

# Chapter 12. Environmental watering



## 12. Environmental watering

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 planning and management framework

Environmental water management in Victoria's North and Murray water resource plan area is managed under 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 [Chapter 7](#)).

It also supports the environmental water planning and management framework which coordinates and defers responsibility for different tasks to different partners ([section 12.4](#)) 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 12-6](#)).

The Victorian Water Act and the Commonwealth Water Act, including the Basin Plan, set out the objectives for environmental water management 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 Environmental Water Reserve's objective is to preserve the environmental values and health of water ecosystems, including their biodiversity, ecological functioning, quality of water and other uses that depend on environmental condition.

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 supported by the Basin-wide environmental watering strategy ([section 12.5.4](#)) and the long-term watering plans ([section 12.5.8](#)), developed in accordance with Basin Plan requirements.

Planning, delivery and monitoring of environmental watering is carried out by a range of environmental water partners in Victoria and interstate. These are outlined in [section 12.4](#) and [section 12.6](#) and explained further in the long-term watering plans.

## 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) and water shares 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.
2. Passing flow requirements specified for environmental purposes under bulk entitlements or water supply protection area water management plans.
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 water includes that 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 [section 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 [section 4.1](#)).

In northern Victoria, the unregulated systems are tributaries of the larger regulated rivers, or are the sections of the regulated rivers upstream of the reservoirs. There are many unregulated rivers and streams that are important for the environment in the water resource plan areas. As there are no major storages on these rivers and streams, flows in these unregulated systems are largely unmodified.

In unregulated surface water systems there is no held environmental water that can be stored and released from storage to manage for specific and measurable environmental objectives and no priority environmental assets. Environmental objectives in unregulated systems are to protect the existing conditions (habitat), rather than provide a specific flow to meet an environmental objective for example, 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 [section 7.1.2.5](#)). Note that the domestic and stock take is still permitted even during bans which apply to use for irrigation and industry (see [section 7.1.1](#)).

All unregulated surface water systems are undeclared, but not all undeclared systems are unregulated. Regulated systems that are undeclared include, among others, the Coliban system which is regulated to supply water to Bendigo and surrounding towns and rural customers, and the North East Water Benalla system which includes several small urban storages - Loombah and McCall Say reservoirs - which regulate Ryans Creek to supply drinking water to Benalla. In Victoria's North and Murray water resource plan area, there are no bulk or environmental entitlements held by the Victorian Environmental Water Holder in these systems. In these systems, the impact on the environment is managed by limiting the volume of take from the system through the relevant urban water corporation bulk entitlements (which may include passing flows (for small urban storages) which have multiple purposes) and conditions on take and use licences (see [section 3.3](#)).

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 water resources in a defined area. A water supply protection area may be declared for surface water, groundwater or both. This is not the same as 'declaring' a system for the purpose of managing water resources under section 6A of the Victorian Water Act. A legally enforceable Streamflow Management Plan must then be developed for Ministerial release. The aim of these plans is to manage the surface water or groundwater or both resources of the water supply protection area equitably and to ensure the long-term sustainability of the resources. An extensive consultative process is required to prepare the plan.

Improvements and changes to water resource management are possible under the Victorian Water Act and the water entitlement framework provides the processes to protect other users and the environment (see [Chapter 7](#) for more detail).

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. For example, the Ovens system has two relatively small reservoirs, and receives relatively high annual river flows and is sometimes called semi-regulated, while the Goulburn River has two large storages and high consumptive demand, so the impact on the environment from regulation is much less in the Ovens River than in the Goulburn River.

Regulation of river systems has a significant impact on the environmental values of the system. Storages capture water during naturally high flow periods and deliver unnaturally high flow down the river during summer for consumptive use. Storages create barriers to flow connectivity and biota migration. Environmental water is used to lessen the impact of regulation and consumptive uses of water by providing flows for priority environmental assets and priority ecosystem functions (see [section 12.3](#)).

In declared and regulated systems in the water resource plan area, environmental water requirements are met with held environmental water and can also be met through planned environmental water (see [section 12.2.2](#)) and other water (see [section 12.2.3](#)). 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, delivery of water from inter-valley trade accounts, or transfers from storages.

Environmental water in both declared and undeclared systems is protected by the Victorian entitlement framework (see [Chapter 7](#)).

### 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 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 bulk entitlements issued to the Victorian Environmental Water Holder (VEWH) to provide water to be used for environmental purposes
- entitlements such as take and use licences or water shares held by the VEWH, MDBA or CEWH
- water specifically allocated in bulk entitlements for environmental benefit or purposes such as minimum environmental flows

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 can be equivalent to high-reliability entitlement or low-reliability entitlement, or it can be provisional and have reliability as described in the bulk or environmental entitlements.

Held environmental water is protected by the Victorian entitlement framework (see [Chapter 7](#)) 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 [section 7.2.2](#) and [section 15.2.4](#)). Information about the holder of the entitlement, where the water may be taken and used, and the volumes authorised by the entitlement, are described in this register.

[Section 12.4](#) outlines how environmental watering objectives are achieved through the use of held environmental water and supported by planned environmental water or water not

otherwise allocated in the system, including minimum passing flows for system water. Protection and rules for passing or minimum flow obligations are outlined in the respective bulk or environmental entitlement instrument for each system.

The use of held environmental water is often closely integrated with other types of water use. The VEWH works closely with catchment management authorities and storage managers and, where practical, seeks opportunities to adjust the timing and route for delivering consumptive water to achieve environmental objectives efficiently. This can include ‘piggy-backing’ delivery of environmental water on the delivery of consumptive water or passing flow obligations to maximise ecological outcomes (see [section 12.2.3](#)).

Held environmental water in the Victorian Murray and Northern Victoria water resource plan areas, including water held for the Snowy River, is listed here in ([Table 12-1](#)) and in more detail in [Table 3](#) in [Appendix E](#).

**Table 12-1: Summary of environmental water holding**

Water Resource Plan area	Volume (ML)	Reliability	Holder
Victorian Murray	95,931.7	High	VEWH
	112,089.6	Low	VEWH
	174,382.7	Provisional <sup>(a)</sup>	VEWH
	320,779.0	High	CEWH
	25,489.0	Low	CEWH
Northern Victoria	111,731.9	High	VEWH
	196,166.0	Low	VEWH
	45,882.0	Provisional <sup>(a)</sup>	VEWH
	286,454.0	High	CEWH
	30,361.0	Low	CEWH

*a. Provisional entitlements have special rules about when they are made available and where they can be used. For more detail see relevant bulk and environmental entitlements on the Victorian Water Register*

### 12.2.2.2 Planned environmental water in Victoria

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 Victoria’s North and Murray water resource plan area was undertaken to determine where planned environmental water was in northern Victoria. 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

It is 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 outcomes as specified in section 6 of the Commonwealth Water Act. Passing flow requirements tend to serve multiple outcomes as shared benefits and are rarely identified as being for an environmental purpose
- where water is committed or preserved, or 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 committed or preserved water cannot 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 are instances in Victoria's North and Murray water resource plan area where instruments meet the Basin Plan definition of planned environmental water as described here.

