basic rights). The Basin Cap method used a proportion (1.9%) of the volume determined for take from a regulated river (excluding basic rights).

Therefore, the BDL for take from a watercourse (excluding basic rights) is equal to 1.9% of the BDL for take from a regulated (excluding basic rights) . This equates to a volume of 1.3 GL for the Wimmera-Mallee (surface water) SDL resource unit). As there is no water recovery in the unregulated system, the SDL equals BDL for this form of take.

Recognising there are flaws in this method, Victoria is proposing to revise the estimate within the next two years to determine a more accurate means of representing levels of take as at 2010 for this form of take.

Table 3: Comparison of Victoria's and Basin Plan surface water BDL and SDL estimates for each form of take

	Form of take	Basin Plan		Victoria		Explanation
		BDL (GL)	SDL (GL)	BDL (GL)	SDL (GL)	
(a)	Take from a regulated river (excluding basic rights)	66	43	66.87	43.84	Changes in estimates is based on an updated model
(b)	Take from a watercourse (excluding basic rights)*	1	1	1.3	1.3	This volume was estimated based on a percentage of Take from a regulated river (excluding basic rights).*
(c)	Take from a waterway under basic rights	—	—	1.07	1.07	The volume is estimated based on a model of domestic and stock demand. This volume also includes a best estimate of take under section 8A by Traditional Owners
(c) (i)	Take from a regulated river under basic rights	—	—	—	—	This is not being estimated separately
(c) (ii)	Take from a watercourse under basic rights	—	—	—	—	This is not being estimated separately
(d)	Take by runoff dams**	61	61	24.10	24.10	Volume is based on more accurate data and comprises consumptive take and take for domestic and stock purposes by runoff dams
(d) (i)	Runoff dams (excluding domestic and stock)	—	—	13.10	13.10	This volume was estimated based on the sum of existing entitlements recorded on the VWR as of July 2016
(d) (ii)	Runoff dams (domestic and stock)	—	—	11.0	11.0	Estimate is based on modelling using the number and volume of dams shown in aerial imagery as at 2005 adjusted to account for the entitlements shown in item (d)(i)
(e)	Net take of water by commercial plantations	1	1	5.70	5.70	Estimate is based on modelling recently undertaken by DELWP
	TOTAL (GL)	**129**	**106**	**99.04**	**75.9**	

* The BDL and SDL for this form of take is subject to review as outlined above. Following the two year review the volume may change. Accreditation of this volume does not prohibit Victoria from providing a revised estimate of BDL and SDL for take from a watercourse, excluding basic rights that increases the volume.

** It is expected that the significant difference in these two estimates is due to the large number of dams in the region that were historically connected to the channel supply system but do not harvest surface runoff and hence have been excluded from Victoria's estimates of take via detailed analysis of the aerial imagery. Victoria's estimates are based on the best available information and a fit-for-purpose method.

For groundwater, the Basin Plan estimates of BDL and SDL have been adopted as shown in Table 4.

Table 4: Basin Plan groundwater BDL and SDL estimates for each form of take

Form of take		Basin Plan	
		BDL (ML)	SDL (ML)
Wimmera–Mallee: Highlands SDL Resource Unit			
1	Take from groundwater (excluding basic rights)	1,110	2,575
2	Take from groundwater under basic rights	150	175
Wimmera–Mallee: Sedimentary Plain SDL Resource Unit			
3	Take from groundwater (excluding basic rights)	67,770*	189,284*
4	Take from groundwater under basic rights	1,130	816
Wimmera–Mallee: deep SDL Resource Unit			
5	Take from groundwater (excluding basic rights)	0	20,000
6	Take from groundwater under basic rights	0	0

Note: For item 3 in the table volumes for the Wimmera–Mallee: Sedimentary Plain SDL resource unit currently include the volumes taken in West Wimmera; therefore the SDL volume is the volume identified minus West Wimmera take. The West Wimmera GMA entitlement portion in the Murray–Darling Basin is 3.2 GL (at 30 June 2018).

3. Surface water

3.1 Determination of permitted and actual take

10.10(4) The methods for determining permitted take for all forms of take are based on identical climate sequences to those used for determining SDL and therefore will result in meeting the SDL for the relevant SDL resource unit. **Table 7** of the Methods Report at **Appendix C** to the Wimmera-Mallee Comprehensive Report shows the volumes of SDL and permitted take for each form of take to demonstrate the methods.

See **Part 3.3** of the Methods Report for surface water at **Appendix C** to the Wimmera-Mallee Comprehensive Report for an explanation of the demonstration of the methods.

Under section 10.10 of the Basin Plan the Wimmera–Mallee Water Resource Plan is required to set out the method for determining permitted take for each form of take in the water resource plan area. The method for determining permitted take must be applied at the end of each accounting period (yearly). Actual take must be assessed against permitted take to ensure that the volume of water actually taken during the year does not exceed permitted take and therefore will not lead to exceeding the SDL.

The Basin Plan, section 6.10, defines permitted take to be the maximum volume of water permitted to be taken by each form of take for consumptive use from the SDL resource unit. Section 6.10 defines actual take as the sum of the volume of water actually taken by each form of take for the consumptive use from the SDL resource unit.

Permitted take is calculated for each form of take using the methods detailed below. Actual take is the water diverted or taken by water users from the resource or system to be stored or used. See Part 10.4 of this plan for more discussion on actual take.

3.1.1 Managing and determining take in the Wimmera–Mallee

In the Wimmera–Mallee (surface water) water resource plan area there are the following forms of take:

- take from a regulated river (excluding basic rights)
- take from a watercourse (excluding basic rights)
- take from a regulated river under basic rights
- take from a watercourse under basic right
- take by runoff dams (excluding basic rights)
- take by runoff dams under basic rights
- net take by commercial plantations.

Below is a summary of the water management framework and assessment tools used to determine actual take for the above forms of take.

Where the form of take relates to take under a Victorian entitlement (water access right) the Victorian water management framework has measures in place to ensure that actual take during the accounting period is responsive to water availability during that same period. These mechanisms are outlined below.

For forms of take that rely on the estimation of use because they are not actively monitored and take is not metered, the tools used to estimate the volume of actual use are outlined below. These forms of take relate to take under basic rights (domestic and stock right and right of Traditional Owners to take water under section 8 and section 8A of the Victorian Water Act

respectively) either directly from the river or by way of runoff dams and take by commercial plantations.

3.1.1.1 Take from regulated rivers (excluding under basic rights)

This form of take accounts for the largest proportion of total surface water take in the Wimmera–Mallee water resource plan area. The Wimmera–Mallee system includes all regulated rivers in the Wimmera–Mallee water resource plan area.

GWMWater's bulk entitlement (*Bulk Entitlement (Wimmera and Glenelg Rivers – Grampians Wimmera Mallee Water) Conversion Order 2010*) grants the corporation the right to harvest and store water flows in the Wimmera–Mallee system with a complementary obligation to supply all entitlement holders who have an entitlement to take water from the system.

- While this system primarily relates to take from regulated rivers, it also includes take from several small diversions on unregulated tributaries in the catchment that are part of the overall Wimmera–Mallee supply system and are covered under GWMWater's bulk entitlement. These include the Mt Cole, Langi Ghiran and Panrock Creek diversions in the upper reaches of the Wimmera Basin. For the purpose of this method the take from these small tributaries is considered part of the regulated take as the volume is negligible and it is managed as part of the regulated system under the same bulk entitlement.
- It also includes water taken from the Glenelg River catchment and used to supply the Wimmera–Mallee system. These flow diversions are physical transfers into the Murray–Darling Basin, not a natural surface water connection.

GWMWater, as the storage manager, is required to determine the available water that can be taken from the system during the accounting period and make the corresponding water allocations for all consumptive users and the environment. Schedule 2 of the storage manager instrument of appointment establishes the rules the storage manager must use when determining available water and making allocations on a monthly basis.[1] This is how water is managed during the season to ensure that water allocated to users and hence authorised for use under the Victorian framework will not lead to the permitted take for the year being exceeded.

These allocation rules are replicated in the water resource plan model, which is used as the method for determining permitted take at the end of each year and is how the method responds to water availability as required under section 10.10(2) of the Basin Plan. Refer to schedule 1 below for the relevant allocation rules from schedule 2 of the storage manager instrument of appointment.

The Wimmera–Mallee SDL model for take from regulated rivers (excluding basic rights) represents the infrastructure, policy, operational rules and full use of entitlements as for the BDL conditions (i.e as at 31 October 2010), except for transfer of former irrigation entitlement (19 GL) and the associated distribution losses (9 GL) to the Commonwealth Environmental Water Holder. The water resource plan model will be developed for take from regulated rivers (excluding basic rights) by:

- updating the SDL model to represent current infrastructure, policy, operational rules and full use of entitlements as required and defined by the currently published Bulk and Environmental Entitlements relevant to Wimmera–Mallee (surface water) water resource plan area (i.e. 2014 BEs and EEs)
- scaling the modelled diversions to ensure that average annual diversion over the historical climate conditions from 1895 to 2009 matches the SDL.

It is Victoria's position that permitted take equals the sustainable diversion limit to allow Victorian water users the ability to fully use all water available under the prescribed SDL.

The water resource plan model incorporates changes between 2009 and 31 December 2017 to account for changes since setting SDLs for the Wimmera–Mallee relevant at the time of accreditation. Any changes to infrastructure or operational rules that impact on the application

1 http://www.gwmwater.org.au/about-the-storage-manager/instrument-of-appointment

of the water resource plan model to adequately determine permitted take during the life of the Wimmera–Mallee Water Resource Plan will be considered in accordance with the review process outlined at Part 1.2 of the plan.

The water resource plan model will be used for determining the annual permitted take and assessing annual compliance in the Wimmera–Mallee (surface water) water resource plan area for take from regulated rivers as follows:

1. extend the Wimmera–Mallee water resource plan model input data (inflows, rainfall, evaporation, demands) to 30 June, being the end of the last water accounting year
2. run the model from 1 July 2019 to the end of the last water accounting year by initialising the simulation with recorded storage volumes at the end of June 2019
3. determine the annual permitted take using the consumptive diversions calculated by the model
4. determine the difference between the annual actual take and annual permitted take
5. determine the new cumulative balance of the difference between annual permitted take and annual actual take for the water accounting years commencing 1 July 2019
6. assess the compliance with the annual SDL by comparing the new cumulative balance with the agreed noncompliance trigger volume.

3.1.1.2 Take from watercourses that are not regulated rivers (excluding basic rights)

This category includes take by small urban water supply systems and take and use licensees. The total volume authorised to be taken under bulk entitlements and take and use licences (outlined below) for this form of take equals 5,790 ML per year.

A number of very small towns have their water supplies in the headwaters of the Wimmera and Avoca catchments:

- Amphitheatre, Avoca, and Redbank are supplied by Central Highlands Water from small reservoirs on tributary streams in the upper Avoca catchment under three bulk entitlements:
  - *Bulk Entitlement (Amphitheatre) Conversion Order 2003*
  - *Bulk Entitlement (Avoca) Conversion Order 2003*
  - *Bulk Entitlement (Redbank) Conversion Order 2003*
- Landsborough and Navarre are supplied by Central Highlands Water from tributary streams in the upper Wimmera catchment under *Bulk Entitlement (Landsborough–Navarre) Conversion Order 2003*
- Elmhurst, Buangor, Moyston, Wickliffe and Lake Bolac are supplied by GWMWater, and Glenthompson is supplied by Wannon Water with water sourced partly from GWMWater's diversion weirs on small tributary streams in the upper Wimmera and Wannon catchments under:
  - *Bulk Entitlement (Willaura, Elmhurst and Buangor systems—Grampians Wimmera Mallee Water) Conversion Order 2012*
  - *Bulk Entitlement (Willaura System—Wannon Water) Conversion Order 2012*

These small water supply systems are independent of the nearby Wimmera–Mallee system and are classified as diversions from watercourses that are not regulated. They have a combined upper limit take of 862 ML per year. The authorisation to take water under bulk entitlement is based on full utilisation of each entitlement, however these instruments do specify rules that limit take that can respond to water availability year to year, including:

- minimum passing flows to be met before diversions can occur, and in some cases the months of the year when no diversion is permitted
- capacity of on-stream storage

- maximum rates of diversion
- volumetric limits on take

Take and use licences are used to authorise the take and of water by individual water users from the system. A total of 4,928 ML is authorised to be taken under take and use licences issued to individuals on various unregulated watercourses in the Wimmera-Mallee water resource plan area. These licences comprise of:

- 2,239 ML of licences on the Wimmera River and its tributaries
- 2,689 ML of licences on the Avoca River and its tributaries.

Similar to bulk entitlements, while full utilisation is assumed when authorising take under these instruments, take and use licence holders are required to comply with rosters, bans or restrictions. These rosters, bans and restrictions are articulated in either local management plans or water supply protection area water management plans.

The interim method for determining permitted take and actual take is outlined in **Part 3.1.2**. The existing simulation model for the Wimmera–Mallee system does not include take on these unregulated streams. Victoria does not support the development of a new simulation model suitable for determining annual SDL compliance for this component of take because of the high cost for a very limited return. Incorporating rules that apply to bulk entitlements and take and use licences that affect the rate and volume of water that can be diverted in response to water availability is difficult due to the varied nature in which they are applied. In late 2018 the MDBA advised that Victoria's proposed method of using entitlements to determine permitted take was not appropriate. Therefore alternative approaches must be investigated to determine the most appropriate method for determining permitted take.

Until Victoria can determine a more appropriate and cost-effective method for determining permitted for take from a watercourse (excluding basic rights) that recognises adjustments under bans and restrictions it is proposed that the permitted take method is the same as the annual actual take determination in the water accounting period. By setting permitted take equal to actual take Victoria will not be able to accumulate credits under SDL reporting for water not taken under the SDLs year to year until the method is updated. This is appropriate given the alternative method of using total entitlement volume is not reflective adjustments that are made during the year to respond to water availability and therefore may result in the accumulation of credits in years of low availability when the water could not actually be taken. This approach also reflects that the BDL and SDL methods also need to be revised to determine a more accurate means of representing levels of take as at 2010 for this form of take.

Accreditation of this method does not prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year.

This method will be reviewed in 2 years. The review will allow for the permitted take method to be an annual representation of the sustainable diversion limit. The SDL will equal the BDL, and the BDL will be revised to determine the best representation of water available under unregulated bulk entitlements and take and use licences.

3.1.1.3 Take from a regulated river and watercourses under basic rights

Basic rights are defined under the Basin Plan to include rights to take water for domestic and stock purposes and a native title right. Under Victorian legislation basic rights are prescribed in section 8 and Traditional Owner's rights are described in section 8A of the Victorian Water Act.

Under section 8, waters users have a right to take water, free of charge, from a waterway for domestic and stock purposes under prescribed circumstances (see **Part 6.2** of the Wimmera–Mallee Water Resource Plan for more detail on basic rights). In general terms, people or

businesses can exercise that right if they own the land over which the water is flowing, or their land is next to a waterway of which the bed and banks remain the property of the Crown. The rights do not apply where there is Crown frontage between the waterway and freehold land.

The right of Traditional Owners to take water under section 8A aligns with the requirements under section 8 regarding the circumstances in which the right to take can be exercised. Traditional Owner rights to take water under section 8A are outlined in more detail at **Part 6.2.2** of the plan. At the time of making this report there are no circumstances of Traditional Owner groups exercising this right in the Wimmera–Mallee water resource plan area. However, this may change as a result of the implementation of the Aboriginal Water policy outlined in Water for Victoria.

Take under basic rights is generally not metered and the volume of take is difficult to estimate precisely. Take under this right may be metered in circumstances where bores or pumps are used to take water for other purposes under an entitlement in addition to water taken under domestic and stock rights. In these cases, a meter may be attached to the works. However, where the works provide only for take for domestic and stock rights there is no requirement to install a meter to monitor volumes of take.

While take under this right is not metered, total take is relatively small because water taken under this right cannot be used for commercial purposes and the majority of the regulated parts of the Wimmera and Avoca Rivers and their tributaries are covered by a Crown Reserve. Further, the unregulated rivers in this area dry up regularly and the majority of the unregulated parts of the Wimmera and Avoca Rivers and their tributaries are bordered by Crown Reserve. Therefore, the landowners who are separated from the waterway by Crown land are not eligible to exercise the right under section 8.

In addition, due to irregular seasonal flows in this region, the majority of stock and domestic take in these circumstances is likely to be harvested and stored in runoff dams. These dams are already included as a separate form of take.

The method for determining permitted and actual take is outlined in **Part 3.1.2**. The method uses the upper limit estimates due to the uncertainty around domestic and stock estimates and therefore opting to take the most conservative approach.

3.1.1.4 Take by runoff dams (excluding basic rights)

Runoff dams (often referred to in Victoria as small catchment dams) are small dams not located on a defined watercourse. Runoff dams used for commercial and irrigation purposes are required to be licensed or registered in Victoria. Refer to **Part 10** for further details on runoff dams.

The volume of water authorised to be taken by these runoff dams by individuals is estimated to be 13,100 ML in the Wimmera–Avon and Avoca Basins. The estimate was obtained from the VWR as of July 2016.

3.1.1.5 Take by runoff dams under basic rights

Under section 8 of the Victorian Water Act, landholders may take water free of charge for domestic and stock use under prescribed circumstances. As with other section 8 rights, the take is not required to be metered.

Victoria has estimated the number and volume of runoff dams used for domestic and stock purposes in the Wimmera–Mallee (surface water) water resource plan area and also the total annual extraction, which varies with climatic conditions. These estimates were made from desktop studies using maps and aerial photographs.

Many dams identified in aerial photographs were already licensed and so were already counted as a different form of take. These licensed dams were separated, based on the data available, to avoid double counting of take.

The volume of water authorised to be taken by unlicensed runoff dams used for stock and domestic (basic rights) purposes within the Wimmera–Mallee (surface water) water resource plan area is 11,000 ML.

When estimating the volume of permitted take and actual take for runoff dams under basic rights the volume determined does not represent a legislative limit for take under section 8 rights. The Victorian Water Act does not set a volumetric limit on the right to take water under section 8. The right to take water under section 8 is limited by the method of access and the purposes for which the water may be used.

3.1.1.6 Net take by commercial plantation

The effect of commercial forestry plantations on the water balance in the Wimmera–Mallee (surface water) water resource plan area is not accurately monitored and good data is not readily available.

The annual permitted take of water by commercial plantations will be estimated as the difference between the long-term average rate of evapotranspiration from plantations that were present in 2009 and from the vegetation type that was thought to be present before the plantation was established. The long-term average rate of evapotranspiration will be estimated using the SoilFlux model. Commercial plantations cover an area of 42 km^2 within the Wimmera–Mallee water resource plan area and take an estimated 5,700 ML per year.

3.1.2 Methods for permitted and actual take

Section 10.10(1) of the Basin Plan requires that for each SDL resource unit in the Wimmera–Mallee water resource plan area the plan set out the methods for determining the maximum volume of water that the plan permits to be taken for consumptive use during a water accounting period.

The determination of permitted take in the Wimmera–Mallee (surface water) water resource plan area varies depending on the form of take. **Table 5** outlines the methods used for determining permitted take for each form of take in the Wimmera–Mallee (surface water) water resource plan area.

Section 10.15 of the Basin Plan requires that the Wimmera–Mallee Water Resource Plan sets out how the volume of water actually taken for consumptive use will be determined for each form of take within each SDL resource unit. This will be completed at the end of each water accounting period using the best available information at the time. The methods for determining actual take for each form of take in the SDL resource unit Wimmera–Mallee (surface water) water resource plan area is outlined in **Table 5**.

3.1.2.1 How water availability is considered

Section 10.10(2) of the Basin Plan requires the method to be designed to be applied after the end of the relevant water accounting period, having regard to the water resources available during that period.

In respect of take from a regulated river excluding basic rights, the impact of water availability is managed in practice throughout the accounting period on a monthly basis. Water available during the period is accounted for in the water resource plan model at the end of the period based on seasonal conditions in the preceding year and the allocation rules detailed in **Part 3.1.1** and **Schedule 1** of this report.

For take from watercourses (excluding take under basic rights) the method for determining permitted take is linked to actual take (discussed above at **Part 3.1.1.2**). As actual take adjusts to water availability it is considered the most appropriate method until a more appropriate method is developed that recognises adjustments under bans and restrictions. Actual take in this

circumstance will be adjusted by measures that respond to water availability (see **Part 6.7** of the Comprehensive Report) or water shortages during extreme dry periods (see **Part 9.3** of the Comprehensive Report).

For all other forms of take, there is no mechanism to allocate or restrict water take on an annual basis and the estimates are based on long-term averages hence the method for permitted take does not take into account water availability on an annual basis.

10.10(2) The method is applied at the end of each accounting period having regard to the water resources available during that period.

3.1.2.2 Consistency with permitted take method

Section 10.15(3) of the Basin Plan also requires that the determination of actual take where it is estimated is done consistently with the method used to determine permitted take. **Table 5** identifies the methods for actual and permitted take. For all forms of take where actual take is estimated, the same method is used to determine permitted take.

10.15(3) In the Wimmera–Mallee water resource plan area, where the determination of actual take is estimated, the method is the same as the method used to determine permitted take under 10.10(1) of the Basin Plan.