These are:

- minimum passing flows available under the Bulk Entitlement (Broken System – Goulburn-Murray Water) Conversion Order 2004
- minimum passing flows available under the Bulk Entitlement (Ovens System – Goulburn-Murray Water) Order 2004
- minimum passing flows available under the Upper Ovens River Water Supply Protection Area – Water Management Plan (2011)

Details of how this water is committed or preserved for an environmental purpose is outlined in [Table 2](#) of [Appendix E](#).

Section 10.09(1) of the Basin Plan also requires identification of associated rules and arrangements relating to the planned environmental water that is identified in [Table 2](#) of [Appendix E](#).

As is outlined above, planned environmental water in Victoria's North and Murray water resource plan area is provided in two ways. Planned environmental water is provided through instruments that regulate water resource management in Victoria under the Victorian Water Act. The provision of planned environmental water is also supported by measures under the Victorian Water Act such as the Environmental Water Reserve and offences for taking water without authorisation. These would be considered 'rules and arrangements' relating to the planned environmental water. The rules and arrangements relating to the planned environmental water identified in [Table 2](#) of [Appendix E](#) are identified for the purposes of section 10.09(1) of the Basin Plan.

### 12.2.2.3 No net reduction of planned environmental water

Section 10.28 of the Basin Plan requires that there is no net reduction in the protection of planned environmental water from the protection provided under state law immediately before the commencement of the Basin Plan.

Of the three identified cases of planned environmental water identified in Victoria's North and Murray water resource plan area, there have been no changes to instruments or rules for the water in the Ovens system.

There was a change to the instrument for the Broken system in 2017 which altered the arrangements to provide flexibility to manage extreme events. The provision provides the ability for the Authority (Goulburn-Murray Water) and the waterway manager (Goulburn-Broken CMA) to agree to a reduction in minimum flows or an increase in maximum passing flows. The two

parties would also need to consider the period required for the change and any necessary monitoring or mitigation. This could occur because of extreme dry conditions, or because of maintenance works or other unforeseen events. A change to reduce the passing flows in a period of extreme dry conditions would have the positive impact of enabling the Authority to run the system for longer.

The change to the rule relating to planned environmental water in the Broken system has not had an effect of causing a net reduction in the protection of the planned environmental water. As there has been no net reduction in the protection of PEW on the following basis:

- while the change introduces an additional discretion as to how the requirement for a minimum passing flow is implemented, the discretion does not reduce the obligation to provide for the passing flow
- the long-term average volume of the planned environmental water is maintained as any change that causes a reduction in the passing flow will result in the environmental passing flow to be delivered over a longer period of time during extreme dry events
- the rule maintains the requirement to meet the environmental objectives through the requirement to mitigate any impact of the exercise

The assessment of what mitigation measures are required will be made at the time of exercising the discretion to change the minimum passing flow in the Broken system. On this basis, Victoria will report under Schedule 12 of the Basin Plan what discretion was exercised so that it did not cause a net reduction in planned environmental water.

**The following is proposed accredited text for the purposes of section 10.28 of the Basin Plan:**

The protection of the planned environmental water identified in this Index in response to section 10.09(1) of the Basin Plan is provided by the relevant bulk entitlement or management plan that specifically provides for the commitment or preservation of that water for environmental purposes. There has been no change to the rules relating to planned environmental water since 2012 in the following instruments:

- a) Bulk Entitlement (Ovens System – Goulburn-Murray Water) Order 2004
- b) Upper Ovens River Water Supply Protection Area Water Management Plan (2011)

As there has been no change to the instruments that protect the identified planned environmental water there has been no net reduction in the protection of planned environmental water. Nothing in Victoria’s North and Murray Water Resource Plan lessens the protection of planned environmental water.

Bulk Entitlement (Broken System-Goulburn-Murray Water) Conversion Order 2004 was amended in 2017 that provided for an extreme events measure under clause 12.4 of that Order to address extreme drought in accordance with requirements under Part 13 of Chapter 10 of the Basin Plan. If the entitlement holders wish to amend the entitlement then they must first seek the approval of the waterway manager and must agree to the reduction required, the period it will apply for, the monitoring and any mitigation which is required as part of the action. This is not considered to be a reduction in the protection of planned environmental water, as it does not apply outside extreme drought conditions and supports the continued meeting of environmental watering requirements acknowledging that those requirements may change in drought conditions.

It is not considered that the change to the rule relating to minimum environmental passing flows in the Broken system has the effect of causing a net reduction in the protection of planned environmental water. There has been no net reduction in the protection of planned environmental water in the Broken system on the following basis:

- a) while the change introduces an additional discretion as to how the requirement for a minimum passing flow is implemented, the discretion does not reduce the obligation to provide for the passing flow;
- b) the long-term average volume of the PEW is maintained as any change causes a reduction in the passing flow will result in the environmental passing flow to be delivered over a longer period of time during extreme dry events; and
- c) the rule maintains the requirement to meet the environmental objectives through the requirement to mitigate any impact of the exercise of the discretion

<<end of accredited text>>

### 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. [Section 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 Victoria's North and Murray water resource plan area. *Water for Victoria* (2016) 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.

Environmental water managers work with river operators to identify how all types of water can be best utilised to meet multiple objectives, including those for the environment. They coordinate the delivery of held environmental water with above cap and system water, as well as planned environmental water and consumptive water en route, to meet environmental objectives (see [section 12.2.3](#) and [section 12.4](#)). For example, sometimes the timing and route for delivery of consumptive water can be altered to achieve environmental objectives without using environmental water.

Note that the most effective use of all water in the system is being explored through the combined New South Wales-Victoria-South Australia sustainable diversion limit adjustment project, Enhancing Environmental Water Delivery. This is to be completed in 2024.

#### 12.2.3.1 Above cap

Above cap water is described in [section 7.1.2.4](#). 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, generally after heavy rainfall and 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 [section 12.3.1](#)) and priority ecosystem functions (see [section 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 [section 7.1.2.4](#)). It is managed through obligations on the instruments, in particular entitlement holders' compliance with the conditions of their entitlements.

Environmental water managers consider what system water is in the system when requesting the release of held environmental water from storage. Environmental water managers work together with system operators to identify opportunities to use system water to achieve environmental outcomes. System water can contribute to environmental objectives for priority environmental assets and priority ecosystem functions by requiring the use of less held environmental water than would otherwise be needed if the system water was not present.

### 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. For example, in 2018, the Victorian Environmental Water Holder traded 1,000 ML into the Broken system and worked with Goulburn Broken Catchment Management Authority and the storage operator to release an autumn fresh to improve habitat for waterbugs, aquatic plants and to provide fish passage. The held environmental water (from the trade) was combined with system water in the form of a delivery of water from the inter valley trade account. By working with the storage managers, environment water managers were able to align the timing of environmental releases with the normal of delivery of the inter valley trade account which meant that less environmental water needed to be used to achieve the environmental flow objectives of the autumn fresh.

### 12.2.4 Protection of water that contributes to environmental objectives

While above cap water and system water, including many passing flows in the 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 [section 7.1.2.4](#).

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 the Murray and Goulburn systems, early reserve rules mean that system operations water is very secure in these systems. This was recognised in the risk assessment for Victoria's North and Murray water resource plan area which identified this system water as having high reliability and being less susceptible to variations in availability.

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. For example, the Upper Ovens River Water Supply Protection Area - Water Management Plan (GMW, 2012) provides for environmental minimum flows to address risks to the environment. The Management Plan provides for restrictions on take and rules for trade.