Table 5: Methods for determining permitted take—surface water

Form of take	Method		Best available information
	Permitted take (accredited text for 10.10(1))	Actual take (accredited text for 10.15(1))	
Take from a regulated river (excluding basic rights)	The method used for determining permitted take for take from a regulated river (excluding basic rights) in the Wimmera–Mallee (surface water) water resource plan area is the scaled water resource plan model which was developed by: • updating the SDL model to represent infrastructure, policy, operational rules and full use of entitlements as required and defined by the currently published Bulk and Environmental Entitlements relevant to Wimmera–Mallee (surface water) water resource plan area (i.e. 2014 BEs and EEs) as at 31 December 2017 • scaling the modelled diversions to ensure that average annual diversion over the historical climate conditions from 1895 to 2009 matches the SDL. The scaled water resource plan model will be used at the end of each year as follows: • extend the inputs (inflows, rainfall, evaporation and demands) to 30 June, being the end of the last water accounting year • run the model from 1 July 2019 to the end of the last water accounting year by initialising the simulation with recorded storage volumes at the end of June 2019 • determine the annual permitted take using the consumptive diversions calculated by the model • less any incomplete recovery for the Wimmera-Mallee (surface water) SDL resource unit. The model version is from 16 May 2018 and the key model files are: • WP01.sys • WP01.scn • WP01.log The disposal and acquisition of held environmental water is accounted for separately and in a manner that does not affect the permitted take method.	The actual take for the Wimmera–Mallee (surface water) water resource plan area is the sum of all diversions taken under an entitlement from a regulated river excluding take of environmental water held (or HEW) by VEWH and CEWH as recorded in the VWR as of 30 June in each year.	The water resource plan model was run over the historic record and results show that the method results in the SDL being achieved. This scaling is done to ensure that permitted take reflects the SDL, on an annual basis for the resources in the Wimmera–Mallee water resource plan area. Victoria's position is that permitted take equals the SDL to allow Victorian water users the ability to fully use all water available under the prescribed SDL. The water resource plan model incorporates changes between 2009 and 31 December 2017 to account for changes since setting SDLs for the Wimmera–Mallee relevant at the time of accreditation. Any changes to infrastructure or operational rules that impact on the application of the water resource plan model to adequately determine permitted take during the life of the Wimmera–Mallee Water Resource Plan will be considered in accordance with the review process outlined at **Part 1.2** of the plan. The method includes reference to any incomplete recovery to ensure that any outstanding recovery can be accounted for in the method. It is not expected that there will be incomplete recovery in the Wimmera-Mallee water resource plan area at the time of accreditation of the Wimmera-Mallee Water Resource Plan.

Form of take	Method		Best available information
	Permitted take (accredited text for 10.10(1))	Actual take (accredited text for 10.15(1))	
Take from a watercourse (excluding take under basic rights)	Permitted take equals actual take, where actual take equals is the sum of all diversions taken under an entitlement from a watercourse that is not a regulated river minus environmental water held (or HEW) by VEWH and CEWH as recorded in the VWR as at 30 June in the relevant year.	Actual take is the sum of all diversions taken under an entitlement from a watercourse that is not a regulated river minus environmental water held (or HEW) by VEWH and CEWH as recorded in the Victorian Water Register as at 30 June in the relevant year.	The method will be used for 2 years whilst Victoria undertakes a review of a more accurate method of determining permitted take from a watercourse (excluding basic rights). It is not cost effective or fit for purpose to develop a simulation model for the small volume of the SDL that applies to this form of take. Until Victoria can determine a more appropriate and cost-effective method for determining permitted for take from a watercourse (excluding basic rights) that recognises adjustments under bans and restrictions it is proposed that the permitted take method is the same as the annual actual take determination in the water accounting period. By setting permitted take equal to actual take Victoria will not be able to accumulate credits under SDL reporting for water not taken under the SDLs year to year until the method is updated. This is appropriate given the alternative method of using total entitlement volume is not reflective adjustments that are made during the year to respond to water availability and therefore may result in the accumulation of credits in years of low availability when the water could not actually be taken. This approach also reflects that the BDL and SDL methods also need to be revised to determine a more accurate means of representing levels of take as at 2010 for this form of take. Accreditation of this method does not prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year. Using this method eliminates Victoria's ability to accumulate credits against SDL reporting where permitted take has not responded to low water availability in the same way as actual take does. Given that advice from MDBA regarding the appropriateness of the method was not provided until late 2018 Victoria has agreed to a 2 year review period within which a new more appropriate method will be developed. The application of the method proposed in this Table does not prejudice Victoria from adopting a method in 2 years which could result in the accumulation of credits under SDL reporting.

continued

Form of take	Method		Best available information
	Permitted take **(accredited text for 10.10(1))**	**Actual take** **(accredited text for 10.15(1))**	
Take from a regulated river under basic rights Take from a watercourse under basic rights	Estimated as the sum of: • a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. • an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the *Traditional Owner Settlement Act 2010*		This is the baseline diversion limit (BDL) method. Water taken under this form of take can only be used for stock and domestic or in accordance with a section 8A right and represents a relatively consistent pattern of use compared to commercial uses of water. As such, the volume of water taken is not expected to vary greatly from year to year. The method to determine annual permitted take is based on estimates of the long-term average of water taken each year having regard to the water resources available in the water accounting period. This is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011) and is based on best available information. The modelled estimate uses the upper limit to account for the uncertainty in domestic and stock estimates. The method for determining permitted take and actual take is fit-for-purpose for this form of take. The number of properties with access to a main waterway is determined in accordance with GIS modelling. A review of the number of properties will be conducted five yearly, to account for any subdivisions. To date there has been no water taken under section 8A of the Victorian Water Act in the Wimmera-Mallee (surface water) water resource plan area. For this reason, an estimate has been made of the expected demand for the Wimmera-Mallee (surface water) water resource plan area. Further work is being undertaken in response to Part 14 of Chapter 10 of Basin Plan to build capacity of Aboriginal communities and explore how section 8A can be utilised. As the level of take increases the method will be reviewed to consider whether it needs to be amended. Where take under basic rights increases to a level that may impact on compliance with sustainable diversion limits, section 10.13 of the Basin Plan applies (for more information see Part 8).

continued

Form of take	Method		Best available information
	Permitted take (accredited text for 10.10(1))	Actual take (accredited text for 10.15(1))	
Take by runoff dams (excluding basic rights)	To be determined from the total volume of licences and registrations based on a fixed annual volume in the VWR as at 30 June in the relevant year (being the water accounting period). Note: Total volume of licences and registrations refers to the maximum volume authorised to be taken under take and use licences and registration licences..		This is the BDL method. The method for determining permitted take and actual take is fit-for-purpose for this form of take, and has appropriate regard to the water resources available in the water accounting period for this form of take. This is the volume of existing entitlements based on data from the VWR as at 30 June in the relevant year. Information on the VWR is considered to be the best available information regarding entitlements in Victoria. Bulk entitlements are not included as no bulk entitlements have been issued for this form of take in the Wimmera-Mallee water resource plan.
Take by runoff dams (basic rights)	Estimate is based on modelling using the number and volume of dams shown in aerial imagery as at 2005, adjusted to ensure that dams which are associated with entitlements which are not basic rights are fully excluded. Entitlement information was adopted as given in the Victorian Water Register as at July 2016.		As forecast information is not reliable at the present time and introduces additional uncertainty into the estimate, the 2005 aerial imagery is considered to be the best available information for the BDL estimate. Changes in the extent of runoff dams within the Wimmera–Mallee (surface water) water resource plan area will be determined using aerial imagery periodically at least every 10 years. This information is proposed to be reviewed at least every 10 years as part of the review of sustainable water strategies and the plan will be amended as required to reflect any update in the method. Water taken under this form of take can only be used for stock and domestic or cultural purposes and represents a relatively consistent pattern of use compared to commercial uses of water. As such, the volume of water taken is not expected to vary greatly from year to year, and the method for permitted take uses the long-term averages taken. The method for determining permitted take and actual take is fit-for-purpose for this form of take.

continued

Form of take	Method		Best available information
	Permitted take **(accredited text for 10.10(1))**	**Actual take** **(accredited text for 10.15(1))**	
Net take by commercial plantations	Net take is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present as at 30 June 2009 and from the vegetation type that was thought to be present before the commercial plantations were established. The long-term average rate of evapotranspiration is estimated using the SoilFlux model. The long-term average rate of evapotranspiration from commercial plantations present in 2009 was estimated by using the SoilFlux model with the following inputs: • areas of plantations present as at 2009 using data from the Victorian Land Use Information System (VLUIS) dataset 2009 and improved using aerial imagery and plantation industry data. This is considered the best available data of current commercial plantation conditions and best available evidence suggests that this has not changed between June 2009 and June 2016. • climate data between 1961 and 2016 from the Bureau of Meteorology The long-term average rate of evapotranspiration from plantations present before the commercial plantations were established was estimated by using the SoilFlux model with the following inputs: • Estimated land use types present prior to establishment of plantations present in 2009 using nearby land use data from the Victorian Land Use Information System (VLUIS) dataset and expert judgement. • climate data between 1961 and 2016 from the Bureau of Meteorology.		Victoria's estimate is based on modelling recently undertaken by DELWP, whereas the Basin Plan volume was an estimate prepared by the MDBA. The method is based on the SoilFlux model, which is considered to be the best available information. Changes in the extent of plantations within the Wimmera–Mallee (surface water) water resource plan area will be determined using information that is provided on an annual basis by the managers and owners of large plantation estates for bushfire and emergency management purposes. This information will be reviewed every ten years subject to any significant changes in the industry which would cause a review to occur earlier Take by this form is relatively consistent year to year, and the method uses the long-term average rate of evapotranspiration to calculate take. The method has appropriate regard to the water resources available in the water accounting period.

3.2 Matters accounted for in the permitted take method (10.12)

The matters identified in section 10.12 of the Basin Plan are accounted for in the methods proposed for determining the maximum volume of water that the plan permits to be taken for consumptive use during a water accounting period. **Table 6** outlines how the matters were taken into account (the alphabetical numbering corresponds to the paragraph numbering in Basin Plan 10.12).

10.12(1)(a) For the Wimmera-Mallee (surface water) water resource plan area and the Wimmera-Mallee (groundwater) water resource plan area, all forms of take from the SDL resource unit and all classes of water access rights are accounted for by the methods specified for the purposes of section 10.10(1) of the Basin Plan.

Table 6: Matters relating to accounting for water

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(a)	All forms of take from the SDL resource unit and all classes of water access right.	For the Wimmera–Mallee (surface water) water resource plan area all forms of take from the SDL resource unit and all classes of water access rights are accounted for by the methods specified for the purposes of 10.10(1), as detailed in Part 3.1 of this report. The classes of water access right accounted for by the methods are: • bulk entitlement, environmental entitlement and take and use licence (take from a regulated river and a watercourse) • take and use licence (runoff dams excluding basic rights) • section 8 and section 8A rights to take water (basic rights)
(b)	Water allocations that are determined in one water accounting period and used in another, including water allocations that are carried over from one water accounting period to the next (also referred to as carryover).	Carryover applies to take from a regulated river (excluding basic rights). Carryover is accurately accounted for in the model for the form of take being taken from a regulated river. Under Victorian instruments carryover is accounted for and included in the equation used by the storage manager to determine water available for take from a regulated river (excluding basic rights) for the season and set allocations as detailed in **Schedule 1** of this report. Carryover is not relevant to other forms of take.
(c)	For a surface water SDL resource unit, return flows must be taken into account in a way that is consistent with arrangements under the Murray–Darling Basin Agreement immediately before the beginning of the Basin Plan.	There are no identified return flows in the Wimmera–Mallee water resource plan area as at the time of preparing this plan. Therefore, return flows are not accounted for in the methods for determining permitted take for any forms of take.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(d)	Trade of water access rights	Trade of entitlements and allocation is only permitted in the Wimmera–Mallee system for take from a regulated river (excluding basic rights) and take from watercourses that are not regulated (excluding basic rights) within their relevant supply systems. Therefore, trade from one consumptive user to another has no impact on the volume of permitted take. The only trade that impacts on the permitted take volume for any form of take is where there is trade between consumptive use and environmental use. Any change to entitlement volumes or allocation as a result of trade is recorded in the VWR and is taken into account in the method used to determine permitted take for both forms of take, including separate accounting of held environmental water (10.12(3)). The trade of water from consumptive use to HEW or from HEW to consumptive use will not impact on the methods used to determine permitted take under section 10.10 of the Basin Plan. The net balance of any disposals or acquisitions of HEW will be used to adjust the cumulative balance.
(e)	Water resources which have a significant hydrological connection to the water resources of the SDL resource unit	Surface water transfers via infrastructure from the Glenelg system to the Wimmera–Mallee system are included in the SDL and the method for determining permitted take for regulated systems (excluding basic rights). There are no other significant hydrological connections to the water resources of the Wimmera–Mallee (surface water) water resource plan area - the Basin Plan considers this area to be disconnected from the River Murray.
(f)	Circumstances in which there is a change in the way water is taken or held under a water access right	The method used to determine permitted take for regulated rivers (excluding basic rights), includes simulation of environmental demand patterns that differ from previous consumptive demand patterns. The impacts of changes in consumptive demand patterns, e.g. as a result of any future trade or conversion of additional water savings to HEW, will be taken into account. This will be done by adjusting permitted take for trade of allocation in a single year or in updates to the method and water resource plan as a result of any permanent changes.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(g)	Changes over time in the extent to which water allocations in the unit are used. Note: Paragraph (g) includes what is commonly known as a growth-in-use strategy	Changes over time in the extent to which water allocations in the unit are utilised will be addressed through the related provisions provided for in relation to section 10.11(1) which will ensure SDL compliance. Changes to the permitted take method will be given effect consistent with the responses implemented by Victoria.
(h)	Water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water.	This matter is not relevant to the Wimmera–Mallee (surface water) water resource plan area.
(i)	Water resources which are used to manage aquifer recharge	This matter is not relevant to the Wimmera–Mallee (surface water) water resource plan area.

3.3 Demonstration of method

Section 10.10(4) of the Basin Plan requires that the Wimmera–Mallee water resource plan set out a demonstration that the method relates to the SDL of each resource unit in such a way that, if applied over a repeat of the historical climate conditions, it would result in the meeting of the SDL for the resource unit, including as amended under section 23B of the Commonwealth Water Act.

For regulated rivers (excluding basic rights), as outlined above, the average annual diversion from the scaled water resource plan model over the historical climate period from 1895 to 2009 is equivalent to the SDL, i.e. the average annual diversion from the SDL model over the same historical climate period. Therefore, the scaled water resource plan model as a method for determining permitted take for the Wimmera–Mallee (surface water) water resource plan area demonstrates that if applied for a repeat of the historical climate conditions, the method meets the SDL, see Table 2 of the Wimmera-Mallee Water Resource Plan Model report (DELWP, 2018).

In Victoria, the method for determining permitted take is the same method used for determining the SDL for all other forms of take. This means that methods are based on the same climate sequences and therefore the permitted take method would always produce the same result as the SDL model. Therefore, the requirement under section 10.10(4) of the Basin Plan is considered satisfied for all forms of surface water take.

Given that Victoria is required to run the method for permitted take on an annual basis, only the long-term average of permitted take can be compared to the SDL to demonstrate compliance with SDLs over the life of the plan. **Table 7** identifies the same volumes for SDL and long-term average permitted take on the basis that the methods for calculating permitted take and SDL are identified and are based on identical climate sequences and therefore always provide the same result.

Table 7: SDL Volume and Permitted Take Volume (10.10(4) Basin Plan)

Form of take	SDL (ML)	Long-term average permitted take (ML)
Take from a regulated river (excluding basic rights)	43,842	43,842
Take from a watercourse (excluding basic rights)	1,299	1,299
Take from a waterway under basic rights which includes: • take from a regulated river under basic rights • take from a watercourse under basic rights	1,065	1,065
Take by runoff dams (excluding basic rights)	13,100	13,100
Take by runoff dams under basic rights	11,000	11,000
Net take by commercial plantations	5,700	5,700

4. Groundwater

4.1 Determination of permitted take and actual take

4.1.1 Permitted take

10.10(4) The methods for determining permitted take for all forms of take are identical to the method for determining SDL and are based on identical climate sequences and therefore always provide the same result. **Table 10** of the Methods Report at **Appendix C** to the Wimmera-Mallee Comprehensive Report shows the volumes of SDL and permitted take to demonstrate the methods.

See **Part 4.3** of the Methods Report for groundwater at **Appendix C** to the Wimmera-Mallee Comprehensive Report for an explanation of the demonstration of the methods.

Under section 10.10 of the Basin Plan the Wimmera–Mallee Water Resource Plan is required to set out the method for determining permitted take for each form of take in the water resource plan area. The method for determining permitted take must be applied at the end of each accounting period (yearly). Actual take must be assessed against permitted take to ensure that in the long term the volume of water actually taken during the year does not exceed permitted take and therefore will not exceed the SDL.

The Basin Plan, at section 6.10, defines permitted take to be the maximum volume of water permitted to be taken by each form of take for consumptive use from the SDL resource unit. Section 6.10 defines actual take as the sum of the volume of water actually taken by each form of take for the consumptive use from the SDL resource unit.

The determination of permitted take in the Wimmera–Mallee (groundwater) water resource plan area varies depending on the form of take. **Table 8** outlines the methods used for determining permitted take for each form of take in the Wimmera–Mallee (groundwater) water resource plan area.

4.1.2 Actual take

The Basin Plan (section 10.15) requires that a water resource plan set out how the volume of water actually taken will be determined after the end of the water accounting period using the best information available.

Actual take of groundwater incorporates entitlement use as recorded in the VWR and estimates of domestic and stock use (basic rights). The method incorporates information from the VWR, which is considered to have the most accurate information regarding the inputs into the method.

Water used as part of a Managed Aquifer Recharge Scheme is not relevant to the Wimmera–Mallee (groundwater) water resource plan area.

4.1.3 Managing and determining take in the Wimmera–Mallee

In the Wimmera–Mallee (groundwater) water resource plan area there are the following forms of take:

- take from an aquifer (excluding basic rights)
- take from an aquifer under basic rights.

These forms of take are prescribed as "take from groundwater" under the Basin Plan. For this reason, the tables in this report refer to take from groundwater when providing the methods and volumes for SDL and permitted take to meet Basin Plan requirements.

4.1.3.1 Take from an aquifer (excluding basic rights)

Take from an aquifer, excluding where it is under a basic right, is managed through Victoria's entitlement framework. A water user must hold a take and use licence and a works licence to take water from an aquifer. The works licence regulates the construction, use, maintenance and alteration of the bore used to extract groundwater. The take and use licence is the water access right that authorises the maximum volume the user is permitted to take in a year. The take and use licence also prescribes the place at which groundwater may be taken, the time and rate. These conditions protect other users and the aquifer by regulating how water is extracted overall by all users to prevent third party impacts from extraction and also protect the resource and environment.

In the Wimmera–Mallee: Sedimentary Plain SDL resource unit, the water taken from Basin resources in the West Wimmera is excluded from the water resource plan and from the SDL maximum volume. The limit on the taking of groundwater from the Wimmera–Mallee: Sedimentary Plain SDL resource unit excludes groundwater taken from the component of the West Wimmera Groundwater Management Area within the Murray–Darling Basin (see **Figure 1**). This volume is estimated to be 3.2 GL. (Victoria's section 71 report for 2017-18) The amount may vary due to trade within the West Wimmera Groundwater Management Area but is not expected to increase markedly, due to the poor quality of groundwater in the area.[2]

4.1.3.2 Take from an aquifer under basic rights.

Basic rights are defined under the Basin Plan to include rights to take water for domestic and stock purposes and a native title right. Basic rights are prescribed in section 8 and 8A of the Victorian Water Act.

Under section 8, water users have a right to take water, free of charge, from a bore for domestic and stock purposes under prescribed circumstances (see **Part 6.2** of the Wimmera-Mallee Water Resource Plan for detail on basic rights). In general terms, people or businesses can exercise that right if they own the land on which the bore is located.

Take under section 8 is generally not metered and the volume of take is unknown. Take under this right may be metered in circumstances where bores are used to take water for other purposes under an entitlement in addition to water taken under section 8. In these cases, a meter may be attached to the works; however, where the works only provide for take for domestic and stock rights there is no requirement to install a meter to monitor volumes of take. Take under basic rights is relatively small because water taken under this right cannot be used for commercial purposes including irrigation.

The right of Traditional Owners to take water under section 8A aligns with the requirements under section 8 regarding the circumstances in which the right to take can be exercised. Traditional Owner rights to take water under section 8A are outlined in more detail at **Part 6.2.2** of the Comprehensive Report. At the time of making this report there are no circumstances of Traditional Owner groups exercising this right in the Wimmera–Mallee water resource plan area. However, this may change as a result of the implementation of the Aboriginal Water Policy outlined in *Water for Victoria*.

2 *CSIRO and SKM, 2010, Sustainable extraction limits derived from the Recharge Risk Assessment Method – Victoria. CSIRO:Water for a Healthy Country National Research Flagship*

4.1.4 Methods

The methods for determining permitted take and actual take of groundwater in the Wimmera–Mallee water resource plan area apply to the following forms of take in the following SDL resource units:

- Wimmera–Mallee: Highlands
- Wimmera–Mallee: Sedimentary
- Wimmera–Mallee: deep

Table 8: Methods for determining permitted take and actual take—groundwater

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	Actual take 10.15(1) Basin Plan	
Wimmera–Mallee: Highlands SDL resource unit			
Take from groundwater (excluding basic rights)	Permitted take is equal to the SDL for the Wimmera–Mallee: Highlands SDL resource unit as prescribed in schedule 4 of the Basin Plan minus the annual permitted take volume for take from groundwater under basic rights.[1]	Determined using entitlement data from all forms of take except basic rights use, on the VWR, based on the location of licensed and registered bores in the water resource plan SDL reporting area.	Permitted take for groundwater SDL resource units is determined by the SDL prescribed for the SDL resource unit. This method is considered the most appropriate method for the Wimmera–Mallee water resource plan as further work is required to determine the most appropriate and cost-effective means for determining permitted take for groundwater. The SDL volume for take from groundwater under basic rights is determined in accordance with the method described in this Table. The method reflects the volume specified in Table 4 of this Report. The method is fixed as at 30 June 2010. Further consultation is occurring between Basin states and the MDBA to progress the development of permitted take methods. In the absence of these methods, it has been agreed between Victoria and the MDBA to rely on SDL volumes for the respective SDL resource unit for setting permitted take. Actual take reflects entitlements in Victoria as this is how a user is authorised to take water in a given accounting period. Therefore, the water actually taken is equal to the water taken under entitlement for this form of take. The best available information in relation to entitlement use that is metered and recorded in the VWR.

continued

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	Actual take 10.15(1) Basin Plan	
Take from groundwater under basic rights	Estimated based on the number of bores in the SDL resource unit less than 30 years old[2] with a rate of 2 ML/year[3] calculated as at 30 June 2010. The volumetric output from this method is outlined in Table 4 of this Report.		The method to determine permitted take and actual take is the same method used to determine the SDL for take from groundwater under basic rights for the Wimmera-Mallee: Highlands SDL resource unit. The volumetric output from this method is outlined in Table 4 of this Report. This estimate is considered to be based on the best available information. Victoria's assessment of bores and reasonable domestic and stock use identified: • 2 ML/year as a reasonable volume for domestic and stock users and is expected to be sufficient on average to allow for any uptake of Traditional Owner rights as permitted under basic rights • bores older than 30 years are considered to be non-functional and are excluded from the estimation (calculated as at 30 June 2010)
Wimmera–Mallee: Sedimentary Plain SDL resource unit			
Take from groundwater (excluding basic rights)	Permitted take is equal to the SDL for the Wimmera–Mallee: Sedimentary Plain SDL resource unit as prescribed in schedule 4 of the Basin Plan minus the annual permitted take volume for take from groundwater under basic rights.[4] The reduction in the SDL to account for the West Wimmera (as defined in Schedule 4 of the Basin Plan) is determined using entitlement data on the Victorian Water Register, based on the location of licensed bores.[5]	Determined using entitlement data from all forms of take except Basic Rights use, on the VWR, based on the location of licensed and registered bores in the water resource plan SDL reporting area (excluding bores in the West Wimmera Groundwater Management Area that are also in the Basin)	Permitted take for groundwater SDL resource units is determined by the SDL prescribed for the SDL resource unit. This method is considered the most appropriate method for the Wimmera–Mallee water resource plan as further work is required to determine the most appropriate and cost-effective means for determining permitted take for groundwater. The SDL volume for take from groundwater under basic rights is determined in accordance with the method described in this Table. The method reflects the volume specified in Table 4 of this Report. The method is fixed as at 30 June 2010. Further consultation is occurring between Basin states and the MDBA to progress the development of permitted take methods. In the absence of these methods, it has been agreed between Victoria and the MDBA to rely on SDL volumes for the respective SDL resource unit for setting permitted take. Actual take reflects entitlements in Victoria as this is how a person is authorised to take water in a given accounting period. Therefore, the water actually taken is equal to the water taken under entitlement for this form of take. The best available information in relation to entitlement that is metered and recorded in the VWR. A map showing the West Wimmera is provided at Figure 1 of this report.

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	**Actual take 10.15(1) Basin Plan**	
Take from groundwater under basic rights	Estimated based on the number of bores in the SDL resource unit less than 30 years old with a rate of 2 ML/year (excluding those bores in the West Wimmera GMA) calculated as at 30 June 2010. The volumetric method is outlined in Table 4 of this Report.	Estimated based on the number of bores in the SDL resource unit less than 30 years old with a rate of 2 ML/year (excluding those bores in the West Wimmera GMA) calculated as at 30 June 2010.	The method to determine permitted take and actual take is the same method used to determine the SDL for take from groundwater under basic rights for the Wimmera-Mallee: Sedimentary Plain SDL resource unit. The volumetric output from this method is outlined in Table 4 of this Report. This estimate is considered to be based on the best available information. Victoria's assessment of bores and reasonable domestic and stock use identified: • 2 ML/year as a reasonable volume for domestic and stock users and is expected to be sufficient on average to allow for any uptake of Traditional Owner rights as permitted under basic rights • bores older than 30 years are considered to be non-functional and are excluded from the estimation (calculated as at 30 June 2010).
Wimmera–Mallee: deep SDL resource unit			
Take from groundwater (excluding basic rights)	Permitted take is equal to the SDL for the Wimmera–Mallee: Deep SDL resource unit as prescribed in schedule 4 of the Basin Plan minus the annual permitted take volume for take from groundwater under basic rights.[6]	Determined using entitlement data from all forms of take except Basic Rights use, on the VWR, based on the location of licensed and registered bores in the SDL resource unit.	Permitted take for groundwater SDL resource units is determined by the SDL prescribed for the SDL resource unit. This method is considered the most appropriate method for the Wimmera–Mallee Water Resource Plan as further work is required to determine the most appropriate and cost-effective means for determining permitted take for groundwater. The SDL volume for take from groundwater under basic rights is determined in accordance with the method described in this Table. The method reflects the volume specified in Table 4 of this Report. The method is fixed as at 30 June 2010. Further consultation is occurring between Basin states and the MDBA to progress the development of permitted take methods. In the absence of these methods, it has been agreed between Victoria and the MDBA to rely on SDL volumes for the respective SDL resource unit for setting permitted take. Actual take reflects entitlements in Victoria as this is how a user is authorised to take water in a given accounting period. Therefore, the water actually taken is equal to the water taken under entitlement for this form of take. The best available information in relation to entitlement use that is metered and recorded in the VWR.

continued

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	Actual take 10.15(1) Basin Plan	
Take from groundwater under basic rights	Estimated based on the number of bores in the SDL resource unit less than 30 years old with a rate of 2 ML/year calculated as at 30 June 2010. The volumetric method is outlined in Table 4 of this Report.		The method to determine permitted take and actual take is the same method used to determine the SDL for take from groundwater under basic rights for the Wimmera-Mallee: deep SDL resource unit. The volumetric output from this method is outlined in Table 4 of this Report. This estimate is considered to be based on the best available information. Victoria's assessment of bores and reasonable domestic and stock use identified: • 2 ML/year as a reasonable volume for domestic and stock users and is expected to be sufficient on average to allow for any uptake of Traditional Owner rights as permitted under basic rights • bores older than 30 years are considered to be non-functional and are excluded from the estimation (calculated as at 30 June 2010)

1 The relevant SDL for take from groundwater under basic rights is outlined in Table 4 of this report.

2 Based on SKM 2012, An assessment of groundwater management and monitoring costs in Australia, Waterlines report, National Water Commission, Canberra. This considers observation bores; however, the typical domestic and stock bores installed more than two decades ago are mild-steel cased and have similar life expectancies to monitoring bores.

3 For examples see SKM, CSIRO and the Bureau of Rural Sciences 2010, Surface and/or groundwater interception activities: initial estimates, Waterlines report, National Water Commission, Canberra.

4 The relevant SDL for take from groundwater under basic rates is outlined in Table 4 of this report.

5 The limit on the taking of groundwater (licensed and domestic and stock) from the area of the Victorian West Wimmera Groundwater Management Area in the Murray Darling Basin (see Figure 1) under the Victorian Water Act is 3.2 GL (Victoria's section 71 report for 2017-18). The volume may vary due to trade within the West Wimmera Groundwater Management Area but is not expected to increase markedly, due to the poor quality of groundwater in the area (CSIRO and SKM 2010)

6 The relevant SDL for take from groundwater under basic rights is outlined in Table 4 of this report.

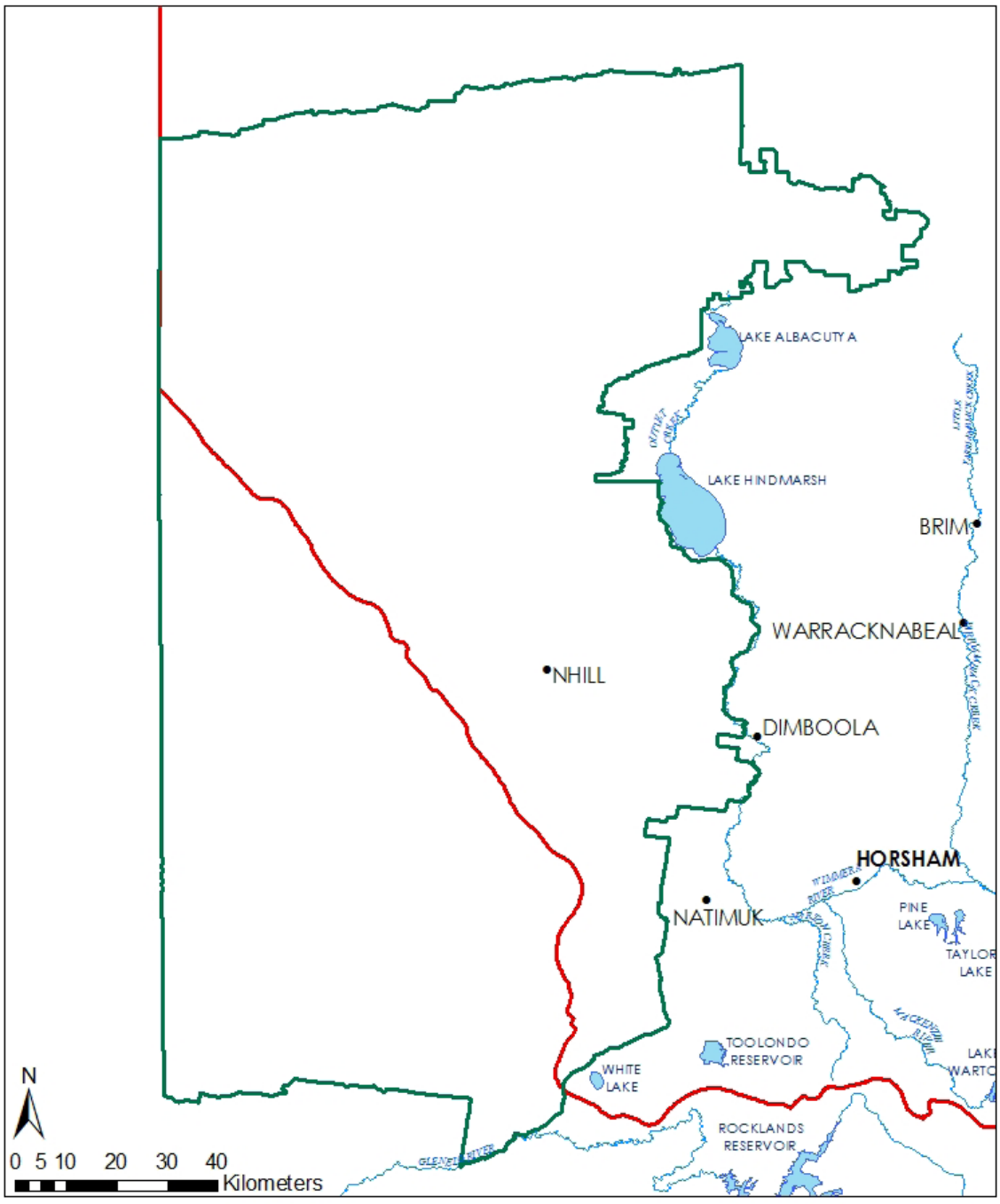


Figure 1: West Wimmera Groundwater Management Area and Wimmera-Mallee water resource plan Groundwater SDL boundary

4.2 Matters accounted for in the permitted take method (10.12)

The matters outlined in section 10.12 of the Basin Plan are accounted for in the methods proposed for determining the maximum volume of water that the plan permits to be taken for consumptive use during a water accounting period (the alphabetical numbering corresponds to the paragraph numbering in BP 10.12.

Table 9: Matters relating to accounting for water

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(a)	All forms of take from the SDL resource unit and all classes of water access right	All forms of take from the SDL resource unit and all classes of water access rights are accounted for by the methods specified for the purposes of 10.10(1). A different method has been developed for each form of take being taken from groundwater (excluding basic rights) and from groundwater under basic rights, as detailed in Part 4.1 of this report. The classes of water access right accounted for by the methods are: • take and use licences (take from groundwater) • section 8 and section 8A rights (take from groundwater under basic rights)
(b)	Water allocations that are determined in one water accounting period and used in another, including water allocations that are carried over from one water accounting period to the next (also referred to as carryover)	Carryover of groundwater take is permitted in some groundwater management areas and is recorded in the VWR. Carryover is considered to be taken into account in the method for annual permitted take as permitted take reflects the long-term average determined as the SDL for the relevant SDL resource unit. Victoria and the MDBA consider that the most appropriate method for determining permitted take for groundwater is to state that permitted take equals SDL. Carryover does not affect the method for permitted take as it reflects the long-term average take represented by SDL. Therefore, while it is "accounted for" in the method, it will not result in variations to the method to adjust annually for carryover as it occurs.
(c)	For a surface water SDL resource unit, return flows must be taken into account in a way that is consistent with arrangements under the Murray–Darling Basin Agreement immediately before the beginning of the Basin Plan	This matter is not relevant for the Wimmera–Mallee (groundwater) water resource plan area.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(d)	Trade of water access rights	Trade of entitlements to take and use groundwater is permitted in the water resource plan and is accounted for in the groundwater statutory and local management plans. Groundwater is not held under an entitlement for the environment and therefore the requirement in section 10.12(3) is not relevant for the Wimmera–Mallee (groundwater) water resource plan area. Therefore, the only trade that affects the SDL method for permitted take (based on the long-term average take) is trade between SDL resource units. Trade has been taken into account as it is permitted in the Wimmera-Mallee water resource plan area, however does not require an annual adjustment to the method for permitted take. This is because the permitted take reflects the long-term average level of take and trade cannot change the maximum volume of take permitted in the relevant system.
(e)	Water resources which have a significant hydrological connection to the water resources of the SDL resource unit	This matter is not relevant to the Wimmera–Mallee (groundwater) water resource plan area as any significant hydrological connections identified in response to section 10.05(b) of the Basin Plan were taken into account when determining the relevant SDL. For groundwater take, permitted take equals SDL for the relevant form of take and relevant SDL resource unit. While there is a significant connection between Victoria and South Australia across the Tertiary Limestone Aquifer (identified in response to section 10.05(b) of the Basin Plan), it is not relevant to the determination of permitted take as the connectivity informed the determination of the SDL for the Wimmera-Mallee: Sedimentary Plain SDL resource unit. The groundwater SDL does not include groundwater take within the West Wimmera groundwater management area (GMA), because the groundwater resources in the West Wimmera GMA have been excluded from the water resources of the Murray-Darling Basin under the Water Regulations 2008). This is due to the groundwater resources within the West Wimmera GMA being only remotely hydrologically connected to the River Murray and disconnected to surface ecosystems in the Murray-Darling Basin. See **Figure 1**.
(f)	Circumstances in which there is a change in the way water is taken or held under a water access right	This matter is not relevant to the Wimmera–Mallee (groundwater) water resource plan area.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(g)	Changes over time in the extent to which water allocations in the unit are used. Note: Paragraph (g) includes what is commonly known as a growth-in-use strategy.	This matter is not relevant for the Wimmera–Mallee (groundwater) water resource plan area. The SDL method for permitted take allows for growth as full utilisation of existing licences is well below SDL and therefore growth in use is permitted up to this prescribed limit.
(h)	Water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water	This matter is not relevant to the Wimmera–Mallee (groundwater) water resource plan area as there is no water sourced from the Great Artesian Basin.
(i)	Water resources which are used to manage aquifer recharge	This matter is not relevant for the Wimmera–Mallee (groundwater) water resource plan area. Currently there are no Managed Aquifer Recharge schemes operating or proposed in the Wimmera–Mallee (groundwater) water resource plan area.

4.3 Demonstration of method

Section 10.10(4) of the Basin Plan requires that the Wimmera–Mallee Water Resource Plan set out a demonstration that the method relates to the SDL of each SDL resource unit in such a way that, if applied over a repeat of the historical climate conditions, it would result in the meeting of the SDL for the SDL resource unit, including as amended under section 23B of the Commonwealth Water Act.

The demonstration or explanation as to how this requirement has been met is outlined in **Table 9** above for each method outlined in this report. **Table 8** relates to the methods for determining permitted take for groundwater forms of take.

Given that Victoria is required to run the method for permitted take on an annual basis, only the long-term average of permitted take can be compared to the SDL to demonstrate compliance with SDLs over the life of the plan. **Table 10** identifies the same volumes for SDL and long-term average permitted take on the basis that the methods for calculating permitted take and SDL are identified and are based on identical climate sequences and therefore always provide the same result.

Table 10: SDL volume and permitted take volume (10.10(4) Basin Plan)

Form of take	SDL (ML)	Long-term Average Permitted take (ML)
Wimmera–Mallee: Highlands SDL resource unit		
Take from groundwater (excluding basic rights)	2,575	2,575
Take from groundwater under basic rights	175	175
Wimmera–Mallee: Sedimentary Plain SDL resource unit		
Take from groundwater (excluding basic rights)	189,284*	189,284*
Take from groundwater under basic rights	816	816
Wimmera–Mallee: deep SDL resource unit		
Take from groundwater (excluding basic rights)	20,000	20,000
Take from groundwater under basic rights	0	0

* The limit on the taking of groundwater (licensed and domestic and stock) from the area of the Victorian West Wimmera Groundwater Management Area in the Murray Darling Basin (see Figure 1) under the Victorian Water Act is 3.2 GL (Victoria's section 71 report for 2017-18). The volume may vary due to trade within the West Wimmera Groundwater Management Area but is not expected to increase markedly, due to the poor quality of groundwater in the area (CSIRO and SKM 2010).

5. References

DELWP. (2018). *Wimmera-Mallee Water Resource Plan Model*. Melbourne: Department of Environment, Land, Water and Planning.

RMCG. (2011). *Stock and Domestic Water Use Modelling Resource Manager's Handbook*. Melbourne: Department of Environment, Land, Water and Planning.

Schedule 1: Wimmera–Mallee system allocation rules for regulated rivers

Extract of clause 2 and 3 of schedule 2 of the storage manager appointment instrument.

2. MAKING WATER ALLOCATIONS

2.1 In July and in each subsequent month until the maximum allocation for entitlements in Table 1 of this Schedule is reached, or at such other times as the storage manager believes it to be required, the storage manager must determine the water available to meet the entitlements in Table 1 of this Schedule, and bulk entitlement holders' share of that water in accordance with the following steps.

2.2 To determine the water available to meet entitlements, the storage manager must take the resources that could be diverted from the Wimmera–Mallee system, determined in accordance with clause 3 of this Schedule.

2.3 The storage manager must –

(a) use the water available as determined in accordance with sub-clause 2.2 to determine the water allocation to entitlement holders; and

(b) inform the entitlement holders of the water allocation determined under paragraph 2.3(a), and at the same time make available the method and calculations and any other information used to determine the water allocation.

Table 1: Shares of water available

Water available (ML)	A	B	C	D	E	F
	126,050	98,050	75,971	53,459	45,253	0
Grampians Wimmera Mallee Water						
System operating water:						
Pipeline and balancing storage losses	2,960	2,960	2,960	2,960	2,960	0
Commonwealth Environmental Water Holder	28,000	0	0	0	0	0
Glenelg compensation flow	3,300	3,300	825	50	50	0
Recreation	3,090	3,090	648	0	0	0
Wimmera–Mallee Pipeline Product	44,720	44,720	36,352	25,725	21,540	0
Coliban Water						
Wimmera–Mallee Pipeline Product	300	300	244	173	145	0
Wannon Water						
Wimmera–Mallee Pipeline Product	2,120	2,120	1,723	1,220	1,021	0
Environment						

continued

Water available (ML)	A	B	C	D	E	F
	126,050	98,050	75,971	53,459	45,253	0
Wetlands	1,000	1,000	250	0	0	0
Wimmera–Mallee Pipeline Product	40,560	40,560	32,970	23,332	19,537	0

Notes to Table 1:

- If the volume of water available is greater than shown for column A, the share is equal to the volume shown in column A.
- If the volume of water available is between any two columns, the share is linearly interpolated between the shares in the adjacent columns. For example, if there is 60,000 ML of water available (between columns C and D), Wannon Water's share is equal to: [(1,723-1,220)x(60,000-53,459)/(75,971-53,459)]+1,220 = 1,366 ML. The calculation is to be rounded to the nearest whole number.

3. THE RESOURCES THAT COULD BE DIVERTED IN THE CURRENT YEAR

3.1 The storage manager must, in determining water allocations, make an assessment of the resources that could be diverted from the headworks in the current year using the method outlined in Table 2 of this Schedule.

Table 2: Method for estimating the resources that could be diverted

Available water in month i	=	measured total volume in headworks at the start of month i
	-	estimate of total dead storage
	-	the volume of carryover and any accumulated passing flows defined under the schedule 1 of the Wimmera and Glenelg Rivers Environmental Entitlement Order 2010
	+	an estimate of harvestable inflows and pick-up from start of month i to 30 June next
	+	the measured total amount of water released from headworks from 1 July last to the start of month i
	-	the volume of reserve
	-	the estimated headworks losses from the start of month i to 30 June next

3.2 In making the assessment in sub-clause 3.1, the storage manager must –

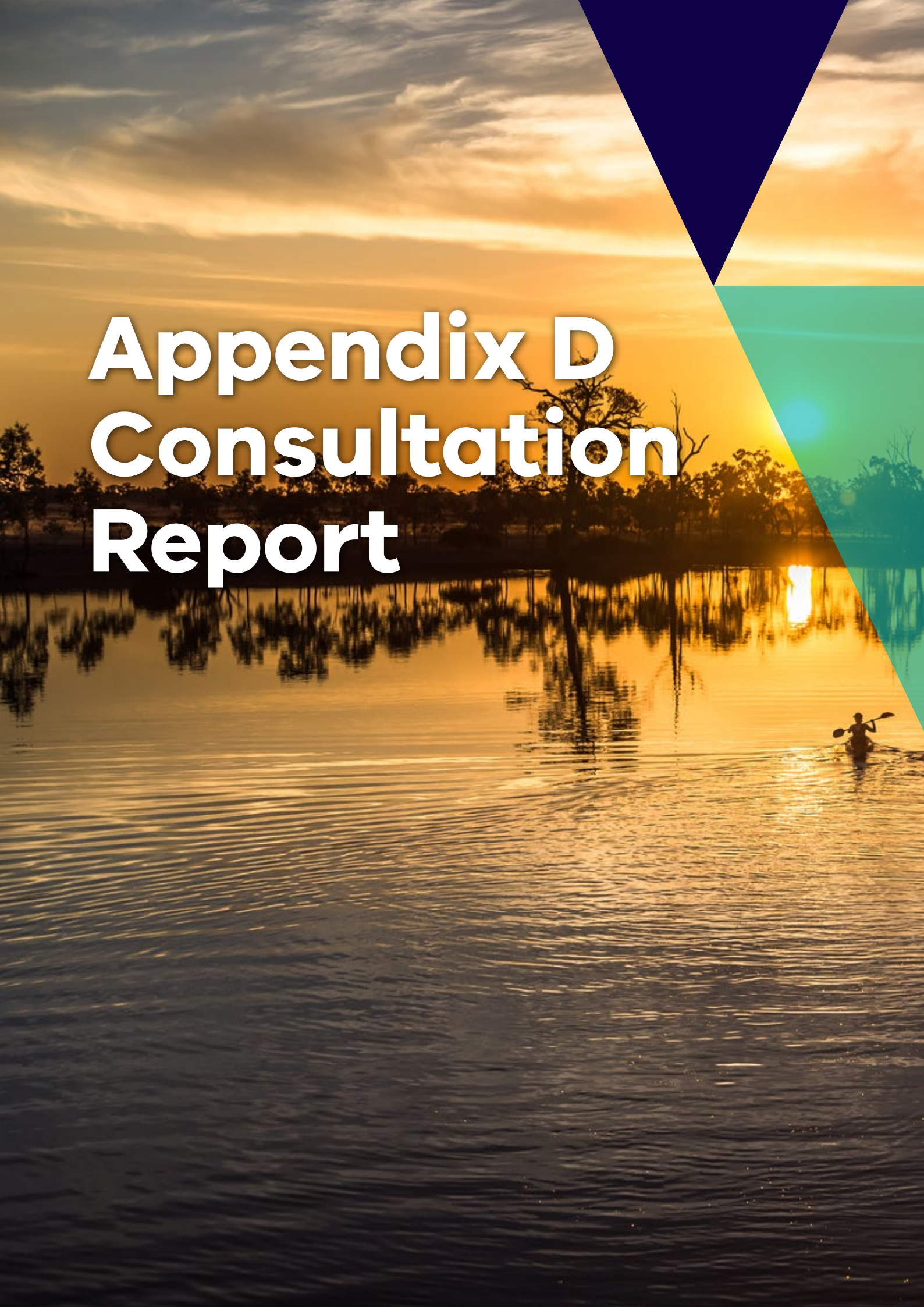
(a) reach agreement with all entitlement holders on the method used to calculate –

(i) the estimated harvestable inflows and pick-up;

(ii) the estimates of headworks losses; and

(iii) the estimated dead storage,

(b) make available to all entitlement holders the information used to apply the method.