Water supply protection areas are also used to manage risks to the structural integrity of aquifers or impacts on water resources where there are significant hydrological connections between surface water and groundwater. This is discussed further in [section 3.3](#).

### 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* (DELWP, 2016) 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 [Chapter 8](#) and [Chapter 13](#)).

Traditional Owner values and uses of water and cultural knowledge are increasingly being recognised 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 northern Victoria, see [Chapter 8](#).

Traditional Owner objectives for water may overlap with environmental water objectives at times, but not in all cases. Consideration of Aboriginal objectives must be 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 the Department of Environment, Land, Water and Planning by working with Traditional Owners.

### 12.3 Priority environmental assets and ecosystem functions

A wide range of aquatic native plants, wildlife and ecosystem processes in Northern Victoria and the Victorian Murray water resource plan areas rely on wetlands and rivers. Those wetlands and rivers that can be managed for environmental outcomes with held environmental water are categorised as priority environmental assets. Ecosystem functions that support these ecological values include geomorphological condition and hydrological connectivity. For the purposes of Basin Plan, a set of priority ecosystem functions have been identified.

The priority environmental assets and priority ecosystem functions to benefit from environmental water planning and management arrangements are detailed in the Victorian Murray and the Northern Victoria long-term watering plans. These plans also set out associated environmental watering requirements.

Note that no separate watering requirements have been set for the priority ecosystem functions because they fit within the objectives set for the priority environmental assets.

#### 12.3.1 Priority environmental assets

The priority environmental assets for the Northern Victoria and Victorian Murray water resource plan areas are water-dependent ecosystems (rivers, wetlands, or floodplains) that can be managed with held environmental water to meet specific environmental objectives. The priority

environmental assets support ecological values<sup>7</sup> 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.

A list of the priority environmental assets is in [Table 4](#) of [Appendix E](#). These assets are also identified in [Figure 12-1](#) and [Figure 12-2](#) in this section. Note that minor updates have been made to the list of priority environmental assets since the 2015 long-term watering plans were completed, including the removal of several assets that cannot be managed with held environmental water. These changes are purely editorial, and do not reflect a change to Victoria's policy.

In the future, however, the priority environmental assets may change to reflect the latest technical information and prioritisation by catchment management authorities. 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 Victoria's North and Murray Water Resource Plan is accredited.

Many more waterways in the Northern Victoria and Victorian Murray water resource plan areas, such as unregulated rivers noted in the long-term watering plans, 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.

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

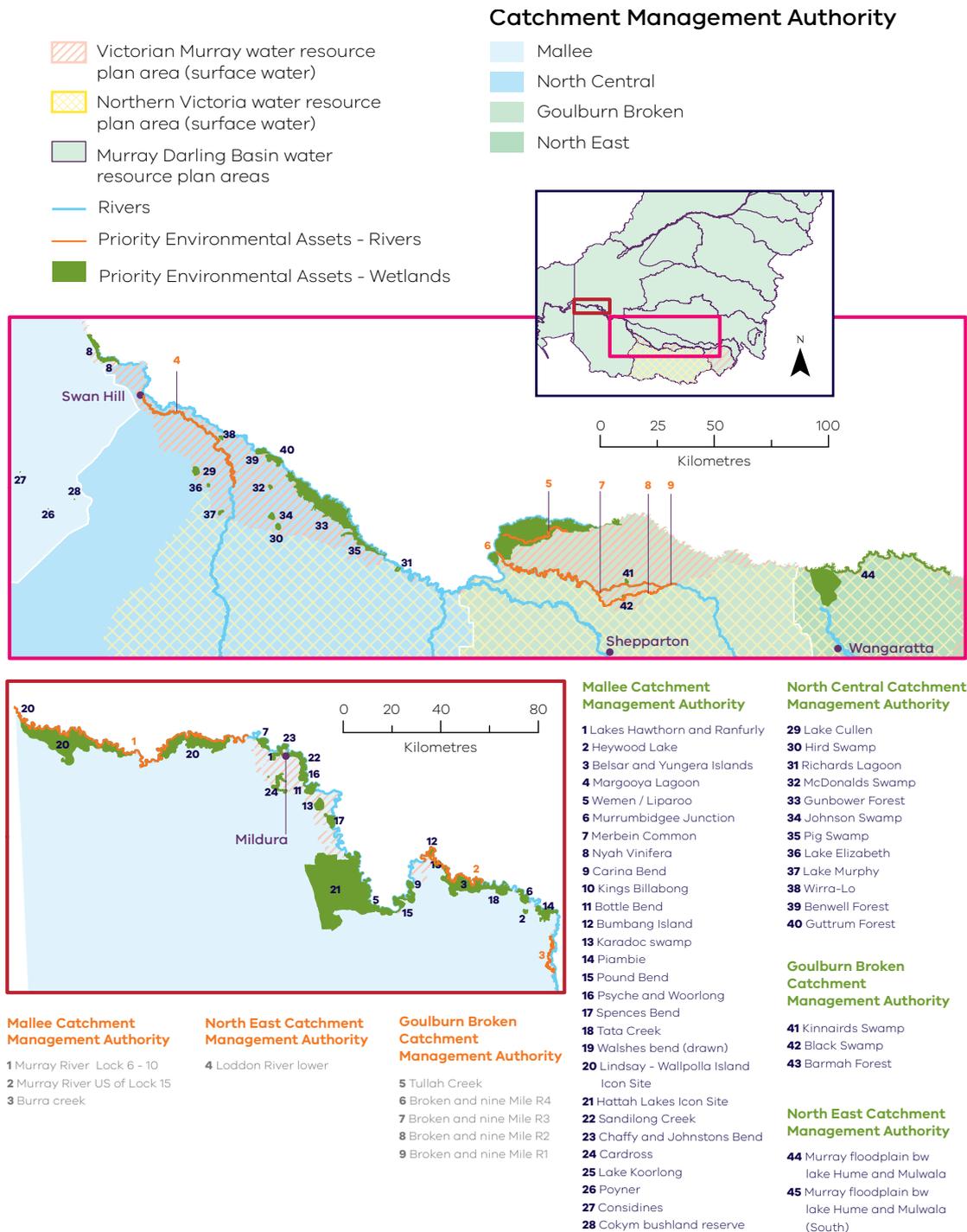


Figure 12-1: Priority environmental assets in the Victorian Murray water resource plan area