Appendix D Consultation Report

Contents

The Victorian Government consulted and worked with stakeholders, including the broader community and Traditional Owners, to develop the Wimmera–Mallee Water Resource Plan.

About this report

This report outlines the consultation carried out for the Wimmera–Mallee Water Resource Plan including:

- consultation for the risk assessment
- stakeholder engagement before the release of the draft plan in May 2017
- Traditional Owner engagement throughout the development of the draft and final plan
- community consultation during the formal public submission period
- how feedback in submissions was incorporated into the final Wimmera–Mallee Water Resource Plan
- follow-up consultation before the final plan was given to the Murray–Darling Basin Authority.

The report includes some discussion about consultation carried out during 2015–16 for the development of *Water for Victoria*, specifically about the emerging Victorian Aboriginal Water Policy. This consultation is relevant as the Basin Plan requirements for water resource plans helped to drive development of the Victorian Aboriginal Water Policy that was finalised in October 2016.

1. Introduction

1.1 Wimmera–Mallee Water Resource Plan

The Wimmera–Mallee Water Resource Plan demonstrates how Victoria will meet the requirements identified in the Basin Plan for the Wimmera–Mallee region, by bringing together existing arrangements from bulk water and environmental entitlements, groundwater management plans, sustainable water strategies and other legal instruments. It also outlines and starts to build on the Victorian Government's Aboriginal Water Policy.

The Wimmera–Mallee Water Resource Plan includes the Wimmera, Avon–Richardson and Avoca river systems and all groundwater beneath these rivers. These river systems extend from the Grampians (*Gariwerd*) and the Pyrenees, flowing north but ending – at Lake Tyrrell from the Avoca River, and Lake Albacutya for the Wimmera, before reaching the River Murray[1].

Lake Hindmarsh and the Ramsar site of Lake Albacutya are significant wetlands, and the Wimmera–Mallee pipeline supports a large collection of wetlands east of these lakes.

The Wimmera–Mallee Water Resource Plan was prepared by the Department of Environment, Land, Water and Planning (DELWP).

1.2 Changes through the Wimmera–Mallee Water Resource Plan

The Wimmera–Mallee Water Resource Plan makes no changes to Victoria's water management framework. It proposes that some existing instruments be revised and improved to address high or medium risks identified in developing this plan.

Any necessary changes to individual instruments will be made under Victoria's legislative framework, following stakeholder consultation.

In 2013, the Commonwealth Government bought the entire water entitlement of 28 gigalitres (GL) from the Wimmera irrigation district to provide environmental water to the Wimmera River for Lake Hindmarsh and Lake Albacutya. The irrigation entitlements bought by the Commonwealth deliver the 23 GL of long-term annual average water to the environment and fulfil the water recovery requirement of the Basin Plan for the Wimmera–Mallee surface water resource plan area.

As a result, sustainable diversion limits (SDLs) for this area have already been met and no further water recovery is required.

1 Victoria's water resource plans use the name 'River Murray' because Victoria's legislation and instruments refer to it as such. We recognise colloquially that Victorians refer to the river as the Murray or the Murray River.

Table 1: Wimmera–Mallee Water Resource Plan: Stages of delivery

Stage	Actions
Risk Assessment 2015–16	• Working group formed • Advisory panel appointed • Working group and advisory panel meetings held • Preliminary risk assessment released to inform water resource plan • Traditional Owner engagement started
Draft Water Resource Plan 2016–17	• Coordination working group formed • Technical advisory group appointed • Stakeholder briefings began • Traditional Owner engagement and capacity-building continued • Aboriginal Waterway Assessments expression of interest process and implementation began • Stakeholder briefings continued • Draft released for public comment and submissions process
Final Water Resource Plan 2017–18	• Submissions and public meeting feedback addressed • Water resource plan finalised and submitted • Review required following Murray Lower Darling Rivers Indigenous Nations (MLDRIN) assessment
Resubmission to Murray-Darling Basin Authority (MDBA) 2019	• Water Resource Plan submitted following review and update of Traditional Owner content.

2. Wimmera–Mallee Water Resource Plan consultation approach

Victoria's water resource plans propose that our state's existing tools and instruments are the primary mechanism to deliver the Basin Plan requirements. Discussion and feedback in the Wimmera–Mallee tested this approach.

Water and how it is allocated and managed touches the lives of every person, including

- people who live in towns
- Traditional Owners and Aboriginal communities who have a deep connection with their landscape and commitment to Country
- industries depending on water sources and their workers who depend on continuing employment
- people who fish, boat and swim on lakes and river systems
- farmers who rely on water for their livelihood and to produce food
- people who advocate for the environment.

The Wimmera–Mallee Water Resource Plan does not propose changing Victoria's water entitlement and management frameworks. Recognising the critical role of water in the lives of people in the region, development of the Wimmera–Mallee Water Resource Plan included targeted stakeholder engagement with people representing local government and agriculture, water and catchment managers, Traditional Owners, environmental groups, recreation users as well as broader community consultation.

A new development within the plan was to identify the water objectives and outcomes of Traditional Owners.

As a result of the historical exclusion of Traditional Owners from water ownership and management, a number of very high risks to the availability and condition or quality of surface water to support Aboriginal beneficial uses have been identified in the risk assessment for the Wimmera–Mallee Water Resource Plan (see **Appendix B**).

The Aboriginal Water Policy in *Water for Victoria* is the main strategy provided to address risks to Aboriginal values and uses in the water entitlement and management framework. This means that the Wimmera–Mallee Water Resource Plan recommits the Victorian Government to implementing this policy and all related actions to meet its obligations under the Basin Plan.

Once this water resource plan is accredited, Victoria will be required to report each year on the effectiveness of this risk strategy. Risk strategies can be revised if necessary, but any material changes to a strategy will require an amendment to the water resource plan (see **Part 1.5** of the plan for details).

When preparing the approach to consultation, the Wimmera–Mallee Water Resource Plan took into account the extent of change the plan would represent to stakeholders across the region.

This approach:

- sought to make sure target audiences understood the role of the Wimmera–Mallee Water Resource Plan, including timing
- outlined what changes were being proposed as part of the water resource plan process

- explained how the Basin Plan impacted on the Wimmera–Mallee region
- confirmed what was in scope for negotiation within the Wimmera–Mallee Water Resource Plan.

2.1 Cascading engagement

The consultation approach was based on four tiers of engagement:

1. Technical contributions and advice from delivery partners, government and peak bodies

- Engaging with delivery partners, DELWP, other sectors of the Victorian Government, the Murray–Darling Basin Authority and peak bodies including Murray Lower Darling Rivers Indigenous Nations (MLDRIN), the Victorian Farmers Federation (VFF), VicWater, the Wimmera Development Association and Environment Victoria to:
  - recognise and respond to change and risk
  - assess existing arrangements and determine where change is required
  - understand obligations and make sure they are met.

2. Testing with primary stakeholders

- Taking new policy recommendations or results of work to primary stakeholders, including an advisory panel, for decision making to:
  - acknowledge current conditions and concerns
  - test preferred ways of contact
  - adjust approaches to meet expectations.

3. Engaging with primary and secondary stakeholders

- Engaging collaboratively with key stakeholders to:
  - build better understanding of different needs
  - identify opportunities and gaps in the Wimmera–Mallee Water Resource Plan
  - comment on risks and responses.

4. Consulting with and informing the general public

- Providing information and opportunities for the general public to contribute, and using a plain English approach, communicate the essence of complex water resource plans in a summary document, social media and web text to:
  - provide information and seek comment on areas of interest
  - explain the Victorian water entitlement and management framework, and the relevance of the Basin Plan for the Wimmera–Mallee region
  - demonstrate and maintain the Victorian Government's position on water management.

2.1.1 Consultation objectives

Consultation and engagement in the Wimmera–Mallee aimed to recognise and respond to the importance of water to community members.

Objectives included:

- providing opportunities for stakeholders to discuss and comment on key risks and themes
- making information available to the wider community to comment on areas of interest
- making sure water resource plans contributed to a better understanding of Victoria's water entitlement and management framework by providing clear descriptions of the state's instruments and how they relate to each other
- consistently explaining and applying the Victorian Government's policy position on water management in consultation and communication materials
- making sure stakeholders and community members received information in time to consider it and respond.

2.1.1.1 Increasing understanding

One of the difficulties of Victoria's water entitlement and management framework is its complexity. The release of the draft Wimmera–Mallee Water Resource Plan was accompanied by supporting materials that included a summary document to help inform the public and clarify what the plan entailed.

2.1.1.2 Emerging policy

Engagement with Traditional Owners was a major focus during the development of the plan because knowledge and understanding of Traditional Owner water objectives and outcomes is a significant gap in Victoria's water management arrangements. Initially the approach was driven by the *Water for Victoria* policy development and engagement that was led through drawing up that statewide policy.

The water resource plan sought to build on Victoria's statewide policy by engaging with Traditional Owners within the Wimmera–Mallee area and collaborating with other parts of DELWP responsible for putting the Aboriginal Water Policy into action.

The engagement approach has been adapted to the needs, capacity and interests of each Traditional Owner and Nation group, while seeking to remain consistent with the principles and guidelines adopted by MLDRIN for the Basin Plan.

These include the:

- Murray–Darling Basin Authority (MDBA) Part 14 Guidelines
- Convention on Biological Diversity Akwé: Kon Guidelines
- United Nations Declaration on the Rights of Indigenous Peoples
- MDBA Position Statement 14A: Aboriginal objectives and outcomes:
  - a planned approach to properly engaging Traditional Owners (e.g. adequate time, appropriate venues and resources)
  - identification and involvement of appropriate Traditional Owners
  - Traditional Owners are properly notified of the opportunity to be involved in the water resource planning process (e.g. print, phone, electronic and personal media and town meetings)
  - clear information about water resource planning processes and content is provided to Traditional Owners
  - use of appropriate tools and mechanisms for recording and understanding Aboriginal objectives and outcomes.
- Murray–Darling Basin Authority Handbook for Practitioners.

Further details are provided for each relevant Traditional Owner and Nation group in section 8.

3. Preliminary Risk Assessment 2015–16

The risk assessment for the Water Resource Plan was developed through consultation with an advisory panel for the assessment and a DELWP working group. This work aimed to improve the quality of the risk assessment and to assist with the next engagement processes required as water resource plans were developed.

- DELWP working group: made up of leaders in policy areas in DELWP, with skills and responsibilities in surface water policy, interception (farm dams, and forestry), climate change, groundwater, water quality and drought. It provided preliminary review and contributions to data, methods and project outcomes.
- Risk assessment advisory panel: set up to review and provide high-level advice as the risk assessment was done.

Table 2: Wimmera–Mallee Water Resource Plan Risk Assessment Advisory Panel members

Organisation	Representative
DELWP	Chris McAuley (chair)
DELWP	Amber Clark
DELWP	Adrian Spall
DELWP	Dr Grace Mitchell
Goulburn Broken Catchment Management Authority	Chris Norman
Goulburn-Murray Water	Graeme Hannan
GWMWater	Andrew Barton
Mallee Catchment Management Authority	Jenny Collins
MLDRIN	Will Mooney
MLDRIN	Darren Perry
North Central Catchment Management Authority	Brad Drust
North East Catchment Management Authority	Catherine McInerney
Victorian Environmental Water Holder	Tori Perrin
Victorian Farmers Federation	Richard Anderson (observer)
VicWater	James Cleaver
Wimmera Catchment Management Authority	Greg Fletcher

3.1 Workshops

Workshops were held for the advisory panel to provide high-level guidance and endorsement of the risk assessment process in workshop one and the risk assessment outcomes in workshop two.

Workshop one held on 11 February 2016 sought agreement and endorsement from the advisory panel on:

- the context of the risk assessment
- the list of real, possible or perceived risks to be considered
- an approach to assess the likelihood and consequence of each identified risk
- any following work or processes for resolving identified issues.

Workshop two held on 15 April 2016 was to:

- discuss the draft application of the risk assessment
- review, refine if necessary, and endorse the draft assessment of major risks to be addressed in each water resource plan - noting that further approval was required within DELWP before submission of the first draft to the MDBA for comment and release for stakeholder discussion
- determine a pathway to resolve anomalies.

Main statements endorsed by the advisory panel at the completion of workshop two, subject to comments being addressed, were:

- the risk-based approach was consistent with risk principles
- documentation of the work was appropriate and adequately detailed the process
- the scenarios were suitable for further consultation, with agreed clarifications
- the revised risk assessment method was fit for purpose
- the risk assessment outcomes were fit for purpose for consultation.

Minutes of both workshops were documented and circulated to all who attended.

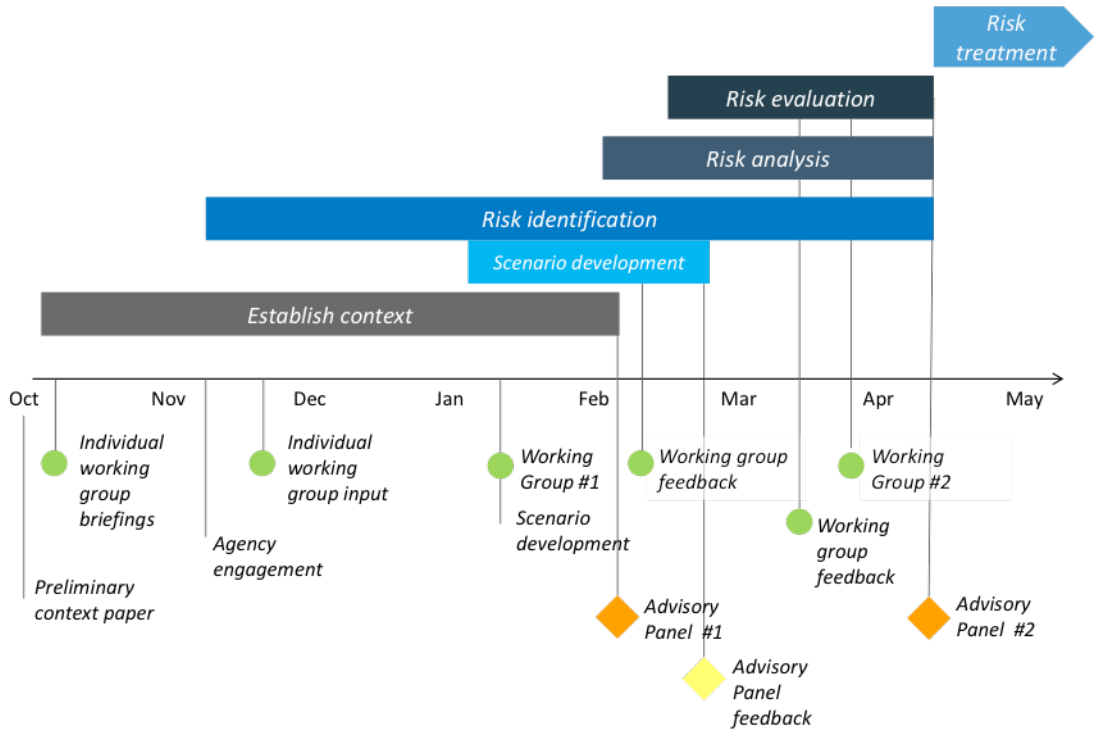


Figure 2: Chronology of project engagement (below the line) and alignment with stages of the risk assessment (above the line) for 2016–17

4. Traditional Owner values and uses: early discussions with peak bodies during 2016

During 2016, DELWP met Traditional Owner groups about the formation of the *Water for Victoria* Aboriginal Water Policy. While this was not directly consultation about water resource plans, it certainly had the relevant Basin Plan requirements in mind as the policy was being developed.

MLDRIN was engaged in the development of *Water for Victoria*, including as a member of the Victorian Aboriginal Water Reference Group set up as part of the policy consultation.

DELWP's Rural Water Programs Team presented to MLDRIN's board and full membership and provided updates on pilot projects that were informing the development of Victoria's Aboriginal Water Policy, and on DELWP's Aboriginal Inclusion Plan. DELWP had initial discussions with MLDRIN about establishing an Aboriginal Water Reference Group specially for water resource plans. In July 2016, Rural Water Programs proposed establishing an Aboriginal Working Group which would meet around six times a year.

In May 2016 the Victorian Government agreed to fund six Aboriginal Waterway Assessments through its water resource plans at locations decided through an expression of interest process run by MLDRIN. The Aboriginal Waterway Assessment tool has been designed to help Traditional Owners assess the cultural health of their Country and set priorities for environmental water delivery.

While these assessments are not specifically designed to contribute to water resource plans, it was hoped they would help relevant Traditional Owners discuss their water objectives and outcomes and produce targeted information for the water resource plans. The Barendgi Gadjin Land Council completed an Aboriginal Waterway Assessment on the Wimmera River and findings were relevant to the Wimmera-Mallee Water Resource Plan.

When *Water for Victoria* was released, discussions with MLDRIN's chair at the time, Darren Perry, recommended testing the potential of expanding the Aboriginal Water Reference Group to include Traditional Owners outside Victoria's share of the Basin.

Regular meetings were held with MLDRIN representatives and some presentations were given to the MLDRIN Board and delegates before the release of *Water for Victoria*, including but not limited to, meetings on 2 March, 13 April, 19–20 May, 5 July, 18 August and 2 October 2016. These covered subjects including involvement in the water resource plan risk assessment, approach to Traditional Owner engagement, Basin Plan requirements and development of the Aboriginal Water Policy.

On 12 July 2016, DELWP presented to the Federation of Traditional Owners Natural Resource Management sub-committee on water resource plans and the development of *Water for Victoria*.

The release of *Water for Victoria* in October 2016 provided the opportunity to develop a statewide strategic advisory body to make sure Aboriginal water values and uses were incorporated into Victoria's water planning and management.

Funding was secured to establish a statewide body and a two-day community meeting resolved to establish the Water for Country Project Control Group. MLDRIN was involved in the design of the Water for Country Project Control Group and was part of process to select members. The release of *Water for Victoria* enabled conversations with Traditional Owners to be framed by the new policy.

The *Water for Victoria* Aboriginal Water Policy was developed to address long-standing shortcomings in Victoria's water management arrangements and to help meet Basin Plan requirements for identifying Traditional Owner water objectives and outcomes, as well as increased protection of Aboriginal values and uses of water.

5. Development of the draft Wimmera-Mallee Water Resource Plan in 2016–17

The draft Wimmera–Mallee Water Resource Plan was prepared for public comment with contributions from technical and key stakeholders and through consultation with a technical advisory group and a DELWP coordination working group.

5.1 Wimmera–Mallee Water Resource Plan technical advisory group

A technical advisory group made up of key delivery partners and representative stakeholder groups was set up in November 2016 to inform and review content while the Water Resource Plan was developed. The group reflected community interests, highlighted water issues, took part in stakeholder and community consultation and steered the inclusion of wider stakeholder and community feedback into the final version.

The technical advisory group met throughout the drafting of the Wimmera–Mallee Water Resource Plan to:

- review working documents, including the draft Water Resource Plan
- share its skills and expertise and represent local perspectives within the water resource plan area
- take part in and, at times, lead community and stakeholder consultation and give feedback on what issues would most likely interest stakeholders, and their preferred tools of engagement.

The group reconvened to guide the incorporation of feedback from public consultation into the final Wimmera–Mallee Water Resource Plan before it was submitted to the Murray-Darling Basin Authority.

Table 3: Wimmera–Mallee Water Resource Plan technical advisory group members*

Organisation	Name	Title
DELWP	Heather Griffith	Manager, Water Resource Plans
DELWP	Geoff Miller	Regional Manager, Environment and Natural Resources
DELWP	Adrian Spall	Director, Water Information Management
Environmental Justice Australia (representing MLDRIN*)	Bruce Lindsay	Lawyer
GWMWater	Kym Wilson	Acting Manager, Water Resources
Mallee Catchment Management Authority	Jenny Collins	Chief Executive
North Central Catchment Management Authority	Tim Shanahan	Executive Manager, Program Delivery
Victorian Environmental Water Holder	Caitlin Davis	Acting Team Leader, Planning and Delivery

Organisation	Name	Title
Victorian Farmers Federation	Richard Anderson	Chair, Water Council
Wimmera Catchment Management Authority	Tony Baker	Statutory and Strategy Manager
Wimmera Development Association	Ralph Kenyon	Executive Director

Notes:

- While MLDRIN was represented, it was not expected to represent individual Traditional Owner views
- Environment Victoria was invited to be a part of the technical advisory group but was unable to participate at the time.

The group met three times in 2016–17.

This is a summary of those meetings:

Meeting one held on 6 December 2016 sought agreement and advice on:

- the group's role and terms of reference
- the proposed outline and approach of the Wimmera–Mallee Water Resource Plan
- accreditation requirements
- a draft comprehensive report and summary document for public release
- issues and community perspectives in the Wimmera–Mallee
- consultation requirements.

Meeting two held on 7 March 2017 outlined and considered:

- key chapters in the draft Water Resource Plan
- the summary report
- the approach to public consultation.

Meeting three held on 27 November 2017 considered:

- feedback raised through public consultation
- submissions and discussion of responses
- feedback from the MDBA
- expected changes from the draft Water Resource Plan to the final document:
  - addressing MDBA feedback
  - Aboriginal water values and uses
  - recreational values
  - risk assessment changes and integration
  - compliance and enforcement
  - timelines.

5.1.1 DELWP coordination (working) group

This group made of up policy area leaders from DELWP with skills and responsibilities for surface water policy, interception (farm dams, and plantations), Aboriginal water, climate change, bulk entitlements, groundwater, water quality and drought. This group met monthly and provided preliminary review and contributions to data, methods and project outcomes.

6. Working towards identifying Aboriginal objectives and outcomes for water

During the development of the final Wimmera–Mallee Water Resource Plan the Government sought to engage local Traditional Owner groups in accordance with Basin Plan requirements.

The Murray–Darling Basin Plan requires that basin states identify objectives and outcomes of water based on Aboriginal values and uses of water, and have regard to the views of Aboriginal organisations as listed in Sections 10.53 and 10.54.

The Victorian Government, through DELWP, spoke with Traditional Owner groups within the Wimmera–Mallee water resource plan area to:

- outline the purpose, scope and opportunity for Traditional Owners, through the Murray–Darling Basin Plan
- define the role of water resource plans in the Basin, including, but not limited to, the requirements of the Basin Plan (Chapter 10, Part 14)
- provide the timeline for the development and accreditation of Victoria's water resource plans
- confirm each Traditional Owner group's preferred means of engagement and involvement in the development of water resource plans, especially how Nation groups would be engaged
- liaise and collaborate with Traditional Owners to investigate specific concerns about the water planning and management framework
- determine how to identify Aboriginal water objectives for each Traditional Owner or Nation group, and their desired outcomes.

The Wimmera–Mallee Water Resource Plan recognised that discussions to identify Aboriginal water objectives, and desired outcomes, would require a collaborative approach tailored to meet the needs of individual Traditional Owner and Nation groups.

Engagement was mostly through meetings on Country, providing support to Traditional Owner groups where requested. This was to identify objectives and desired outcomes for the Wimmera–Mallee water resources, support celebrating and sharing culture and traditional practices within Traditional Owner groups, discuss economic development opportunities and build relationships and Traditional Owner organisational and community capacity.

The Wimmera–Mallee Water Resource Plan turned to the Aboriginal Water Policy announced in *Water for Victoria* as the framework to address the high and medium risks to Aboriginal water identified in the preliminary risk assessment.

6.1 Traditional Owners in the Wimmera–Mallee water resource plan area

Traditional Owners in the Wimmera–Mallee water resource plan area include:

- The Wotjobaluk Peoples, represented by Barengi Gadjin Land Council Aboriginal Corporation. Wotjobaluk Country is in the heart of the Wimmera–Mallee water resource plan area. It includes the Wimmera River and Lakes Albacutya and Hindmarsh, and across to Lake Tyrrell, where the Wotjobaluk Peoples hold an Indigenous Land Use Agreement (ILUA) and Registered Aboriginal Party (RAP) status on part of the lake.
- The Jaara people, represented by the Dja Dja Wurrung Clans Aboriginal Corporation. Waterways within Dja Dja Wurrung Country included in the Wimmera–Mallee Water Resource Plan include the Avoca and Avon–Richardson Rivers and Lake Buloke, among other wetlands.
- The Ngintait, Nyeri Nyeri and Latje Latje Nations, represented by the First Peoples of the Millewa–Mallee Aboriginal Corporation. The Murrayville groundwater area of the Wimmera–Mallee Water Resource Plan is on the lands of the First Peoples of the Millewa–Mallee, who have identified highly significant songlines with associated watering points across both the Wimmera-Mallee and Northern Victoria water resource plans. Surface water in the First Peoples of the Millewa–Mallee's proposed settlement area is mainly from the River Murray or connected sources and falls in the Northern Victoria Water Resource Plan.
- Martang Pty Ltd represents the Djab Wurrung people. Martang's Registered Aboriginal Party area includes the upper reaches of the Wimmera River, and tributaries such as Spring Creek.
- Barapa Barapa, Tati Tati, Wadi Wadi, Wamba Wemba and Weki Weki Nations are represented in the Wimmera-Mallee Water Resource Plan through interest in Lake Tyrrell. Lake Tyrrell is connected to Tyrrell Creek, which in turn is connected to the Avoca River, and is an area of significant cultural importance. Part of Lake Tyrrell is covered by the Barengi Gadjin Land Council ILUA and Registered Aboriginal Party agreement, while; the remainder is not subject to any Registered Aboriginal Party, Settlement Agreement or Native Title status.

6.1.1 Link to Northern Victoria and the River Murray

Several Traditional Owner groups have interest in both the Wimmera-Mallee and Northern Victoria water resource plans, including Barapa Barapa, Dja Dja Wurrung, First Peoples of the Millewa-Mallee, Tati Tati, Wadi Wadi, Wamba Wemba and Weki Weki.

Their respective contributions detail values and uses and objectives and outcomes for water relating to the Wimmera-Mallee Water Resource Plan at January 2019. These contributions may be amended as the Northern Victoria Water Resource Plan is being finalised.

When water managers and policy makers are reviewing Traditional Owners' contributions, it is recommended they read the contributions in both the Wimmera-Mallee and Northern Victoria water resource plans to make sure they are considering all information on Traditional Owner values, uses, objectives and outcomes for water.

Any substantive changes to content from Traditional Owner contributions when the Northern Victoria Water Resource Plan is being finalised will result in an amendment to the Wimmera-Mallee Water Resource Plan.

6.2 Feedback on approach – first formal assessment

Following the initial submission of the Wimmera-Mallee Water Resource Plan to the Murray-Darling Basin Authority (MDBA) for formal assessment on 29 June 2018, MLDRIN delegates assessed the engagement approach. They raised a number of concerns about DELWP's method for engaging with Traditional Owners. Concerns raised included.:

- unnecessary delays in starting water resource plan engagement and not properly taking Traditional Owners' needs and desires into account about how they were to be engaged in developing water resource plans
- the application of a source-based approach to engagement with Traditional Owners. This resulted in some Nations not being consulted about areas of interest that were geographically located within the Wimmera-Mallee water resource plan area.
- consistency of engagement between Traditional Owner Nations, largely due to the engagement being designed around the source-based approach to developing Victoria's water resource plans.

After the assessment was received, it was agreed between the MDBA and MLDRIN that DELWP would do extra engagement with Traditional Owners to provide them with more opportunities to contribute to the Wimmera-Mallee Water Resource Plan.

6.2.1 Revised work program

Following the initial MLDRIN assessment, engagement with Traditional Owners for water resource plans was based on these guiding principles:

1. Engagement on water resource plans is directed by the requirements of the Commonwealth Government Murray-Darling Basin Plan 2012 and supported by the Victorian Government's Aboriginal Water Policy.
2. The engagement approach is tailored to the needs of each Nation group, as advised by MLDRIN delegates wherever possible, and adhering to the key principles of:
   a. inclusivity
   b. self-determination
   c. free, prior and informed consent.
3. DELWP takes responsibility for engaging with Traditional Owner groups within Victoria's share of the Basin and commits to building relationships between the state and Nations through face-to-face engagement on Country, supported by MLDRIN delegates, peak Traditional Owner organisations and delivery partners as required.
4. Feedback and information sharing from Traditional Owner groups is, when permitted, communicated to DELWP water senior managers to support integration of Traditional Owner requirements in policy and planning.
5. DELWP will endeavor to provide a clear narrative to talk through the issues, and use plain English to explain the complexities of water resource management.
6. Cross border issues are managed sensibly, with Traditional Owner groups to decide where and when they want the opportunity for joint consultation or involvement between states.

After the MLDRIN assessment DELWP re-engaged with Traditional Owner groups to:

- develop engagement plans relevant to each group in consultation with the nominated MLDRIN delegates or appropriate key contact
- support and fund Nation meetings to provide wider opportunity for Nation members to discuss the Nation's contribution to Victoria's water resource plans

- include, where possible, water senior management and key policy officers in Nation meetings to demonstrate commitment to continued engagement with Traditional Owners and to make sure experts in water resource management were part of the conversation and were starting to build relationships with Traditional Owners
- support and fund extra meetings required to finalise and approve contributions of Traditional Owner Nations for inclusion in Victoria's water resource plans
- capture Traditional Owners' views in water resource plans through contributions for each Nation, authored or co-developed with DELWP. The contributions were largely structured around a template that outlines matters relevant to addressing the requirements of Part 14 of Chapter 10 of the Basin Plan.

The finalisation of Traditional Owner contributions is based on meetings, workshops and community events supported by DELWP through the engagement process aimed at building capacity, shared understanding and delivering on the requirements of Basin Plan.

6.2.2 Tools used to support engagement

Aboriginal Waterway Assessments

The Aboriginal Waterways Assessment tool was funded by Victoria's water resource plans for six nations, including in the Wimmera-Mallee Water Resource Plan area, Wotjobaluk, Ngintait, Tati Tati, Dja Dja Wurrung Nations.

Aboriginal Water Officers

Funding support for water officers at the Mallee Catchment Management Authority and the Wimmera Catchment Management Authority. Aboriginal Water Officers are not expected to take responsibility for engaging on water resource plans, but instead they support engagement between Nations and government water planning and policy matters, including water resource plans.

Work programs and workshops

Work programs and capacity building directly through water resource plans. Work programs typically include meetings on-Country between water resource plan representatives and Traditional Owners to discuss water opportunities, issues, risks and challenges. Those discussions work to build possible responses to water resource plans, provide links between Nations and delivery partners and identify opportunities to increase engagement, involvement and representation in water planning and policy.

Nation meetings

Nation meetings/inclusive gatherings or workshops were scheduled for most Nations contributing to the water resource plans. The work before each workshop/Nation meeting and its format was specific to each Traditional Owner group.

Approach to questions

Meetings included an:

- explanation of water resource plans, including timelines
- outline of the aims of the engagement for water resource plans
- explanation of why Traditional Owners need to be involved.

Indicative questions and areas of discussion included:

- What does water mean to you and your people?
- Do you currently use water from Country? What for?
- What would you like to use water from Country for?
- What's stopping you?
- How important is it to be able to access water or water on Country?
- Which water-related places are important to you?
- What would you like to change regarding water on Country?
- Are you familiar with cultural flows? What are your views?

6.3 Engagement with Traditional Owner groups

6.3.1 Barapa Barapa

Barapa Barapa Country includes both sides of the Murray, including the iconic Gunbower Forest in Victoria.

DELWP began discussions with the Barapa Barapa Water for Country Steering Committee in 2017, presenting to the committee on 26 October that year and meeting on Country several times to discuss the project and future aspirations, including in March, April, July and November 2017.

Barapa Barapa hosted an on-Country tour by the Northern Victoria Water Resource Plan Technical Advisory Group, of which Barapa Barapa man Dixie Patten is a member, on 6 December 2017.

On 1 February 2018 DELWP met with the steering committee to workshop the views, objectives and outcomes for the draft Northern Victoria Water Resource Plan. The steering committee agreed in principle to a set of objectives and outcomes, including consideration of cultural flows. These became the basis for the Barapa Barapa contribution to the Wimmera-Mallee Water Resource Plan.

On 1 May 2018 DELWP presented on Country to the Barapa Barapa Water for Country Steering Committee on the water regimes of Lake Tyrrell and the Avoca River and how these systems are connected to the Wimmera–Mallee water resource plan area water supply system. The presentation included information on the Avoca River flow regime, entitlements and average take.

The draft objectives and outcomes for the Northern Victoria Water Resource Plan were presented to a community gathering of Barapa Barapa Traditional Owners in mid-2018 at Gunbower Island. Extra documentation outlined the purpose of water resource plans, the Basin Plan legislative requirement for states to liaise with Traditional Owner groups and the focus areas of consultation, the river systems of Victoria's share of the Basin and key questions for consideration and discussion.

On 13 November 2018 DELWP a Barapa Barapa Nation meeting was held to consider a draft contribution for water resource plans, where it was decided to also contribute to the Wimmera-Mallee Water Resource Plan. The Barapa Barapa people said they had concern for the whole system, not just Barapa Barapa Country. At that meeting, Barapa Barapa MLDRIN delegate Uncle Neville Whyman expressed the need for some changes to the contribution.

A shortened draft of the Barapa Barapa objectives and outcomes was sent to MLDRIN delegate Sharnie Hamilton on 4 January 2019 and was approved for inclusion in the draft Northern Victoria Water Resource Plan. A subsequent meeting with Barapa Barapa representatives at Kerang in January 2019 workshopped the entire contribution and approved for it to be included in the draft Northern Victoria Water Resource Plan and final Wimmera-Mallee Water Resource Plan.

6.3.2 Dja Dja Wurrung

The resubmission of the Wimmera-Mallee Water Resource Plan enabled Dja Dja Wurrung's contribution to reflect the Traditional Owner group's requirements, as communicated and responded to by DELWP, after the plan was first submitted to the MDBA. The first submission of the Water Resource Plan for the Wimmera-Mallee was severely constrained by an engagement approach that did not meet the needs of the Dja Dja Wurrung Clans Aboriginal Corporation, including its Settlement Agreement with Victoria.

Meetings between DELWP and Dja Dja Wurrung agreed that Dja Dja Wurrung's water aims were best met through an approach which enabled self-determination, using this structure:

- DELWP to fund Dja Dja Wurrung to conduct its engagement on water resource plans, keeping in close contact but not dictating methodology or approach
- DELWP to be available at Dja Dja Wurrung's request to provide technical, policy or facilitation support
- Dja Dja Wurrung to establish an advisory group for water within its corporation to enable continuity, capacity building, self-determination and transition to outcomes
- Dja Dja Wurrung to have a representative on the Northern Victoria Water Resource Plan technical advisory group.

A funding agreement between Dja Dja Wurrung and DELWP for water resource plans was signed on 13 December 2017. This resulted in a comprehensive and considered contribution to Victoria's water resource plans that was directed and produced by Dja Dja Wurrung, with collaboration by DELWP as requested.

The approach was devised in response to the shortcomings of the Wimmera-Mallee Water Resource Plan engagement through 2016-2017; Dja Dja Wurrung's contribution is updated as a result of the Wimmera-Mallee Water Resource Plan is being resubmitted.

Formation of the Kapa Gatjin (Knowing Water) Advisory Group was a highlight of Dja Dja Wurrung's water engagement. The group has agreed terms of reference and involves facilitated participation of Dja Dja Wurrung members to talk firstly about aspirations for water resource plans, and water more generally now and for the future, including values and uses of water.

The Dja Dja Wurrung water resource plan contribution for Northern Victoria and the Wimmera-Mallee states that:

The function of the Kapa Gatjin Advisory Group is to:

- build on our creation storylines and connection to Djandak (Country) with our mob
- support and advise the Kapa Gatjin Water Unit in developing and delivering the Country Plan aspirations for Rivers and Waterways
- work with the Registered Aboriginal Party (*RAP)* to identify and care for cultural sites near Dja Dja Wurrung waterways
- promote cultural education between Dja Dja Wurrung Traditional Owners and Land and Gatjin (water) users and the broader community
- compile our cultural knowledge in order to produce resources to share knowledge with our community
- promote and build on partnerships with relevant stakeholders to collaborate on joint projects
- revive and conduct our cultural ceremonies associated with water
- assist with developing and progressing projects from Aboriginal Waterways Assessment (AWA) reports
- promote Dja Dja Wurrung self-determination through capacity and rapport building to ensure a legitimate and distinguished role in decision making and management of our waterways.

The Kapa Gatjin group first met 1 May 2018 at Tang Tang Swamp.

Two further meetings of the Kapa Gatjin Advisory Group were scheduled for 2018, supported by the Dja Dja Wurrung water officer position.

According to Dja Dja Wurrung, Kapa Gatjin is not the first engagement point for the corporation. Any water-related issues are first to be communicated to the water policy officer, and/or the CEO of the corporation.

Dja Dja Wurrung Clans Aboriginal Corporation has clearly articulated it needs to be involved in policy development and at the outset of projects to best achieve water objectives. These include shared benefits through environmental water and, importantly for the organisation, cultural flows and economic benefits from water. These are the corporation's requirements, in line with its Settlement Agreement with the State of Victoria.

Dja Dja Wurrung Chief Executive Officer Rodney Carter is the MLDRIN delegate for Dja Dja Wurrung. The approach taken for the water resource plans contribution for Victoria is in full accordance with his requirements.

Consultation conducted by Dja Dja Wurrung may be updated for the Northern Victoria Water Resource Plan. As the Wimmera-Mallee consultation report was produced earlier, it is expected people wishing to know more about consultation done by Dja Dja Wurrung, with DELWP support, review the Northern Victoria Water Resource Plan consultation report when it is released.

6.3.3 First Peoples of the Millewa–Mallee

The First Peoples of Millewa–Mallee have a strong connection to Country. While most of the surface water on Country is sourced from the River Murray, songlines within the First Peoples of the Millewa-Mallee Registered Aboriginal Party area show an ancient history with the water within the landscape spanning both water resource plans. The Wimmera-Mallee Water Resource Plan also includes the Murrayville groundwater area.

Following conversations in 2017, DELWP, the Federation of Victorian Traditional Owner Corporations and the First Peoples of the Millewa-Mallee agreed on an engagement approach to work together to develop the contribution to Victoria's water resource plans.

The First Peoples of the Millewa-Mallee's preferred engagement is initially through their Board. Where MLDRIN delegates were accessible and appointed, they were engaged directly to approve and help lead the Nation meetings.

The approved engagement approach included two residential community gatherings in 2018, incorporating visits on Country to discuss water priorities and issues. Present and former Mallee Catchment Management Authority employees assisted by explaining the current water management regime and challenges, and DELWP staff explained water policy issues.

Before these gatherings, a meeting was held on Country with MLDRIN Ngintait delegate Uncle Norm Wilson on sites of importance to Ngintait. The Water Resource Plan funded the April 2018 Ngintait Aboriginal Waterway Assessment and DELWP attended the assessment for several days.

A meeting was held in Melbourne with Uncle Norm Wilson, the Mallee CMA Living Murray facilitator, the Federation and DELWP to organise the initial First Peoples' community gathering. It was agreed the three-day gathering for the Ngintait, Nyeri Nyeri and Latje Latje Nations would include:

- several visits to waterways and bodies of cultural significance
- a presentation on water regulation from the Mallee CMA at Lock 9
- a short documentary to capture people's thoughts at the event, provide a reference at a point in time and help to highlight discussions on water
- cultural activities
- families to be invited.

The first gathering was based at Lake Cullulleraine in May 2018 and held over several days, with accommodation and catering on site. Participants were presented with information on water resource plan requirements both orally, and through written materials and waterway maps made available.

A second gathering was held in September 2018, with people staying in Mildura and travelling to more places of significance and yarning about water objectives.

Places visited over the two residential gatherings were within the lodged Registered Aboriginal Party boundaries for the First Peoples of the Millewa-Mallee, which have now been approved by the State of Victoria.

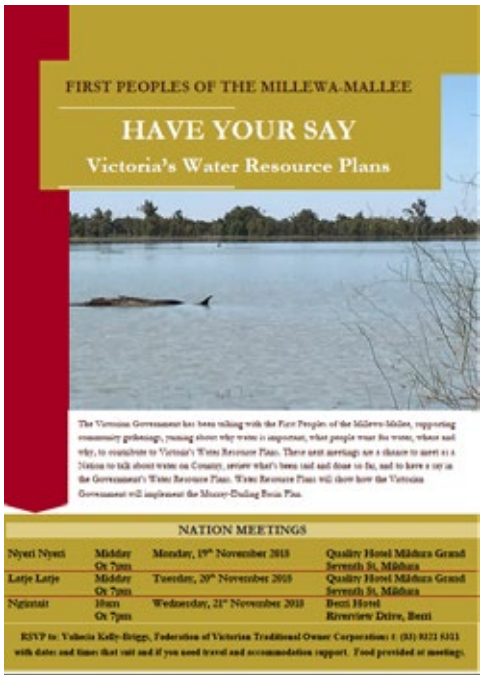


Figure 3: flyer for Nation meetings

Following the community gatherings, it was discussed with Uncle Norm Wilson, Aunty Susan Baxter, Nyeri Nyeri, and Melissa (Lisa) Jones, Latje Latje, as well as with First Peoples' Chair Aunty Janine Wilson, whether separate Nation meetings were the best approach to discuss and approve the objectives, desired outcomes and statements collated from the community gatherings. It was agreed that meetings would be held for Ngintait in Berri, November 2018, Latje Latje in Mildura, November 2018, and Nyeri Nyeri in Mildura, November 2018.

As a MLDRIN meeting was scheduled for the week before and some delegates were waiting on approval, conversations were also held with Nyeri Nyeri men Mark Grist and Robbie Knight. Their advice was much appreciated.

The Nation meetings, facilitated and funded by DELWP, included handouts and were centred around confirming the content each Nation wanted to see. Across the separate meetings there was strong consensus from the three Nations as the objectives and outcomes and statements reflected their own words from discussions on Country.

The Nation meetings started with an outline on water resource plans and their purpose, legislative requirements and opportunities. There was a screening of the video from Lake Cullulleraine and a recap on consultation with the First Peoples of the Millewa-Mallee to date.