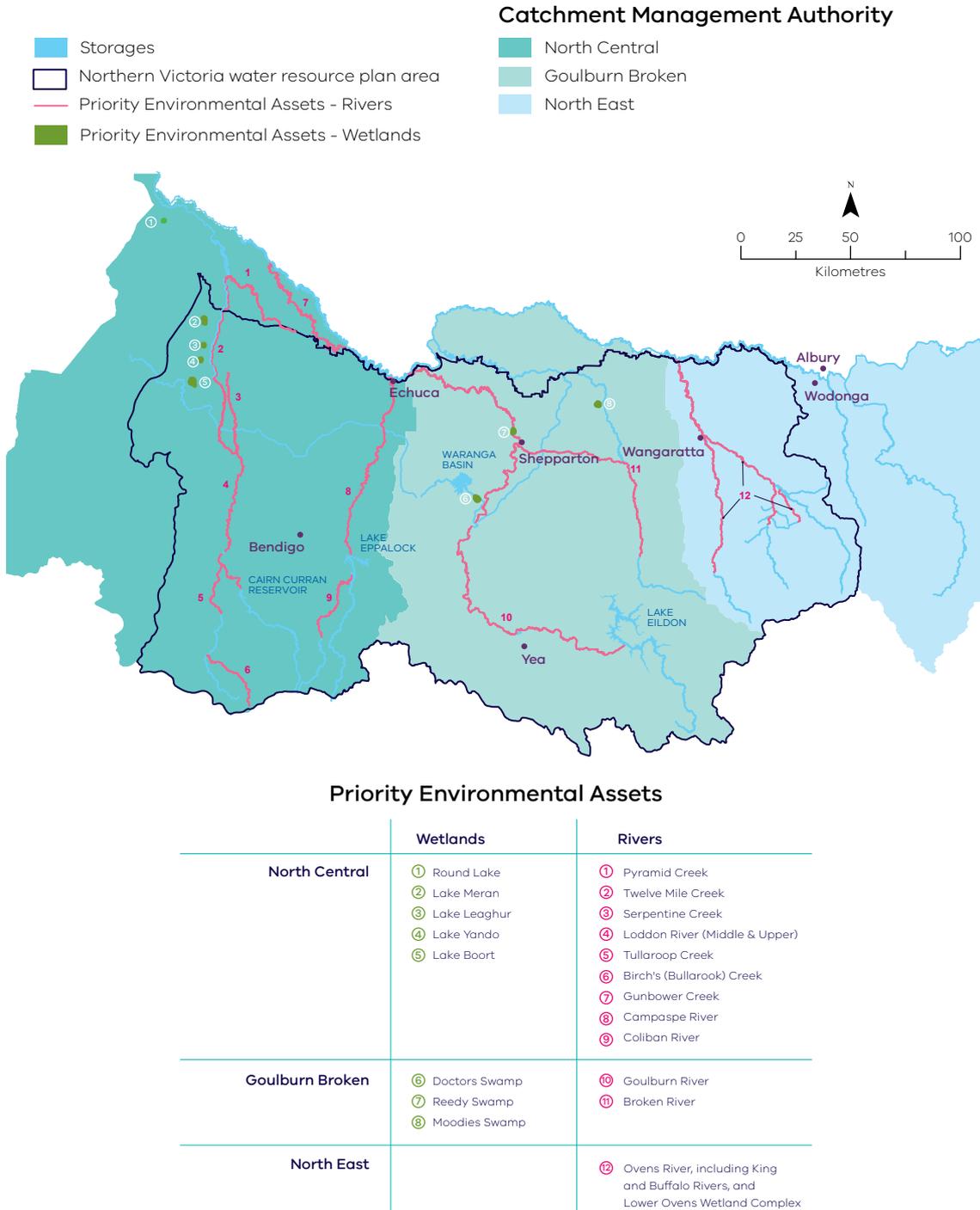


Figure 12-2: Priority environmental assets in the Northern Victoria water resource plan area

**12.3.2 Priority ecosystem functions**

Ecosystem functions are the fundamental physical, chemical and biological processes that support environmental assets. These can include 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 (Alluvium, 2010).

The long-term watering plan identified two priority ecosystem functions for the Victorian Murray water resource plan area and three for the Northern Victoria water resource plan area. The priority ecosystem functions meet criteria in Schedule 9 of Basin Plan, as outlined in the long-term watering plan. The priority ecosystem functions are important in all waterways and can be supported by all water types including held environmental water, planned environmental water and unregulated flows. For example, planned environmental water in the Ovens system supports longitudinal hydrological connectivity and geomorphic habitat. Priority ecosystem functions were taken into account during the risk assessment. See [Appendix B](#) for more information.

**Priority ecosystem functions in the Northern Victoria water resource plan area**

Ecosystem Function	Schedule 9 criteria	Function characteristics
<b>Longitudinal hydrological connectivity (between river reaches and the River Murray)</b>	2 3	Supports the transportation and dilution of nutrients, organic matter and sediment  Provides connections along a watercourse (longitudinal connections)
<b>Water quality (that allows for ecosystem processes)</b>	1 2	Supports the creation and maintenance of vital habitats  Supports the dilution of carbon and nutrients from the floodplain to the river system
<b>Geomorphic habitat</b>	1	Supports the creation and maintenance of vital habitats

Source: Long-term watering plan Northern Victoria (DELWP, 2015)

**Table 12-2: Priority ecosystem functions in the Victorian Murray water resource plan area**

Ecosystem Function	Schedule 9 criteria	Function characteristics
<b>Lateral hydrological connectivity (between floodplains, anabranches and wetlands)</b>	2 4	Supports the transportation and dilution of nutrients, organic matter and sediment  Provides connections across floodplains, adjacent wetlands and billabongs (lateral connections)
<b>Water quality (that allows for ecosystem processes)</b>	1 2	Supports the creation and maintenance of vital habitats and populations  Supports the dilution of carbon and nutrients from the floodplain to the river system

Source: Long-term watering plan Victorian Murray (DELWP, 2015)

**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 Victorian Murray and Northern Victoria water resource plan areas support four of the Murray-Darling Basin's Ramsar sites. These are all priority environmental assets and are supported by priority ecosystem functions. Three of the four Ramsar sites are Living Murray Icon sites.

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 [www.environment.gov.au/water/wetlands/publications](http://www.environment.gov.au/water/wetlands/publications).

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

- 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 Victoria's North and Murray 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, legislation, investment, partnerships and on-ground actions.

#### 12.3.4 Groundwater dependent ecosystems

Groundwater-dependent ecosystems are important environmental features of the Goulburn-Murray water resource plan area. They rely on groundwater for some of their water needs, and include river reaches that receive groundwater discharge ('gaining reaches'), and wetlands that connect to shallow aquifers.

For the purposes of this water resource plan, the priority environmental assets known to have a groundwater connection are listed in [Appendix E Table 5](#) to [Table 8](#). While these priority environmental assets rely on groundwater for part of their water needs, their environmental watering requirements are managed with held environmental (surface) water. Protection of the groundwater at these sites is outlined in [section 3.3](#).