The meetings then workshopped through the commentary which had been recorded while on Country and grouped under:

- water for Country
- values and uses
- capacity building
- engagement
- supporting statements and text.

A draft contribution was prepared from the Nation meetings for the final Wimmera-Mallee Water Resource Plan, and the Northern Victoria Water Resource Plan. The draft was presented at a special board teleconference, then approved a week later in December 2018.

This contribution replaces the initial contribution in the first submission of the Wimmera-Mallee Water Resource Plan.

Initial engagement with the First Peoples of the Millewa-Mallee: before 2018

Initial discussions between the Victorian Government and the First Peoples of the Millewa–Mallee on the Wimmera-Mallee Water Resource Plan centred on the Murrayville aquifer. DELWP had facilitated discussions and information-sharing between the First Peoples of the Millewa–Mallee Aboriginal Corporation, Grampians Wimmera Mallee Water and local landholders.

This followed Grampians Wimmera Mallee Water receiving a joint submission from MLDRIN and the First Peoples of the Millewa–Mallee in response to the water corporation's public consultation on the Murrayville aquifer's local management plan on 29 July 2016.

DELWP liaised with the First Peoples of the Millewa–Mallee, the chair of MLDRIN at that time and Grampians Wimmera Mallee Water about the aquifer several times in 2017. A key request of the First Peoples was to get more information on the water source, quantity, quality and drawdown of the aquifer. As a result, and together with Grampians Wimmera Mallee Water, this objective was added to the Murrayville Local Management Plan and communicated to the First Peoples of the Millewa–Mallee by correspondence on 14 September 2016:

The water corporation and reference group will continue discussions with Traditional Owners to understand and identify cultural objectives and values relating to groundwater in the Murrayville Groundwater Management Area. Appropriate amendments will be made to the local management plan as an outcome of these discussions.

The then chair of First Peoples of the Millewa–Mallee, Darren Perry, presented to the Murrayville Advisory Committee on Aboriginal values and aspirations for groundwater in the Murrayville area on 20 June 2017.

DELWP met the First Peoples of the Millewa–Mallee Aboriginal Corporation board member Janine Wilson on 21 July 2017. This discussion outlined water resource plan timelines, engagement through the Wimmera–Mallee Water Resource Plan, the Northern Victoria Water Resource Plan and the source-based approach to the water resource plan areas. Ms Wilson spoke about how a lot of government consultation had resulted in words spoken, but no action or, at best, 'band-aid' solutions. DELWP spoke about the water resource plan, how it came about and what it was about, and the Government's approach, including talking with Traditional Owners to understand objectives and desired outcomes relating to water.

Ms Wilson told DELWP: "We want to have some control over our land and water that you took away from us."

It was agreed:

- to ask for the water resource plans to be placed on the First Peoples of the Millewa–Mallee Aboriginal Corporation board agenda
- that Ms Wilson would ask DELWP to attend the 'coming together' to talk to Elders about water and what the water resource plan may mean to them
- that if the Traditional Owners preferred, the gathering may talk about water resource plans, and then DELWP would meet Traditional Owners separately.

On 4 September 2017, First Nations Legal and Research Services (formerly Native Title Services Victoria) confirmed that water resource plans had been discussed at a board meeting of the First Peoples of the Millewa–Mallee Aboriginal Corporation and the board had confirmed that they would talk further about water resource plans, with the assistance of the Federation of Traditional Owners.

DELWP met the Federation of Victorian Traditional Owners on 21 November 2017 and outlined a proposed presentation for the following board meeting of the First Peoples of the Millewa–Mallee Aboriginal Corporation. DELWP presented to the board on water resource plans on 19 January 2018.

While that meeting developed the water resource plan contribution has since been replaced, it also was a major step in agreeing to work together for the Northern Victoria Water Resource Plan. Given the Wimmera-Mallee Water Resource Plan resubmission, that contribution is the result of several months' discussion, as outlined before.

Prior, the initial water objectives and outcomes proposed for inclusion in the Wimmera–Mallee Water Resource Plan were shared with the community and confirmed with DELWP on 1 March 2018 as being approved by the board and the broader Traditional Owner community.

At that meeting and at subsequent meetings of the First Peoples of the Millewa–Mallee Aboriginal Corporation board (FPMMAC), the FPMMAC Board endorsed DELWP and the Federation of Victorian Traditional Owner Corporations to provide support to the First Peoples of the Millewa-Mallee. This was to help produce outcomes for both a First Peoples of the Millewa-Mallee Country and Water Plan and to consider contributions to the Victorian Government's water resource plans.

Note that consultation with the First Peoples of the Millewa-Mallee may be updated as we continue discussions through the Northern Victoria Water Resource Plan. As the Wimmera-Mallee consultation report was produced earlier, it is expected people wishing to know more about consultation done with the First Peoples of the Millewa-Mallee review the Northern Victoria Water Resource Plan consultation report when it is released.

6.3.4 Martang Pty Ltd

Despite several attempts by the water resource plan project team using phone and email, a meeting could not be scheduled with Martang Pty Ltd until after the release of the draft Wimmera–Mallee Water Resource Plan.

After the release of the draft, DELWP met with Martang's Chief Executive Officer to discuss the plan on 29 May 2017, and understand what interest Martang's Traditional Owners may have in participating. Martang confirmed that at a minimum it wanted to be recognised in the plan as being a Traditional Owner in the region and that, given its available resources and large number of other priorities, it did not want to have a significant involvement in the finalisation of the plan. DELWP agreed to draft a summary about Martang and its water interests and send to its CEO for review before being included in the final plan.

Martang expressed interest about management of culturally significant sites at the headworks storage of Lake Lonsdale, because it was a priority site. Martang said it would like to keep Lake Lonsdale at least 50 to 60 per cent full of water to protect the cultural heritage at the site. When water levels are low, cultural heritage sites on the lake bed get damaged by recreational users. DELWP discussed other ways to protect the site, such as managing access. Maintaining high lake levels during dry years would not be possible because of the lack of inflows to the lake, no matter how releases from the lake are managed.

Martang said it would be interested in conducting an Aboriginal Water Assessment at Lake Lonsdale, if neighbouring Eastern Maar Aboriginal Corporation was also interested. An initial phone call and follow up face-to-face meeting with Eastern Maar on 20 June 2017 confirmed interest in a joint assessment for Lake Lonsdale and DELWP took some initial steps to help progress this Aboriginal Water Assessment. However the area is now part of a joint Native Title claim from Barengi Gadjin Land Council, Eastern Maar and Gundit Mirring and it is expected an assessment would require agreement by all interested Traditional Owner groups before going ahead. This has not progressed further at this stage.

6.3.5 Tati Tati Wadi Wadi

Tati Tati Wadi Wadi[2] is represented in the Wimmera–Mallee water resource plan area through interests in the culturally rich Lake Tyrrell, a terminal lake at the edge of the Avoca Basin, and the geographic landscape of its areas of interest.

The Traditional Owner group has a strong interest in waterways and water bodies, including those now not receiving water around the Robinvale area, with a focus on the southern banks of the Murray, and west of Swan Hill, extending west toward Ouyen and south of Robinvale, straddling the River Murray.

From the outset, Tati Tati representatives have identified themselves as Tati Tati Wadi Wadi. It is acknowledged that there was a separate consultation for the Wadi Wadi Nation as represented in this Wimmera-Mallee Water Resource Plan.

DELWP started talking with Tati Tati in 2017 through discussions with Tati Tati MLDRIN delegate Brendan Kennedy, and other people identifiying as Tati Tati Wadi Wadi.

An Aboriginal Waterway Assessment was funded by DELWP through the Water Resource Plan. The Aboriginal Waterway Assessment was carried out at several significant sites including:

- Gadsens Bend
- Margooya Lagoon
- Murrumbidgee Junction
- Narrung
- Lake Heywood
- Piambie
- Burra Burra State Forest
- Nyah-Vinifera State Park.

The MLDRIN-facilitated Aboriginal Waterway Assessment was held from 11 to 13 July 2017. A representative from DELWP's water resource plan team attended for several days.

A few weeks later a meeting was held with six representatives, including Tati Tati MLDRIN delegate Brendan Kennedy, to explain the purpose of the water resource plan, including how we were starting early engagement before preparing a draft for the Northern Victoria Water Resource Plan.

At that meeting, Brendan made it clear that there would be a need for the water resource plan representatives to come back to a broader group to explain about the consultation process and what it meant for Tati Tati Wadi Wadi, and that the meeting was the first of many discussions.

DELWP has attempted to honour that requirement through a series of meetings with the Nation. Early in 2018, in collaboration with Brendan Kennedy and before an overarching DELWP agreement to fund Nation meetings, DELWP entered into a funding agreement to help support Tati Tati Wadi Wadi meetings, in recognition of the barriers to participation. The resulting funding agreement was to facilitate workshops on water objectives, hold an inclusive gathering open to all people identifying with the Nation, conduct planning meetings and provide support for sign off.

In May 2018, water resource plan representatives and Tati Tati Wadi Wadi had a series of conversations about Lake Tyrrell about its inclusion in the Wimmera–Mallee Water Resource

2 A July meeting at Robinvale in 2018 concluded the people present wished to be identified as Tati Tati Wadi Wadi. In November 2018, the MLDRIN full gathering formally appointed delegates for the Wadi Wadi Nation, that were not part of the Tati Tati Wadi Wadi consultation. These delegates had, from September 2018 led consultation for their Nation. The Water Resource Plan will continue to liaise with MLDRIN delegates to determine how best to meet the needs of the Nations, for the finalisation of the Northern Victoria Water Resource Plan, which should be referenced, once accredited.

Plan, its water management regime, its water source and whether Tati Tati Wadi Wadi wished to make a contribution to the Wimmera-Mallee Water Resource Plan. Tati Tati Wadi Wadi provided a statement and objectives for inclusion in the Wimmera–Mallee Water Resource Plan (May 2018), which appeared in the initial submission of the plan for accreditation.

Figure 4: flyer for Tati Tati Wadi Wadi Nations meeting

The resubmission of the Wimmera-Mallee Water Resource Plan has provided an opportunity to update the contribution.

Meetings between DELWP and Tati Tati Wadi Wadi were held on Country. These included workshops in July and August 2017, meetings in March and April 2018, and culminating in a Nation meeting on 29 October 2018 attracting around 30 participants at Nyah.

The Nation meeting included a handout presentation outlining the purpose of water resource plans, the consultation with Tati Tati Wadi Wadi up until then, retrospective and future timelines, and a full list of the objectives, outcomes, values and uses, and statements recorded to that point, for discussion and sign off.

Participants workshopped the objectives, statements and supporting text, which had been prepared based on previous meetings, and approved them for inclusion in Victoria's water resource plans.

The generosity of Tati Tati Wadi Wadi Traditional Owners to collaborate on water resource plans and give their perspective on what needs to be bridged in terms of Government policy, planning and management, is greatly respected.

As well as meetings on Country, MLDRIN delegate Brendan Kennedy was a representative on the water resource plan for Northern Victoria technical advisory group. This was extremely beneficial for water managers from DELWP, water corporations and catchment management authorities to hear his perspective and think about how to respond to Traditional Owner expectations.

A further meeting with Tati Tati Wadi Wadi is being considered under the Northern Victoria Water Resource Plan. This, and any changes that may result, would be reflected in the Northern Victoria Water Resource Plan consultation report.

6.3.6 Wadi Wadi

Wadi Wadi is represented in the Wimmera–Mallee water resource plan area through interests in the culturally-rich Lake Tyrrell, a terminal lake at the edge of the Avoca Basin.

MLDRIN delegates were contacted initially by DELWP in August/September 2018 to discuss an engagement plan.

After several meetings it was agreed:

- to run a Nation meeting over two days in Swan Hill on 11 and 12 October 2018
- fuel, accommodation and travel costs were covered by DELWP to support people's participation
- to coordinate mailouts, RSVPs and payment for attendance through First Nations Legal and Research Services who have contact details of all Wadi Wadi members
- to invite representatives from relevant organisations, including the executive officer of MLDRIN and environmental watering manager from the Mallee CMA.
- to carry out joint consultation with NSW Department of Industry (DOI Water)

This was the first time that New South Wales and Victorian Governments had delivered a joint consultation for water resource plans and agreed to adopt NSW's approach to engagement.

This text is from the final report delivered by the consultants as described below.

6.3.6.1 Scope

Independent Aboriginal consultants, Strategic Small Business Solutions (SSBS), were contracted by DOI Water to conduct the engagement to provide a sense of independence, and to safeguard cultural knowledge. The consultants were given this brief before the consultation process.

First Nations stakeholder consultants will:

- work with New South Wales' DOI Water and Victoria's DELWP and the Wadi Wadi Nation, which crosses the border of Victoria and NSW
- identify the importance of water to the Wadi Wadi Nation and seek information about the values placed on water and the Nation's vision for the future in water sharing and management. They will work in a culturally appropriate manner with the appointed Wadi Wadi delegate(s) to meet with identified Traditional Owners of the Wadi Wadi Nation and gain informed and agreed consent, using the data use agreements provided by DOI Water.
- conduct face-to-face interviews with identified Wadi Wadi Nation Traditional Owners after obtaining written consent
- seek Traditional Owner support for the planned workshops on water resource plans and encourage active engagement and participation
- make sure SSBS support the workshop by promoting discussion around key issues and creating a comfortable atmosphere conducive to open and direct feedback from participants
- prepare an extensive consultation report for DOI Water and DELWP that provides authentic data gained with consent from Wadi Wadi Nation members about their values and objectives for water resource planning in their Nation
- provide the report to interviewees and seek approval of report content during return face-to-face visits
- present the final report to DOI Water and DELWP for publication.

6.3.6.2 Methodology

The methodology for this consultation is based on a Nation by Nation approach developed by Strategic Small Business Solutions on "principles for culturally appropriate Nation-based

consultation". These principles are supported by a commitment to the practice of Indigenous data sovereignty and the use of qualitative research practices, including participant-centred research and generic thematic analysis.

Principles for culturally appropriate Nation-based consultation

Strategic Small Business Solutions rely on their proven approach to culturally appropriate consultation. While this is the first time we have taken part in the new method of Nation-based consultation, our approach as shown here has proven to be culturally appropriate and successful.

Strategic Small Business Solutions propose the following community consultation methodology for culturally appropriate First Nations stakeholder engagement:

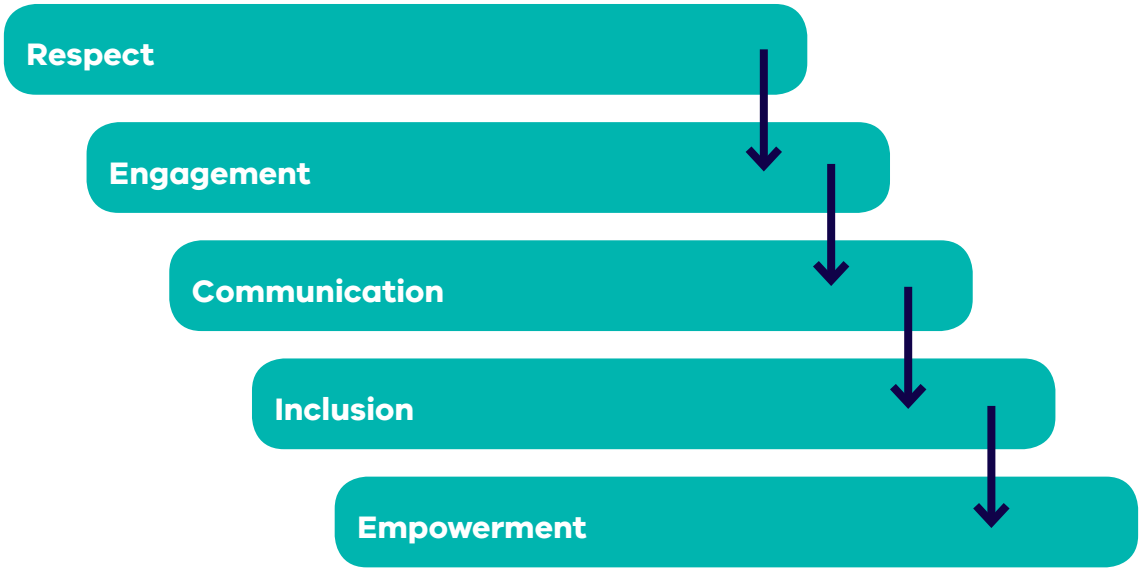


Figure 5: Proposed community consultation methodology of Strategic Small Business Solutions

Nation-based approach

The consultation methodology enables First Nations people to continue their traditional roles as custodians. A Nation-based approach, encouraged by the MDBA, Northern Basin Aboriginal Nations and MLDRIN, sustains the presence of individual Nations and allows them to contribute to water resource plans within the context of their cultural boundaries. With this approach, First Nations can assist government to make better decisions in water planning.

Governance structures of First Nations are complex and in their infancy in engaging with government. The engagement approach taken was guided by the MDBA, Northern Basin Aboriginal Nations and MLDRIN and considered accepted cultural protocols. It relied heavily on the Wadi Wadi Nation organisers. MDBA states that 'the term 'Traditional Owners' is used to refer to those with recognised cultural authority to speak for Country' and guides states to identify appropriate Traditional Owners for consultation. The use of the Nation organiser as a guide relied on widely accepted cultural protocol and lore which determines that only internal representatives have the cultural authority to speak on a Nation's internal governance structures, guide consultative processes and identify senior Traditional Owners.

Indigenous data sovereignty

Part of a culturally appropriate consultation framework acknowledges the rights of First Nations people over their own knowledge. The contract signed between Strategic Small Business

Solutions and DOI Water included this definition of First Nations Cultural Knowledge:

> ‘Accumulated knowledge which encompasses spiritual relationships, relationships with the natural environment and the sustainable use of natural resources, and relationships between people, which are reflected in language, narratives, social organisation, values, beliefs, and cultural laws and customs’

Consultants are required to identify any First Nations cultural knowledge gathered during the consultation. This can only be used for specific purposes in the accreditation of water resource plans. Wadi Wadi participants read through data use agreements which made them aware of the purpose of the research and the use of their knowledge, and signed consent forms, giving them options for the recording and storage of their individual data.

Research methods

Our research methodology is aligned with the principles of Culturally Appropriate Nation-based consultation and the MDBA Part 14 Guidelines. Ethical considerations include the de-identification of data, the explanation of the purpose and scope and participant consent. These aligned with general considerations in the guidelines:

- prior, informed consent of the affected Indigenous and local communities
- ownership, protection and control of traditional knowledge
- the need for transparency.

DOI Water supplied the data use agreements. They are a sign to First Nations people that they and their knowledge are being treated with respect. The research process was expected to be directed by participants, with Traditional Owner face-to-face interviews shaping the research design. This two-pronged approach was recommended by the MDBA.

Data was collected from eight Wadi Wadi Nation-identified Traditional Owners during face-to-face interviews in the Traditional Owners’ chosen location. A two-day workshop was conducted and further data was collected from just under 50 participants in a pressure- free environment.

Carefully thought out questions and prompts developed by the consultants encouraged open, narrative responses, in line with the principle of flexibility and MDBA guidelines to ‘use appropriate tools and mechanisms for recording and understanding Aboriginal objectives and outcomes.’ A qualitative data analysis of both interview and workshop data was used to ‘provide a fair-minded representation of information and knowledge gained through the consultation process,’ as guided by the MDBA.

6.3.6.3 Consultation process

The Consultation Process followed four phases.

- Phase 1: design and development – planning, development of consultation tools (question list and data use agreements) and participant identification (stakeholder list).
- Phase 2: preparation - face-to-face interviews with Traditional Owners to share information, build relationships and guide planning of later workshops.
- Phase 3: consultation – inclusive workshops with the wider Wadi Wadi community to gather more contributions into the clauses of Part 14 on objectives and outcomes based on values and uses of water.

- Phase 4: analysis and review - data analysis and report writing, including face-to-face presentation of the draft report to Wadi Wadi Nation members who took part in face to face interviews.

The MDBA Part 14 guidelines advise 'a planned approach to properly engaging Traditional Owners, including identification and involvement of appropriate Traditional Owners' (phase 1). They suggest that for genuine engagement in water resource planning, Traditional Owners be consulted for two specific purposes of information sharing/relationship building meetings (phase 2) and inclusive workshops (phase 3).

Phase 1: design and development

Phase 1 included development of a stakeholder list, a data use agreement and a question list for the face-to-face interviews.

Stakeholder list

The stakeholder list was a key document required in the early stages of the consultation. It guided Strategic Small Business Solutions and DOI Water to engage participants for interviews and workshops according to a priority of traditional Nation-based governance. Other regional stakeholders who don't operate on a Nation-based model were also included.

The list clearly classified stakeholders into these different governance types, to overcome previous reliance on a few key stakeholders at the expense of others:

- **Traditional Owners**: groups or individuals under Nation-based governance
- **external governance**: those with non-traditional governance structures imposed from outside the Wadi Wadi Nation
- **historically connected**: those from other Nations who live on Wadi Wadi Country.

The Nation Organisers, with their cultural authority and internal knowledge of Wadi Wadi Nation governance, were essential to developing the stakeholder list in this Nation-based approach. They provided Strategic Small Business Solutions with a list of Traditional Owners to make sure of inclusive representation of Wadi Wadi family groups and communities who do not always correspond to towns from a Western geographical perspective. These Traditional Owners are not necessarily associated with established lead agencies in the Aboriginal sector, but are recognised from grassroots governance structures as true cultural leaders by the Wadi Wadi community.

The stakeholder list was treated as a living document, with names being added throughout the consultation. All individuals on the list consented to share their details, either through the Nation organiser or Strategic Small Business Solutions. The list will be kept with DOI Water Aboriginal staff. As guided by the MDBA, 'better practice would expand and update available knowledge and understanding about the relevant stakeholder groups that are linked with the Basin water resources in an area'.

The Nation organisers were integral to the consultation. Freely-given consent and a culturally appropriate introduction to the identified Wadi Wadi Nation Traditional Owners was essential to the success of the interviews, comfort level of the interviewees and gathering of highly useful data. Strategic Small Business Solutions believe the consultation process would not have been achieved productively without the Nation organisers' contribution to the consultation project.

Data use agreements

Data use agreements allowed the Wadi Wadi Nation people, as a Nation and as individuals, to play a part in managing and controlling information they gave throughout the consultation.

Two different agreements were created for face-to-face interviews and workshops. These defined and explained:

- the purpose and scope of the consultation
- identity protection measures where data was de-identified and personal details stored securely
- data storage procedures, giving options for choice by participants
- data use where First Nations' cultural knowledge was limited to use for water resource plan development and accreditation, water planning and internal education.

Strategic Small Business Solutions concluded that once the data use agreements for the face-to-face interviews had been carefully explained and reviewed with participants, there was no room for doubt in participants' minds about the integrity, safety, ownership and use of the data once it had been shared freely with the consultants.

At first some participants appeared daunted by the data use agreements. However, they all agreed to sign them once they clearly understood that the signed agreements would protect their shared knowledge, and this relieved any anxiety.

The MDBA guidelines acknowledge that 'it is an ongoing challenge for Aboriginal organisations to engage multiple and repeated times with governments for a range of purposes.'

The reasons why we have data use agreements are:

- to safeguard First Nation' cultural knowledge
- that data gathered can only be used for the water resource plans, with participants consulted again for future water planning or approached to release the knowledge.

Question list

Strategic Small Business Solutions developed a question list in consultation with DOI Water. This was used for the face-to-face interviews to encourage conversation, shape interviews and ensure comprehensive coverage of information.

The list was useful as a guide, but was not always needed as interviews adopted a flexible, participant-controlled approach, and were often structured in a free-flow narrative style.

Phase Two – preparation

As the knowledge holders and heads of family groups within the contemporary cultural framework, senior Traditional Owners were invited to take part in interviews to share information, build relationships and shape the consultation by gathering feedback to guide the wider community workshops. Strategic Small Business Solutions did a series of face-to-face interviews with Traditional Owners in October 2018

Face-to-face interview participant data

In total eight Traditional Owners were interviewed in phase two. The first interview was terminated after it was agreed by all meeting with the Traditional Owner in her home that she was far too unwell to trouble her on that day. Aunty was terribly disappointed to be unable to participate as she expressed that the issue of water sharing was extremely important to her and her family and people.

There was an even gender spread as shown in Table 1. It is important to note that good representation for culturally appropriate consultation is measured not by numbers, but by inclusiveness of family groups and communities. In total, these Traditional Owners represented seven different family groups, more than 5,000 different people and spoke for a broad range of communities and different areas of Wadi Wadi Nation Country. The Nation organisers were included as participants. Consultants travelled more than 1,200 kilometres across the Wadi Wadi Nation and beyond to different locations.

Table 4: Participant Data: Traditional Owner face-to-face interviews

Date	M/F	Governance	Families Represented*	Location
12/10/2018	F	Grassroots	Davies/Wise-Sabina	Koondrook
13/10/20181012018	M	Grassroots	Kennedy	Robinvale
06/11/2018	F	Grassroots	Kennedy	Robinvale
13/10/2018	F	Grassroots	Kennedy/Baxter	Robinvale
13/10/2018	F	Grassroots	Ingram	Swan Hill
13/10/2018	M	Grassroots	Jackson	Balranald
14/10/2018	M	Grassroots	Firebrace	Echuca/Moama
14/10/2018	M	Grassroots	Firebrace/Morrison	Echuca/Moama
14/10/2018	F	Grassroots	Firebrace/Kennedy	Echuca/Moama

*Family groups represented do not necessarily correspond with surnames of participants.

Face-to-face interview participant identification process

Traditional Owners from these groups were invited to be participants, always with guidance from the Nation organisers:

- grassroots Traditional Owners on the stakeholder list, as provided by the Nation organiser
- further suggestions from interview participants, while on the ground
- Native Title applicants on the stakeholder list, as provided by Native Title Services.

Best practice culturally appropriate consultation dictates that the Nation organiser arrange with the Traditional Owner/s a time and location of their choice to meet the consultants Strategic Small Business Solutions. If the Traditional Owner/Owner's were then comfortable, an interview was done once consent was confirmed via data use agreements. SSBS did find, as previously experienced, that in line with culturally appropriate consultation a need to be flexible around booked appointment times and travel plans made with individual Traditional Owners is required along with an ability to adapt quickly to changed circumstances and move forward.

Face-to-face interview process

So that the process could be as culturally appropriate as possible, Traditional Owners were encouraged to choose how they would like the interview conducted, including:

- choice of venues, including own homes, motels, cafes and community venues
- food brought to their home or in a cafe
- options for sharing feedback such as question and answer, walks on Country or photo documentaries
- recording options such as voice recording, note-taking, or both
- on Country trips.

Interviewees were given an information package that included the data use agreement, a consent form, the list of questions and a water resource plan information booklet/workshop notes. Nation organisers introduced all those present to the Traditional Owner/s, including an Aboriginal cultural officer from DOI Water who was at all but two of the interviews. Strategic Small Business Solutions asked Traditional Owner/s how they would prefer to be addressed, thanked the Traditional Owner/s for their time, allowing us to talk to them on Country and paid

their respects to Traditional Owner/s and Elders past, present and emerging. All present yarned comfortably and the data use agreement was then provided and explained to the Traditional Owner/s who freely gave their consent to share knowledge in all cases was freely given. The consultants asked questions with the TO's sharing their knowledge where and when able about Water Sharing and Planning, in their home, in a café, at Nation Organisers and Consultants accommodation and in one case on Country on the riverbank which included a much enjoyed and appreciated visit to the "family camp" which is where the Traditional Owner and his family had lived until 1965 when they were compelled to move into the town.

The consultants asked questions and the Traditional Owner/s shared their knowledge where and when they could about water sharing and planning. This took place in their home, in a café, at Nation Organisers' and consultants' accommodation, and in one case on Country on the riverbank, with a much enjoyed and appreciated visit to the 'family camp' where the Traditional Owner and his family had lived until 1965 when they were compelled to move into the town.

The 'family camp' visit was a rare opportunity to gather information about how significant the water/land connection is to First Nations people, and the time and spiritual journey taken for them to have recreated their 'family camp' is not to be taken lightly (see photos).

Over the course of the face to face interviews journey, it was evident that the more the Traditional Owner/s shared their stories, the more they wanted to, with the consultants receiving phone calls from Traditional Owner/s after the interviews with more knowledge the Traditional Owner/s wished to share. The Nation Organisers did a tremendous job of encouraging attendance at the workshop to be held the week after the Traditional Owner interviews. The interviews appeared to cement the relationships forged between the Nation Organisers, Traditional Owner/s and the consultants. Strategic Small Business Solutions concluded that the face-to-face interviews are integral to effective workshop attendance and participation, and the importance and valuable contributions of the Nation Organisers cannot be overstated.

Face-to-face interviews feedback

The feedback from the Traditional Owners in these interviews will provide a good basis for the workshops and for the overall structure of the findings in this report. From these interviews, the following themes, were drawn out to guide the workshop discussions.

These themes from the interviews were drawn out to guide the workshop discussions:

- water represents 'Life'
- grave concerns over present care of all waterways
- 'special' memories and spiritual and physical cultural connections to the waterways for living and ancestral First Nations people
- accessibility to the waterways
- First Nations management of the waterways
- a firm belief that there are First Nations solutions to present water issues
- financial assistance required to repair damaged waterways.

The Basin Plan, Chapter 10, Part 14 requires that the views of First Nations people on the values and uses of water and a range of other issues including cultural flows, protection of First Nations water values and uses, identified heritage and identification of risks arising from the use and management of water resources are identified for inclusion in the water resource plans. It also requires that First Nations are given the opportunity to actively take part in identifying their own objectives and outcomes.

The feedback gathered in the face-to-face interviews allowed for extensive analysis. The recurring themes that were identified provided the basis for drawing the Wadi Wadi Nation Workshop questions to First Nations participants by aligning to culturally appropriate protocols.

As the Wad Wadi Nation consultation for Water Resource Planning is a collaborative project between New South Wales DOI Water and Victoria's the Wadi Wadi workshops location and venue had been arranged with DELWP under the guidance of the Nation organisers to align with culturally appropriate consultation protocols.

All Traditional Owners we spoke with supported the chosen workshop location and venues.

Phase 3 – consultation

Workshop participant data

A two-day Wadi Wadi workshop was held in Swan Hill Victoria on Thursday 11th and Friday 12th October, 2018. As per MDBA guidelines, this workshop put forward the opportunity for the Wadi Wadi Traditional Owners, along with other Wadi Wadi members to have their voices heard on the values and objectives of water resource planning within their Nations boundaries.

There was a total of 28 participants who signed the attendance sheet including Wadi Wadi members of all ages. There were an estimated 15-20 First Nations people in attendance who signed the attendance sheet. Of the 28 signed in as attending the workshop, 16 signed the workshop participation agreements.

Workshop logistics

As previously mentioned, the workshop logistics in this instance were organised by DELWP and the Nation organisers prior to the collaborative agreement between DOI NSW and DELWP VIC and the engagement of the consultants (SSBS).

The amount of people attending the workshop was more than anticipated based on prior workshop attendance, however less than had indicated attendance to the Nation organisers and DELWP. It is noted that travel costs, at a per kilometre allowance for travel over 100km's to attend and meal costs and accommodation costs were covered by DELWP.

The lunch on the day of the first workshop, followed by afternoon tea and a BBQ dinner were warmly received. The second day breakfast, morning tea and lunch were provided prior to closing the meeting.

This cost covering arrangement may have influenced the larger turnout than anticipated, based on prior workshop attendance, amount of Wadi Wadi Nation members who could travel to Swan Hill based on affordability and a wish to have their voices heard.

Workshop process: day one

All workshop participants and facilitators including consultants, DOI staff, DELWP staff and other organisational representatives met at the riverfront in Swan Hill on the banks of the Murray River as deemed most culturally appropriate by the Nation organisers and Wadi Wadi participants.

Figure 6: Smoking Ceremony – Swan Hill

Image credit: Andrew McMahon, SSBS

- a smoking ceremony was performed and Welcome to Country followed
- all workshop participants and facilitators then travelled to workshop venue, the Grain Shed
- workshops lasted between four to five hours according to the following structure:
  - lunch
  - introductions and acknowledgment of Traditional Owner's and Elders past, present and emerging, thanks for participants time and allowing the workshops on Country.
  - overview of the two-day workshop
  - water planning information session (DOI Water) and (DELWP)
  - data use agreement and consent (SSBS)
  - workshop 1
  - close meeting

All workshop participants and facilitators returned to Swan Hill riverbank for a BBQ.

Workshop process day two

Participants and facilitators met at the Grain Shed for the commencement of the workshop:

- re-cap of previous day
- MILDRIN presentation
- morning tea
- workshop 2
- lunch
- adjourn to Swan Hill riverbank
- close meeting

Data use agreement

SSBS found that the workshop participant agreements were met with a degree of trepidation and mistrust. We conclude that due to the large volume of attendees seated at round tables with other family members, there were mixed views regarding signing any documents perceived to be for the Government and this promoted discussion about the agreement itself.

In comparison, the face to face interview data use agreements were signed without hesitation. Further clarification was sought in some instances and as previously mentioned 16 participants

chose to sign the agreement. Other participants were willing to share knowledge whilst choosing not to sign an agreement. SSBS conclude that more time to address large numbers of workshop participants on an individual or small group basis would be helpful to allaying any concerns about the data use agreements.

Feedback Sessions

Figure 7: Workshop Participants – Swan Hill
Image credit: Andrew McMahon, SSBS

Some factors to consider in the feedback sessions:

- keep it simple
- use 3-4 questions
- use prompts to encourage discussion
- use examples to start conversations use photos, and
- use large colour maps.

Phase 4: analysis and review

Analysis

Qualitative data analysis was used to identify recurring themes in the face to face interviews and the workshop participation feedback. Data was gathered in a formal, yet comfortable forum with house rules applied beforehand so that all felt free to express their views directly and when required forcibly, however always in a civilised and polite and respectful manner. Participants clearly felt comfortable to ask questions of Government representatives and pushback respectfully when the answer was unsatisfactory to them or required further clarification. From this direct approach, honest data was gathered for analysis and is presented in Chapter 11 of the Comprehensive Report.

Review

All face to face interviewees were asked how they would prefer to review the draft report. All wished to be contacted again to review the report on a face to face basis. Those with access to email will be emailed a draft copy before the visit to ensure time has been allowed for a satisfactory review of their input, that the report is culturally appropriate and to request any amendments they deem necessary be addressed.

Recommendations for future consultation process

The following recommendations are made for future culturally appropriate Nation-based consultation rounds in the water resource plan development process:

- the Nation organisers in the Wadi Wadi Nation were crucial to the success of the consultation. Their combined input and guidance proved invaluable and determined accessibility to First Nation Traditional Owners. SSBS recommend the Nation organisers be engaged as early as possible in the process to begin identification of Traditional Owners and to determine the Traditional Owner's views on participating in the interview process
- the importance of the Nation organiser (delegate) cannot be understated and that MILDRIN/NBAN play a more active role in determining the active status of the delegate prior to recommending the delegate to the Department. This may avoid a pressure situation on the delegate when contacted by consultants or the Department if they do not wish to be involved in the process.
- the project timeframes are reviewed to be more in line with more flexible culturally appropriate timelines, therefore allowing for availability for face to face interviews and travel arrangements to workshops.
- the DOI review the DELWP model for funding for workshop participants who are required to travel to attend workshops.

Figure 8: female MLDRIN delegates with a Traditional Owner

Image credit: Andrew McMahon, SSBS

6.3.7 Wamba Wemba

Wamba Wemba is represented in the Wimmera–Mallee water resource plan area through interests in Lake Tyrrell and the Avoca River. On the Victorian side of the Murray, Wamba Wemba Country includes an area around the Loddon River, north to Kerang and Swan Hill, and including the area of the Avoca River.

Engagement with the Wamba Wemba started during the preparation of the Wimmera Mallee Water Resource Plan in 2017-2018. This included meeting with the Wamba Barapa Working Group on 5 January 2018. After receiving the feedback from the MLDRIN assessment, DELWP changed its approach and adopted a Nation-based approach for future engagement.

MLDRIN delegates were contacted initially in August/September 2018 to discuss an engagement plan. It was suggested to involve another representative (referred to as Nation organiser) in planning the engagement because of his knowledge of the area.

After several meetings and phone conversations with each person this approach was agreed:

- to run a Nation meeting so that the engagement approach is inclusive
- to run separate meetings for NSW and Victoria and allow Traditional Owners to decide which meeting they would like to attend
- to run the meeting over a two-day period starting at midday on the first day and finishing at midday on the second day. This will allow people to travel in the morning and afternoon
- it was suggested that on the first day, run a meeting at the Grain Shed in Swan Hill to share information and on the second day conduct a field trip to visit Lake Boga, Round Lake and Turtle Lagoon
- fuel, accommodation and travel costs to be covered by DELWP to support people's participation
- to invite representatives from relevant organisations, including MLDRIN, North Central CMA and Mallee CMA
- First Nations Legal and Research Service to coordinate a mailout of invitations and information as they have up-to-date lists of Wamba Wemba members.

Based on this, the Nation meeting was coordinated mainly by the Nation organiser, with support from DELWP. First Nations Legal and Research Service coordinated a mailout of the invitation to 118 people on 16 October 2018. The mailout included an invitation to the meeting for 30 and 31 October 2018, a fact sheet and questions to think about before the meeting. The Nation organiser also called individuals to inform them about the meeting. Ten Traditional Owners registered for the event and nine Traditional Owners attended the meeting, including three women. One MLDRIN delegate was unavailable to attend as it was held mid-week and it was difficult to take time off work.

DELWP staff included the director of policy partnerships and experts on environmental flows and wetlands, as well as stakeholder engagement staff.

At the meeting on 30 October, the information packs provided included an agenda, information booklet on water resource plans, maps and an extract from the Kerang Wetlands RAMSAR Action Plan. Other resources also available at the meeting included a hard copy of the Wimmera Mallee Water Resource Plan, A0 map of the waterways in the area and fact sheets on environmental flows.

DELWP provided an overview of water resource plans and facilitated a discussion on Aboriginal values, uses, objectives and outcomes by proposing these questions:

- What does water mean to you and your community?

- What are some of your concerns about water management and its impact on Aboriginal use and values?
- How can we improve the water systems in the region?
- What is your vision for water management in the next 5 to 10 years?

Ideas were documented on a white board and included in the workshop minutes. The data use agreement was discussed up front to make sure everyone understood the purpose of the consultation, how the information would be used and to ask for consent to collect information and take photos. Every person signed the data use agreement.

For the field trip on 31 October, presentations were provided by the Nation organiser, Mallee CMA manager of environmental water, and native fish expert from North Central CMA and environmental water officer from the North Central CMA. MLDRIN's Executive Officer was an apology.

It was agreed DELWP would prepare a draft contribution on behalf of Wamba Wemba. The draft was distributed to the Wamba Barapa working group on 11 December 2018 by the solicitor at First Nations Legal and Research Service. There were no content amendment suggestions or objections to the report.

A working group meeting was planned for 23 January 2019 for further discussion and feedback about the draft contribution. This meeting was cancelled due to sorry business and may be rescheduled for February 2019. As a result, any further amendments will be captured in the Northern Victoria Water Resource Plan.

6.3.8 Weki Weki

Weki Weki Nation is represented in the Wimmera–Mallee Water Resource Plan area through interests in Lake Tyrrell, particularly near the area around Sea Lake. Consultation with the Weki Weki has indicated they are on track to submitting their contribution to the Northern Victoria Water Resource Plan at the end of February 2019. Please refer to the following text for the consultation to date and refer to the final version of the Northern Victoria Water Resource Plan for their contribution that is also relevant to the Wimmera-Mallee Water Resource Plan.

MLDRIN delegates were contacted initially in October/November 2018 to discuss an engagement plan. It was suggested involving the Chair of the Weki Weki Aboriginal Corporation in planning the engagement.

After meeting in Wodonga this approach was agreed:

- run a Nation meeting so that the engagement approach is inclusive
- run the meeting at Tooleybuc, NSW, where there is easy access to a meeting room and accommodation
- run the meeting over an afternoon starting at midday and finishing at 5pm
- fuel, accommodation and travel costs to be covered by DELWP to support people's participation
- the Chair of the Weki Weki Aboriginal Corporation contacted Weki Weki members through email, facebook and phone/texts to inform them about the meeting and to register their details with DELWP
- First Nations Legal and Research Services were able to administer the payments before and after the Nation meeting to ensure quick payment.

The first meeting was held on 15 December 2018 at the Tooleybuc Sporting Club. 14 Traditional Owners registered for the event and 16 Traditional Owners attended the meeting, including five women. DELWP staff included the director of policy and partnerships, engagement coordinator, environmental watering specialist, Aboriginal water policy officer and a project officer.

The purpose of the first meeting was to meet and greet and provide an overview of the water resource planning process and invite Traditional Owners' contribution. This was the inaugural meeting between the Weki Weki and a Government agency. Information packs provided included an information booklet, agenda, maps and a data use agreement. Other resources available at the meeting included a hard copy of the Wimmera Mallee Water Resource Plan, A0 map of the waterways in the area and fact sheets on environmental flows.

The meeting was mainly an informal conversation led by the Elders. Weki Weki members were not comfortable signing the data use agreement and emphasised that trust needs to be built before handing over their intellectual property. They agreed to reconsider it once the contribution had been drafted.

DELWP provided an overview of the water resource plans, including timelines, facilitated an informal discussion on preferred means of engagement and water issues and started discussing objectives and outcomes for the Weki Weki people. By the end of the meeting, Weki Weki members expressed interest in developing a contribution and agreed to include a 'placeholder' in the draft report for the Northern Victoria Water Resource Plan. They resolved to meet again in January to prepare a contribution for the final Water Resource Plan. Minutes were taken during the meeting and were used by DELWP, with Weki Weki permission, to start drafting a contribution for the Northern Victoria Water Resource Plan. This was distributed by email before the next meeting.

The second meeting was held on 17 January 2019 at the Tooleybuc Sporting Club. 23 Traditional Owners registered for the event and 19 Traditional Owners attended the meeting, including

seven women. DELWP staff included the manager of the sustainable water strategies, an engagement coordinator and a project officer. A NSW representative attended, as requested by Weki Weki members. He outlined the NSW process for Traditional Owner engagement and observed the meeting.

The purpose of the meeting was to continue working towards a contribution to include in the Northern Victoria Water Resource Plan. The meeting was led by the Elders and there was an informal discussion about values and uses, objectives and outcomes, cultural flows and areas of interest. During the meeting, it was agreed that DELWP would continue working on the contribution based on the conversation, and distribute it by email before the final meeting in February 2019. The final meeting is intended to review the contribution, suggest amendments and sign off on it to be included in the Northern Victoria Water Resource Plan.

During the second meeting, the Weki Weki people mentioned they have interests in Lake Tyrrell particularly nearby the area around Sea Lake. Therefore, the Weki Weki contribution is also relevant to the Wimmera-Mallee Water Resource Plan.

6.3.9 Wotjobaluk Peoples

The Wimmera River, the Avon-Richardson and the lakes and woodlands of the Wimmera and Mallee plains have sustained the Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagalk peoples for thousands of years.

Early discussions with Barengi Gadjin Land Council (BGLC), facilitated by Wimmera CMA in face-to-face meetings held on 20 April 2016 and 20 June 2016, included:

- how to engage Traditional Owners: BGLC said it was the gateway for government engagement
- understanding whole-of-Country planning
- the water resource plan process and the Aboriginal Water Program
- inviting a representative to be part of the technical advisory group
- understanding BGLC's requirement for more resources to determine priorities and values for incorporation into the Wimmera–Mallee Water Resource Plan.

In response to the early meetings, DELWP agreed to engage directly with BGLC and to attend community events at its invitation. DELWP also agreed to fund an Aboriginal water officer position, with contributions from BGLC and Wimmera CMA, to document Traditional Owner aspirations for the Wimmera River system, and prioritise cultural places of significance through community gatherings, site visits and discussions. The project would also seek to identify alignment between environmental watering and cultural objectives and make sure Nations' views on water were fed into the development of the Water Resource Plan.