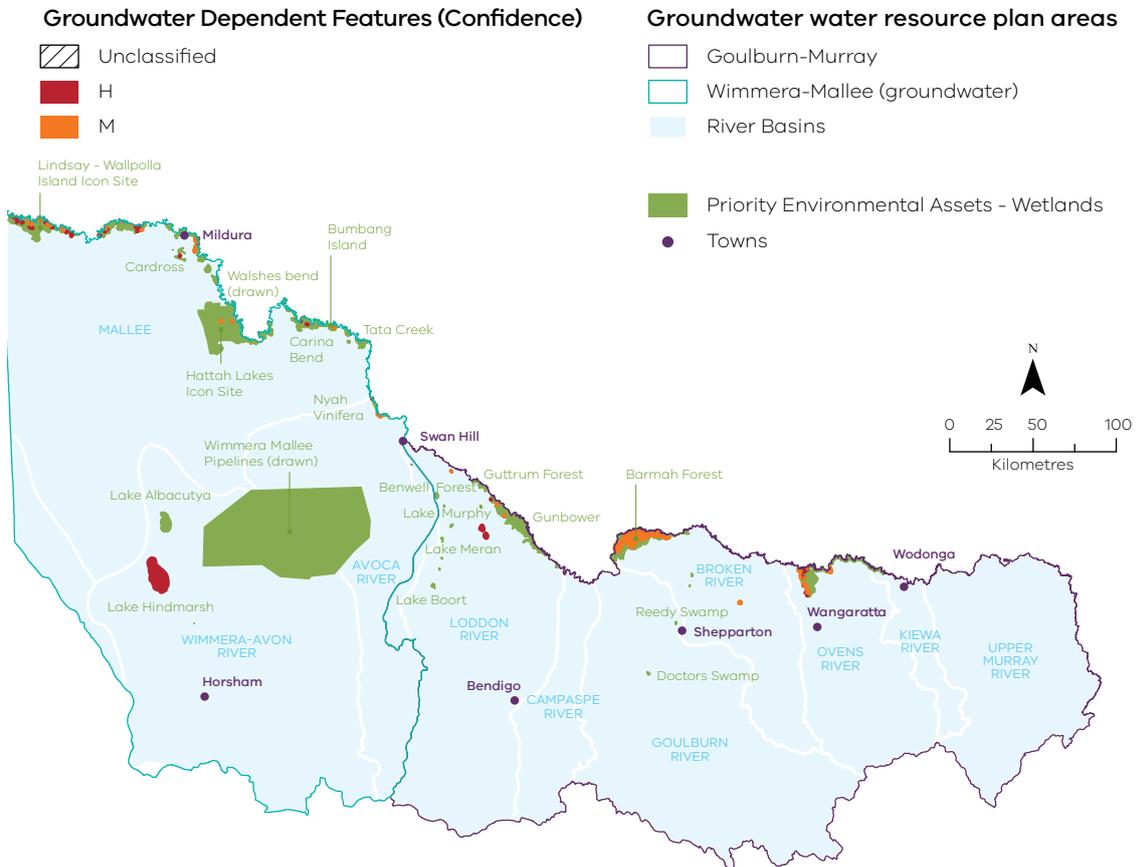
The potential groundwater-dependence of the priority environmental assets across northern Victoria are shown in [Figure 12-3](#) and [Figure 12-4](#). This information is based on the Bureau of Meteorology GDE Atlas (BOM, 2012) and, where in existence, individual river reach assessments. The confidence levels of groundwater-dependency of each priority environmental asset is listed in [Table 5](#) to [Table 8](#) of [Appendix E](#).

For more information about how groundwater-dependent ecosystems are protected see [section 12.7](#).



**Figure 12-3: Confidence levels of groundwater dependence in river priority environmental assets**

Source: (Groundwater Logic, 2018)



**Figure 12-4: Confidence levels of groundwater dependence in wetland priority environmental assets**

Source: (Groundwater Logic, 2018)

## 12.4 How does environmental watering happen?

Water for the environment is managed and delivered through key partnerships and actions:

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

The roles of the DELWP, VEWH, CEWH, CMAs and water corporations as the principal managers of environmental water in Victoria are explained further in this section.

**The following is proposed accredited text for section 10.26(1) of the Basin Plan:**

- 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 considering both regulated and unregulated surface water systems.
- d) Where water contributes to meeting the obligation under paragraph (a) above the Minister will, to the extent practicable and subject to any potential third-party impacts, use best endeavours to support the continued long-term contribution of that water in a system when managing authorisation to take water from Victoria's North and Murray water resource plan area.

*"managing authorisation to take"* includes, for the purposes of paragraph (b) above, approval of new entitlements, transfer of entitlements, conditions relating to minimum passing flows, restrictions on take responding to availability.

**Note:** see response to section 10.08(2) of Basin Plan above which requires holders of a water access right (entitlements) to comply with the conditions of that right. See also response to section 10.11(1) which sets out rules to prevent actual take does not exceed permitted take.

<<end of accredited text>>

#### **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 [section 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 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 and the Arthur Rylah Institute also do long-term intervention monitoring of held environmental water in rivers and wetlands under the Victorian Environmental Flows Monitoring and Assessment Program and 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 [section 15.6.1](#))

#### 12.4.2 Victorian Environmental Water Holder (VEWH)

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 VEWH water holdings.

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

- a) *manage the Water Holdings for the purposes of:*
- b) *maintaining the environmental water reserve in accordance with the environmental water reserve objective*
- c) *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 in which the VEWH is required to operate.

This includes the requirement to develop:

- a four-year corporate plan
- an annual seasonal watering plan ([section 12.5.11](#))
- seasonal watering statements as required
- an annual report which is required under the *Financial Management Act 1994 (Vic)*

The Government's expectations of the VEWH are outlined 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.

One of the Victorian Environmental Water Holder's roles is to coordinate with the Commonwealth Environmental Water Holder and the Murray-Darling Basin Authority to authorise use of held environmental water in water resource plan areas and to optimise the benefits of all water for the environment in Victorian waterways. Each year the CEWH transfers its water allocations to the VEWH to be used in Victoria and the VEWH takes responsibility for delivering that water in Victoria. The amount then becomes part of the Victorian Environmental water holdings until it is used or transferred back.

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

CEWH carries out the long-term intervention monitoring program across the Murray-Darling Basin, including in the Goulburn River in Victoria. This monitoring will be used in reporting on outcomes of environmental water use for Victoria's first Schedule 12 Matter 8 reporting on environmental outcomes at the asset scale.

### 12.4.4 Catchment management authorities

Catchment management authorities (CMAs) are statutory bodies established by the *Catchment and Land Protection Act 1994 (Vic)*, and have functions and powers under Part 10 of the Victorian Water Act (see [section 6.4](#)).

CMAs are responsible for the integrated planning and coordination of land, water and biodiversity management in each catchment and land protection region. Catchment management authorities are designated waterway managers and have operational responsibility for delivering and managing environmental water allocations controlled and authorised by the Victorian Environmental Water Holder. This includes developing seasonal watering proposals each year for priority environmental assets and environmental water management plans (see [section 12.5.9](#)), which are the basis of the long-term watering plans (see [section 12.5.8](#)).

### 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 services for irrigation, water for the environment.

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 section 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 Victoria's North and Murray Water Resource Plan is:

- held environmental water (refer to [Table 3 of Appendix E](#)) is present only in regulated systems (see [section 12.2.2.1](#))
- planned environmental water (refer to [Table 1 to Table 2 of Appendix E](#)) is present only in the Broken River, the Ovens River, and the Upper Ovens River systems

Other water that supports environmental outcomes, such as above cap and system water, but which does not meet the definition of held environmental water or planned environmental water, is not considered environmental water under the Commonwealth Water Act. These other types of water are therefore not covered by the obligation under section 10.26 of the Basin Plan.

### 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 in the annual and long-term processes. The Victorian Waterway Management Strategy commits all environmental water managers in the Victorian Murray and Northern Victoria water resource plan areas 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 a contribution to the objectives in Part 2 of the environmental watering plan.

[Figure 12-5](#) illustrates how planning works at the Basin and state levels.

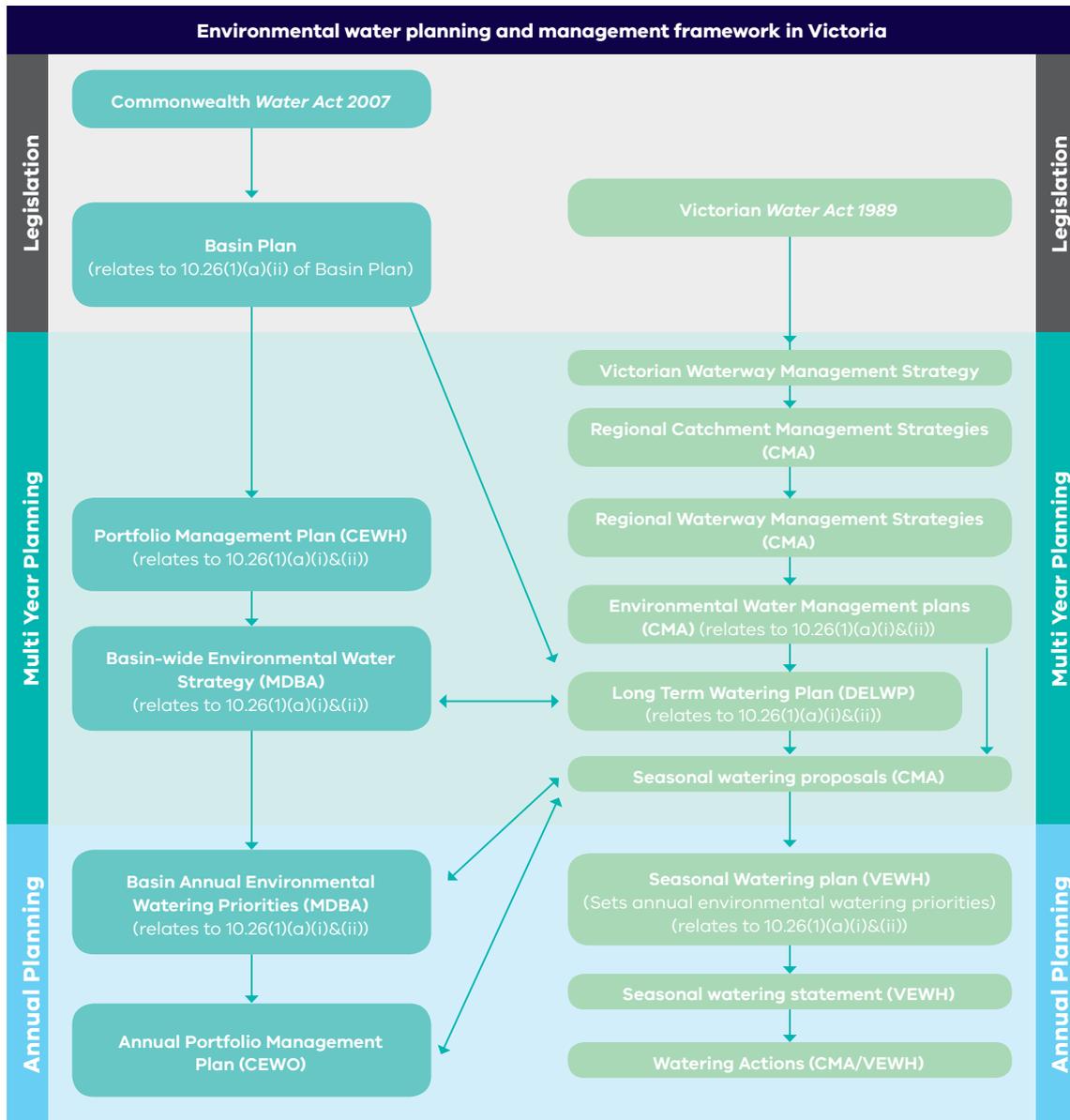


Figure 12-5: Environmental water planning and management framework in Victoria at Basin, state and regional scales

### 12.5.3 Environmental watering plan

Part 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*
  - b) *contributes to the achievement of the objectives in Part 2 of Chapter 8*

#### **12.5.4 Basin-wide environmental watering strategy**

The Murray-Darling Basin Authority 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 community 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 the learning from previous experience and learning 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 in northern Victoria, 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, 2013) describes the Government's state-wide 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 strategy references and makes explicit links to the Basin Plan. Chapter 4 of the strategy sets out the state policies, principles and processes to be followed by catchment management authorities when preparing regional waterway strategies and 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

These are explained in this section.

### **12.5.7 Regional waterway strategies**

The catchment management authorities use a risk-based approach to identify high value waterways and priority management activities. The regional waterway strategies are required to integrate on-ground works with environmental water management in regulated and unregulated systems and make sure environmental water is managed efficiently and effectively.

For each management unit such as a river reach or wetland these strategies:

- describe the environmental values of waterways
- identify threats to these values
- establish management objectives for the waterways after consultation
- determine priorities for management
- establish targets
- identify activities to achieve targets
- estimate the costs of the activities

The North East, Goulburn Broken, North Central and Mallee regional waterway strategies apply to the Victoria's North and Murray Water resource plan.

Infrastructure can be used to improve the watering system and environmental watering outcomes. These can enable more efficient use of the water holdings and overcome barriers to

the migration of plants and animals. Other on-ground works are also used to improve the biophysical condition of rivers, such as reinstating in-stream woody vegetation habitat or fencing out livestock. These works are considered complementary measures to environmental watering and are as vital as flows to environmental outcomes and condition.

### 12.5.8 Long-term watering plans

Long-term watering plans are a state responsibility under the Basin Plan Chapter 8 Environmental watering plan.

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

Victoria has prepared one for the Victorian Murray water resource plan area (DELWP, 2015) and one for the Northern Victorian water resource plan area (DELWP, 2015). The long-term watering plans for the Victorian Murray and Northern Victoria water resource plan areas are available online.

Appendix 1 of the long-term watering plans shows how they meet 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
- being consistent with relevant international agreements

The Victorian Murray and Northern Victoria long-term watering plans collated environmental water management plans' environmental objectives for priority rivers, wetlands and ecosystem functions.

They inform:

- Victoria's annual watering priorities
- the Basin-wide environmental watering strategy and Basin annual watering priorities
- Victoria's North and Murray Water Resource Plan, particularly environmental watering requirements

### 12.5.9 Environmental water management plans

Environmental water management plans 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 held environmental water.

The plans set out:

- long-term environmental flow objectives for held environmental water
- water regimes required to meet these objectives
- constraints on managing flows
- measures to use available water efficiently
- management arrangements and risks to meeting objectives

The plans draw on watering requirements for rivers detailed in environmental flow studies that are prepared using the best available expert information. Flow studies have been prepared for regulated and some unregulated rivers throughout Victoria and are updated regularly. Flow studies for rivers in the Northern Victoria water resource area can be found on the VEWH's website at [www.vewh.vic.gov.au/news-and-publications/technical-reports2](http://www.vewh.vic.gov.au/news-and-publications/technical-reports2)

Catchment management authorities prepare environmental water management plans using the best available information. They use a collaborative process involving community members, water holders, Traditional Owners, the Department of Environment, Land, Water and Planning, storage managers, experts and a scientific expert review panel.

An environmental water management plan has been prepared for each river and wetland in the Victorian Murray and the Northern Victoria water resource plan areas that receives held environmental water and the plans for these priority environmental assets have been collated in developing the Victorian Murray and Northern Victoria long-term watering plans. Environmental water management plans provide the detailed analysis used by CMAs to prepare seasonal watering proposals each year. All EWMPs can be found at [www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/environmental-water](http://www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/environmental-water).