The project would provide an increased evidence base for Aboriginal watering outcomes based on Traditional Owner values and uses, increased capacity for Aboriginal communities to participate as water users, and increased awareness and appreciation of Aboriginal cultural and customary interests in water.

Outcomes for the project would include an increased:

- evidence base for Aboriginal watering outcomes based on Traditional Owner values and uses
- capacity for Aboriginal communities to participate as water users
- awareness and appreciation of Aboriginal cultural and customary interests in land, water and natural resources
- participation by Traditional Owners in water for economic benefits.

MLDRIN facilitated a DELWP-funded Aboriginal Waterway Assessment on the lower reaches of the Wimmera River. DELWP representatives participated in planning the assessment on 11 November 2016, and attended the waterway assessment with Traditional Owners in 2017.

Broader management issues were discussed in several meetings on 30 September, 11 November and 5 December in 2016 and 13 February 2017 to talk about the impact of farm dams, water priorities for Lake Albacutya and Lake Hindmarsh and potential impacts of climate change.

BGLC and the Aboriginal water officer, Ben Muir, briefed DELWP on-Country about the key cultural assets related to water use and reliability around Horsham and Dimboola on 6 March 2017. This was followed by another meeting on 22 June 2017 between DELWP, the Aboriginal water officer and Wimmera CMA to address issues identified in the Aboriginal Waterway Assessment concerning places of significance to BGLC, including the Ranch and Billabong.

Figure 9: Aboriginal Water Officer Ben Muir, Wimmera River, Dimboola

BGLC's Brett Harrison, Ben Muir, Wimmera CMA and DELWP had several discussions, including face-to-face meetings on 22 June 2017 and 22 August 2017, on formalising the objectives and desired outcomes realised through work including the Wimmera River Aboriginal Waterway Assessment, Country planning and on-Country site visits. It was thought objectives and outcomes could be finalised at the October bark canoe or earth oven events, however Country planning was not complete because the Aboriginal Waterway Assessment report had not been forwarded to BGLC. DELWP attended the bark canoe event on 4–5 October 2017, and the BGLC earth oven event on 20–21 October 2017, and had informal discussions about water with Traditional Owners attending.

In December 2017, DELWP offered to workshop objectives and outcomes for the Wimmera–Mallee Water Resource Plan at the release of the '*Growing what is good*' Country Plan. BGLC offered to meet DELWP and representatives from the Federation of Victorian Traditional Owner Corporations on 24 January 2018 for a roundtable workshop on the objectives and outcomes for the Wimmera–Mallee Water Resource Plan.

These water objectives and outcomes were approved by the Barengi Gadjin Land Council at its board meeting in February 2018 for inclusion in the Wimmera–Mallee Water Resource Plan. These water objectives and outcomes represent Wotjobaluk Nations' recently completed Country Plan, an expression of the aspirations and outcomes for Country planning, with contributions from family groups, regional meetings and whole group gatherings. For that reason the 'Growing what is good' Country Plan is a strong reflection of Wotjobaluk Traditional Owner values. The representative corporation, BGLC, is now tasked with identifying and carrying out actions that address priorities in the plan.

In October 2018 DELWP had discussions with BGLC about a joint meeting on Country on the Avon-Richardson River with neighbouring Traditional Owner group, Dja Dja Wurrung. The topic was raised at the same time with Dja Dja Wurrung. It was agreed that the approved contribution from Barengi Gadjin could be updated to make specific reference to Lake Tyrrell and BGLC's requirement as the Native Title holders to be informed about water works/visits on Lake Tyrrell.

In early January 2019 DELWP worked with BGLC to update the Wimmera-Mallee Water Resource Plan contribution for Board approval.

7. Community consultation: draft Wimmera–Mallee Water Resource Plan

In May 2017, following several months' discussion and engagement with key stakeholders, Victoria released the draft Wimmera–Mallee Water Resource Plan for public comment. The public consultation process with targeted and open consultation sessions helped stakeholders and communities to better understand Victoria's implementation of the Basin Plan. It provided a vehicle for interested parties to have their voice heard through a formal, recorded and publicly accessible response.

The three-month period of public consultation included:

- public meetings
- targeted stakeholder briefings
- presentations at existing stakeholder forums
- online consultation through engagevic.gov.au and accompanying submissions process
- meetings on Country with Traditional Owner groups
- direct contact with stakeholders by email.

7.1 Public meetings

These public meetings were held in Horsham and St Arnaud on the advice of the technical advisory group:

7.1.1 Public meeting 1

Horsham on 21 June 2017

Welcome to Country, Barengi Gadjin Land Council Key points raised:

- Recreational water and its importance to the Wimmera–Mallee
  - while not a requirement in the Basin Plan, recreational water was acknowledged in the draft Wimmera–Mallee Water Resource Plan to recognise the importance it held for stakeholders
- Water for tourism
  - including recognising the economic value of water for tourism
- Uncertainty about Aboriginal values and water uses
- Concern that the west Wimmera groundwater system was not included in the Water Resource Plan as this is where water demand is high.

7.1.2 Public meeting 2

St Arnaud on 23 June 2017

Welcome to Country by Karen Smith, Dja Dja Wurrung

> "To some people water is money. To us, water is life."
>
> **—Karen Smith, Dja Dja Wurrung Clans Aboriginal Corporation**

Key points raised:

- concern over what Aboriginal values and uses for water may mean to existing uses of lakes and rivers

- the importance of water for recreation, including for young people and mental health, not only for sporting activities and tourism
- monitoring the impacts of water volumes given large fluctuations in rainfall and water levels from season to season
- local communities want to contribute on local water issues
- concern about preferential treatment for particular lakes receiving water, and not others
- natural floods being allowed to occur—would the likes of Batyo Catyo receive water naturally under the Basin Plan/local management? Desire to get more water back in Batyo Catyo
- questioning what Victoria will do with submissions—will they be listened to?
- questioning why Walkers Lake received more water - water was pumped
- an observation that Buloke water is wasted.

7.2 Targeted stakeholder briefings

Table 5: Targeted stakeholder briefings

Stakeholdergroup	Key areas of interest	Forum
BioDiversity Catchment Partnership Committee (CPC)	Impacts on delivery of CMA natural resource management objectives	Meeting
Mallee CMA Aboriginal Reference Group (ARG)	Impacts on water quality, and health of Country Aboriginal Waterway Assessments, water resource plan timing and purpose	September 2017
Mallee CMA board	Impacts on delivery of CMA natural resource management objectives	Board meeting
Mallee CMA Land and Water Advisory Committee	Impacts on delivery of CMA natural resource management objectives	Committee meeting
North Central CMA's Wimmera–Mallee Wetland Environmental Water Advisory Group	Priority watering area on the map needs to be updated to incorporate North Central wetlands Aboriginal Water Program and alignment with environmental watering Lake Hindmarsh—impact of holding water in Horsham North Central wetlands are under-represented in the wetlands that have connections to the pipeline	Meeting 26 July 2017, Donald
Wimmera Development Association	West Wimmera groundwater exclusion from the water resource plan Study underway to look at economic value of recreational water in the region— Wimmera Development Association to provide copy to DELWP on completion	Meeting 14 June 2017, Horsham

continued

Stakeholdergroup	Key areas of interest	Forum
Wimmera and Glenelg Bulk and Environmental Entitlement Holders—Storage Manager Reference Group	Draft Wimmera–Mallee Water Resource Plan summarised for information. There was a brief discussion and submissions to the draft were invited	Meeting 14 June 2017, teleconference

Following the public meetings and stakeholder briefings, primary interests within the region included:

- recreational water
  - while not a consideration of the Basin Plan, recreational water was acknowledged in the draft Wimmera–Mallee Water Resource Plan as a high stakeholder priority
- water for tourism
  - including recognising the economic value of water for tourism
- incorporating Aboriginal values and water uses.

Twelve submissions made to the draft Wimmera–Mallee Water Resource Plan followed the themes from consultation—with recreation a keen point of interest, in particular its reliability. Submissions from delivery partners clarified some points specific to the Wimmera–Mallee area.

Two submissions were from community groups (Donald and District Landcare Group and Friends of Lake Wallace), four from peak bodies (the VFF, MLDRIN, Wimmera District Association and Victorian Recreational Fish (VRFish)), two were from individuals and four from government agencies.

7.3 Main points from the submissions

7.3.1 Recreational water

The importance of recreational lakes, including on mental wellbeing, and the economic value recreational water brings to the region. A request was made for the final Wimmera–Mallee Water Resource Plan to refer to the Wimmera Development Association report into the socio-economic value of recreational water.

A desire for recreational water to be more secure, including mention of a permanent water allocation.

Some focus on localised issues, such as ensuring correct information on Lake Batyo Catyo. This signifies how water for local communities is very much concentrated on local resources.

More generally, VRFish wanted the importance of Lake Toolondo highlighted.

7.3.2 Agricultural water

The VFF submission requested no change to how farm dams are managed within a water resource context without strong supporting evidence, consultation and a transition phase.

7.3.3 Environmental water

Localised support for environmental water was included through concern over local assets. The Donald and District Landcare Group made an individual submission supporting environmental water more generally, and the Friends of Lake Wallace group was concerned that West Wimmera was not included in the plan (note: Lake Wallace is outside the Murray–Darling Basin boundary so it cannot be included).

7.3.4 Technical input

Delivery partners including the Wimmera Catchment Management Authority, Grampians Wimmera Mallee Water and the storage manager for the Wimmera-Glenelg system made submissions largely providing better accuracy on some points. They also included suggestions to increase recognition that the water recovery target in the Wimmera–Mallee has been reached as the Wimmera–Mallee area has already met its water recovery target under the Basin Plan. DELWP is working with a Government agency which is seeking clarification around some modelling results and DELWP is confident it can resolve this with the agency directly.

There was concern that recreational water entitlement has lower security than urban or environmental water.

A review on the risk posed by climate change.

The South Australian Department of Environment, Water and Natural Resources asked for clarification or expanded information on several areas. DELWP held a follow-up meeting on 20 November 2011 to discuss these comments and confirm how the Border Groundwaters Agreement between South Australia and Victoria would be documented in the final plan.

7.3.5 Aboriginal water

A submission was made by MLDRIN, which was represented on the technical advisory group by Environmental Justice Australia. MLDRIN acknowledged that the Aboriginal chapter in the water resource plan was a preliminary draft, and that the final chapter would be expected to contain more information following ongoing engagement with Traditional Owner groups.

While the formal consultation period ended in August, DELWP held ongoing discussions with Traditional Owner groups and MLDRIN as it worked to identify Aboriginal water objectives and desired outcomes for inclusion in the final plan. This engagement has been through direct meetings on Country and by providing funding to better support Traditional Owner aspirations for culture and traditional practices, Country, economic development opportunities, and to build relationships and community capacity.

7.4 Preparing the final Wimmera–Mallee Water Resource Plan for submission

Following the public consultation and submission process and receiving final feedback from the MDBA in February 2018, the draft Wimmera–Mallee Water Resource Plan was revised to incorporate all relevant feedback. Some chapters were not altered much, but many chapters were rewritten entirely and the order of presentation of material with the plan was changed. The significant changes between the draft and final document are:

The accredited text for many parts was changed to better address the requirements of the Basin Plan, after extensive consultation and collaboration with the MDBA to develop suitable accredited text.

- A new chapter was created for recreational values with extral content, given the high level of community interest and concern about this in the public meeting and submissions received on the draft plan.
- The risk assessment was finalised based on feedback received on the preliminary risk assessment and the risk chapter was rewritten to reflect the finalised risk and updated risk strategies. Summary information about the risk assessment outcomes and strategies is also included at the start of a number of other chapters to provide context for the approach taken on that issue.
- Additional information on compliance was added into the first chapter and the content from

the review chapter (previously the last chapter) was moved to the first chapter.

- Some of the technical information in the sustainable diversion limits and interception chapters was updated, based on the best available information and feedback from the MDBA to ensure consistency with other Basin states.
- The environmental watering chapter was amended to clarify why no planned environmental water has been identified, and to provide clearer links to the long-term environmental watering plan and extra detail about how unregulated systems are managed in the region.
- The Aboriginal water values chapter was rewritten entirely, as intended, based on the engagement and additional work done between the draft and final plans on identifying Aboriginal objectives and outcomes for water within the area, and other requirements as stated in Chapter 10 Part 14. These changes are the result of the substantial engagement summarised in this document. A copy of the revised Aboriginal water values chapter was sent to each relevant Traditional Owner group and MLDRIN for review before finalisation.
- Discussions and priorities around water from Traditional Owner groups was facilitated by projects and increased capacity, such as the continued funding of Aboriginal water officer positions and their work programs. These included engaging with their own communities through cultural events designed to share knowledge, such as the bark canoe event on the Wimmera River, policy work supported by Victoria with Dja Dja Wurrung Clans Aboriginal Corporation and discussions between Barengi Gadjin Land Council, DELWP and the Wimmera CMA on how to restore the Billabong at The Ranch.

There have also been discussions with Traditional Owner groups to increase understanding of the Victorian water entitlement and management framework, including how to access to water entitlements and use section 8A rights.

The final Wimmera–Mallee Water Resource Plan is a significant step forward from the draft plan released in May 2017. The Victorian Government is now confident that it meets all Basin Plan requirements and addresses the feedback received where required. As well as meeting Basin Plan requirements, the plan will remain a useful reference for the community about how water is managed within the Wimmera–Mallee region and the various opportunities that exist to influence this through planning processes under Victorian legislation.

8. Meeting the Basin Plan requirements

8.1 Section 10.07(1)

Under this section, a water resource plan must contain a description of the consultation carried out. This requirement is satisfied by this report, Appendix D to the Wimmera–Mallee Water Resource Plan, which describes the consultation that occurred to develop the material contained in the Wimmera–Mallee Water Resource Plan before it was submitted to the MDBA.

10.07(1) The Consultation Report contained at **Appendix D** to the Wimmera-Mallee Comprehensive Report describes the consultation in relation to the plan that was undertaken before Victoria gave the plan to the MDBA under section 63(1) of the *Water Act 2007* (Cth).

8.2 Section 10.26(2)

This section requires that a water resource plan be prepared having regard to the views of local communities, including bodies established by a Basin state, that express community views in relation to environmental watering.

The views of local communities identified during consultation on *Water for Victoria*, the Wimmera–Mallee Long-term Watering Plan and during the development of the Wimmera–Mallee Water Resource Plan were taken into account in the preparation of this plan. This requirement is satisfied by this report, Appendix D to the Wimmera–Mallee Water Resource Plan, which describes the consultation that occurred to develop the material contained in the Wimmera–Mallee Water Resource Plan

8.3 Section 10.52(1)(a)

This section requires that a water resource plan identify the objectives of Indigenous people in relation to managing the water resources of the water resource plan area.

This requirement is satisfied as high-level objectives and outcomes of Aboriginal people in the water resource plan area are identified. The high-level objectives and outcomes do not speak to specific objectives and outcomes of individual Traditional Owner groups, but reflect the overarching sentiment that is common to Aboriginal people in the water resource plan area. The objectives and outcomes were originally published in *Water for Victoria*, released in 2016, and have been slightly modified for inclusion in the Wimmera–Mallee Water Resource Plan. The inclusion of these objectives and outcomes in addition to their own specific objectives was discussed and agreed with each of the Traditional Owner groups in the Wimmera–Mallee region.

These high-level objectives and outcomes were identified following extensive consultation on the preparation of *Water for Victoria* and continued consultation with Traditional Owners and Aboriginal Victorians in the water resource plan area during the preparation of this water resource plan. Regard was had to the social, spiritual and cultural values of Aboriginal people and the social, spiritual and cultural uses of the water resources in the water resource plan area. Details about consultation with the Aboriginal people in the water resource plan area are provided in section 7 of this report.

Further detail regarding actions taken to work towards the objectives and outcomes identified are detailed in **Part 8** of the Comprehensive Report. The plan also identifies, where available, individual objectives and outcomes of individual Traditional Owner groups. It is recognised that more work needs to be done to strengthen relationships between Aboriginal people and the water sector, as well as building capacity of the Aboriginal people to take part in water management policy and operational decisions.

The work done as part of developing this water resource plan represents the first steps in a long journey ahead for Victoria's water sector and Victoria's Aboriginal people. Part 8 outlines proposed strategies for continuing this journey together. Of particular relevance is the risk strategy 31 (detailed in **Table 78** of **Appendix B**), which recommits Victoria to continue to invest in work to identify, recognise and include Aboriginal values and objectives for water in water planning so that Aboriginal water objectives can be achieved.

8.4 Section 10.53(1)

This section requires that a water resource plan be prepared having regard to the views of relevant Indigenous organisations with respect to the matters identified under section 10.52 and the following matters:

a. Native Title rights, Native Title claims and Indigenous Land Use Agreements provided for by the *Native Title Act 1993* in relation to the water resources of the water resource plan area

b. registered Aboriginal heritage relating to the water resources of the water resource plan area

c. inclusion of Indigenous representation in the preparation and implementation of the plan

d. Indigenous social, cultural, spiritual and customary objectives, and strategies for achieving these objectives

e. encouragement of active and informed participation of Indigenous peoples

f. risks to Indigenous values and Indigenous uses arising from the use and management of the water resources of the water resource plan area.

The Wimmera–Mallee Water Resource Plan was prepared having regard to the views of Traditional Owners and Aboriginal Victorians with respect to the matters identified under section 10.52 and those listed in 10.53(1) of the Basin Plan. **Part 8** of the Comprehensive Report, and this consultation report, describe the consultation process and consideration of the views of Indigenous organisations, specifically with respect to section 10.52 and 10.53 in the development of the water resource plan.

Specifically:

a. the engagement approach had regard to Native Title and Traditional Owner Settlement Agreements in terms of identifying the relevant Traditional Owner and Nation groups to engage with and in terms of understanding the relevant obligations and responsibilities contained in these agreements.

b. the Water Resource Plan had regard to Traditional Owners with Registered Aboriginal Party status under the *Heritage Act* (Vic).

Traditional Owner and Nation groups were invited to attend the technical advisory Group meetings of key stakeholders and were engaged with regularly throughout to provide opportunities for contribution during the development of the plan. Implementation of the plan will be done largely through the risk strategies detailed in **Table 78** of **Appendix B**. In particular, risk strategy 31 recommits Victoria to continue to implement four actions to support Aboriginal participation in water management and improve outcomes for Aboriginal Victorians. DELWP will seek to continue to fund work which began during the development of the Wimmera–Mallee Water Resource Plan to fully realise outcomes and make sure implementation of the plan is effective.

c. engagement has confirmed Traditional Owner groups are mindful of their intellectual property rights, and wish to maintain these rights. The government continues to work with Traditional Owners and peak bodies on how to realise outcomes without infringing on these rights where there are sensitivities.

d. the engagement approach has sought to encourage active and informed participation of Traditional Owners and Aboriginal Victorians in developing the plan by listening to what they want, how they want to be engaged and what they need to participate, and by funding staff and/or projects to assist where we can.

e. the risk assessment prepared in 2015–16, with input from MLDRIN, identified very high risks to Aboriginal water values and uses in the Wimmera–Mallee Region and a gap in the information available to identify and document Aboriginal water objectives and outcomes. This has been fundamental to the amount of funding and effort that has since been put into engaging with relevant Traditional Owner and Nation groups to develop the final plan, and in particular the water objectives and outcomes identified up until now in **Part 8.3** of the Comprehensive Report. **Part 8.4.1** of the Comprehensive Report describes the risk assessment outcomes relating to Aboriginal values and uses of water in more detail.

Regard was had to the social, spiritual and cultural values of Indigenous peoples and the social, spiritual and cultural uses of the water resources in the water resource plan area as required under section 10.52(2). Consultation with the Aboriginal people in the water resource plan area is detailed in this consultation report.

8.5 Section 10.54

A water resource plan must be prepared having regard to the views of Indigenous peoples with respect to cultural flows.

The Wimmera–Mallee Water Resource Plan was prepared having regard to the views of Indigenous peoples with respect to cultural flows. Cultural flows were also discussed as part of the consultation for *Water for Victoria*. These conversations revealed that cultural flows mean different things to different people and groups of Aboriginal Victorians and, in some cases, the term 'cultural flows' is being used interchangeably with other terms, such as cultural outcomes from shared benefits.

Victoria is pursuing opportunities to further discuss cultural flows and understand the impact of these various views on water resource management. The pathways to achieving this will differ for each water resource (see also section 11.7 of the Comprehensive Report for discussion of cultural flows).

The mid-2018 release of the National Cultural Flows Research Project findings provides an opportunity to engage further with Traditional Owners and Aboriginal Victorians to share knowledge and discuss the findings and desires to progress this work further. Preliminary discussions with each relevant Traditional Owner group during the development of the Wimmera–Mallee Water Resource Plan have determined a clear interest in entitlement, and how that may be progressed requires further discussion and policy development. DELWP is looking at opportunities to use the findings from the National Cultural Flows Research Project in its future engagement on the Northern Victoria Water Resource Plan, as well as broader implementation of Victoria's Aboriginal Water Policy.

Engagement of Aboriginal Victorians in processes for water resource management provides a way for Aboriginal Victorians to identify their existing and future needs for water and to develop pathways to support and improve their spiritual, cultural, environmental, social and economic conditions. Water entitlements and rights were o f t e n discussed through the engagement for the Wimmera–Mallee Water Resource Plan. On a number of occasions the water resource plan

team provided information about water entitlements, the water market, how to access section 8A rights and specifics of the Wimmera–Mallee water entitlement system. Victoria will continue to provide up-to-date advice as required.

While the Wimmera–Mallee Water Resource Plan does not provide for Aboriginal water entitlements specifically, it does not prevent this from happening in future as the increased use of section 8A rights is permitted, groundwater is available within the sustainable diversion limits for the area and water is available for purchase on the water market within the regulated Wimmera River.

It is hoped that the information provided and the capacity built as the plan developed by funding several staff and projects related to Aboriginal water will increase Traditional Owners' capacity to engage effectively in Victoria's water sector to get access to water to meet their objectives in future. It is also hoped that the capacity of the water sector and understanding of Aboriginal values and uses of water has been increased through developing the plan, and this will also help to achieve Traditional Owners' objectives in future.

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Taylors Lake by Chris55