#### **12.5.10 Seasonal watering proposals**

Catchment management authorities prepare seasonal watering proposals each year using the objectives and flow regimes identified in environmental water management plans and through annual community consultation, in line with the VEWH's guidelines.

The proposals describe desired watering regimes for different climate-based scenarios and take into account:

- the objectives and flow regimes identified in environmental water management plans
- 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

CMAs consult with key local stakeholders including storage managers, public land managers, Traditional Owners and local representatives of interest groups such as Environment Victoria, Victorian Recreational Fishing and Field, Game Management Australia and local community members from environmental water advisory groups when preparing seasonal watering proposals. These proposals form the basis for the state-wide seasonal watering plan the VEWH prepares each year.

Seasonal watering proposals for priority environmental assets in the Victorian Murray and Northern Victoria water resource plan areas are available on the relevant CMA websites.

#### **12.5.11 Seasonal watering plan**

The seasonal watering plan prepared by the VEWH 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 catchment management authorities' seasonal watering proposals inform the seasonal watering plans, along with the MDBA's annual environmental watering priorities and the CEWH's portfolio management priorities.

The seasonal watering plan's objectives are set out in the Victorian Water Act. The plan aims to achieve the objectives by making sure 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 the different water availability scenarios of 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 to the environment such as deteriorating water quality

The VEWH engages with state stakeholder representatives when preparing Victoria's seasonal watering plan.

The current seasonal watering plan is available on the VEWH website at [www.vewh.vic.gov.au/watering-program/seasonal-watering-plan](http://www.vewh.vic.gov.au/watering-program/seasonal-watering-plan).

## 12.6 How are Basin Plan environmental watering outcomes achieved?

### 12.6.1 Overview

As already explained, Basin Plan environmental watering outcomes are achieved through long-term and annual planning, and the delivery of held environmental water combined with other water such as consumptive, above cap, passing flows and system water. Monitoring of environmental watering outcomes informs adaptive management and potential revision of watering objectives in the planning stage. Complementing this are critical measures, also known as complementary measures, that are necessary to achieve an environmental objective alongside water delivery.

The delivery of environmental water outcomes is managed through the state environmental water planning framework outlined in [section 12.5](#). Environmental watering in Victoria's North and Murray 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

Targeted objectives for priority environmental assets and how they relate to Basin Plan objectives are outlined in [Table 9](#) and [Table 10](#) of [Appendix E](#).

When the VEWH is preparing the seasonal watering plan (see [section 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 ([section 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 coordinates its activities with other environmental water holders in northern Victoria, NSW and SA to achieve environmental outcomes at the southern-connected Murray-Darling Basin scale (see [section 12.6](#)).

The VEWH uses trade and carryover to support environmental outcomes (see [section 12.6.6](#)) and uses return flows and piggybacking on system water to get the most efficient and effective use from held environmental water, in line with Victorian policy (see [section 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 located on the Goulburn River. 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.

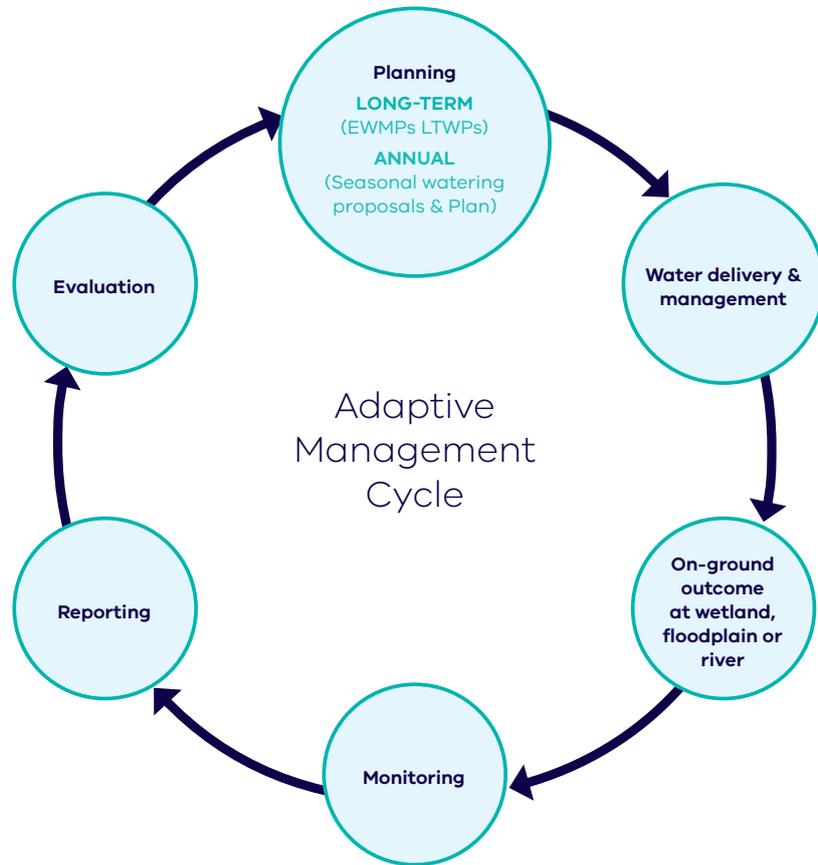
The Victorian Environmental Flows Monitoring and Assessment Program was established by the Victorian Government in 2005 to monitor and assess ecosystem responses to environmental watering in priority rivers across Victoria. Results from the program help inform decisions for environmental watering by 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 Basin 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 12-6](#).



**Figure 12-6: Adaptive management cycle for environmental water**

**12.6.3 Critical 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 measures, also known as complementary measures, are vital to support priority environmental assets and priority ecological functions and meet environmental watering objectives. These measures include 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 systems in Victoria’s North and Murray water resource plan area, and across Victoria’s state borders, is done through cooperative arrangements.

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 VEWH represents the Victorian priorities and objectives at interstate and Commonwealth environmental watering coordination forums to help align and coordinate objectives and outcomes at the broader Murray-Darling Basin scale.

The Basin Plan 2012 environmental management framework objectives (section 8.11) are intended to:

- coordinate the planning, prioritisation and use of environmental water in the Southern Connected Murray-Darling Basin on both a long-term and an annual basis
- enable adaptive management to be applied to the planning, prioritisation and use of environmental water, and
- facilitate consultation, coordination and cooperative arrangements between the Authority, the Commonwealth Environmental Water Holder and Basin states

The Intergovernmental Agreement on Implementing Water Reform in Murray-Darling Basin 2013 states:

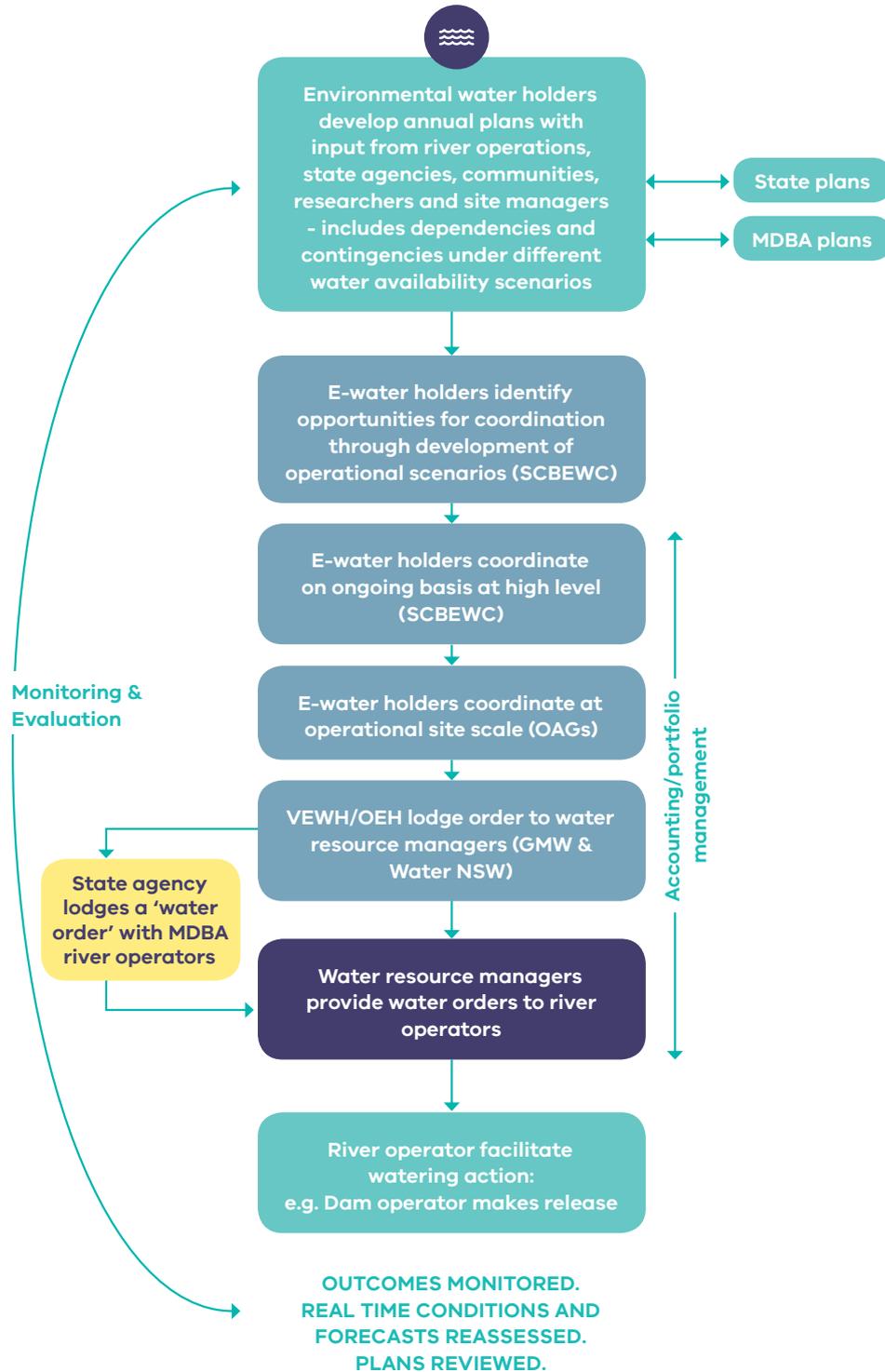
- clause 5.1 - The parties agree that their environmental water holders and managers will work collaboratively, in close consultation and where appropriate by Agreement, in exercising their responsibility in accordance with the Basin Plan Environmental Watering Plan and have regard to the Basin annual environmental watering priorities, as prepared by the MDBA
- clause 5.5 - The parties agree to establish mechanisms to coordinate planning, delivery and monitoring of environmental water

The Murray-Darling Basin Plan 2012 Implementation Agreement (7 August 2013) is established with Basin states under section 1.12 of the Basin Plan. This establishes the Environmental Water Working Group under the Basin Plan Implementation Committee. The Environmental Water Working Group undertakes advice on policy and planning issues relating to the environmental watering plans, including the Basin-wide watering strategy, long-term watering plans, Basin and Basin state annual environmental watering priorities, local engagement, accounting for environmental water use and environmental water delivery.

The Implementation Agreement also states the parties agree to establish an Environmental Water Holders and River Operators Coordination Forum. This forum is now known as the Southern Connected Basin Environmental Watering Committee (SCBEWC), and has these features:

- Purpose: To support the operational coordination of environmental water delivery in the southern-connected Basin in line with the environmental watering plan, the water quality and salinity management plan and the annual environmental watering priorities, so as to achieve the best environmental outcomes. The committee will not be a decision-making body but will be a mechanism to coordinate environmental watering activities to ensure decision makers, namely environmental water holders, managers of planned environmental water and river operators, can act on the best information, in accordance with their statutory responsibilities.
- Membership: Environmental water holders and managers of planned environmental water, key river operators and waterway managers

The Southern Connected Basin Environmental Watering Committee works to coordinate the delivery of all environmental water in the southern-connected Basin and in particular the River Murray system, including the allocation and management of The Living Murray portfolio, consistent with the Basin Plan Environmental Water Plan and its objectives.



**Figure 12-7: Process for coordinating environmental watering in the River Murray system**

State plans include Long Term Watering Plans and Regional Annual Priorities. MDBA plans include Basin Annual Priorities (Basin Plan 2012 Chapter 8) and the Annual Operating Plan for River Murray System

Source: Murray-Darling Basin Authority

**Key responsibilities of the Southern Connected Basin Environmental Watering Committee include:**

- coordination of operational planning for the delivery of environmental water consistent with the Basin Plan Environmental Management Framework (section 8.10)
- prioritisation of River Murray Unregulated Flows
- call on River Murray Increased Flows, if resolved to this effect
- input into the development of large scale multi-site environmental watering events and the deviations to river operations that may be required
- convening an annual planning coordination meeting for river operators, state water authorities and environmental water holders for the southern-connected Murray-Darling Basin system

Membership of the Southern Connected Basin Environmental Watering Committee is:

- Australian Government's Department of Environment
- Commonwealth Environmental Water Holder
- Murray-Darling Basin Authority, including River Murray Operations
- NSW Office of Environment and Heritage
- South Australian Department for Environment and Water
- Victorian Department of Environment, Land, Water and Planning
- Victorian Environmental Water Holder
- NSW Department of Industry

The committee's terms of reference include a requirement for an annual report to be provided to the Ministerial Council which reports on the committee's work.

The environmental water holders work together to implement joint watering actions in collaboration with river operators and local communities. The high level of cooperation helps to optimise environmental outcomes within the current water management framework.

Participation in the Southern Connected Basin Environmental Watering Committee ensures an understanding of the broader objectives, planning and context of system-wide environmental water objectives and outcomes and provides for coordination between the relevant states for most the efficient and effective use of e-water across the southern-connected Basin. It also allows for alignment between upstream and downstream watering activities.

At a local level, the Victorian Environmental Water Holder hosts or participates in operational advisory groups (OAG) which focus on sites but incorporate relevant multi-site objectives. Participants include the river operators of Goulburn-Murray Water and/or the Murray-Darling Basin Authority, the CEWH, VEWH and The Living Murray as water holders, catchment management authorities and other stakeholders depending on the site, such as environmental water managers from SA or NSW and land managers.

The purpose of the operational advisory groups are to provide a forum to share technical and operational information between all environmental water holders, site managers and river managers for efficient operational coordination for environmental outcomes or watering actions. The group enables operations to be adjusted as conditions change, risks to be appropriately managed and successful results of water delivery. **Figure 12-8** shows an example of environmental watering as agreed by the relevant state agencies.

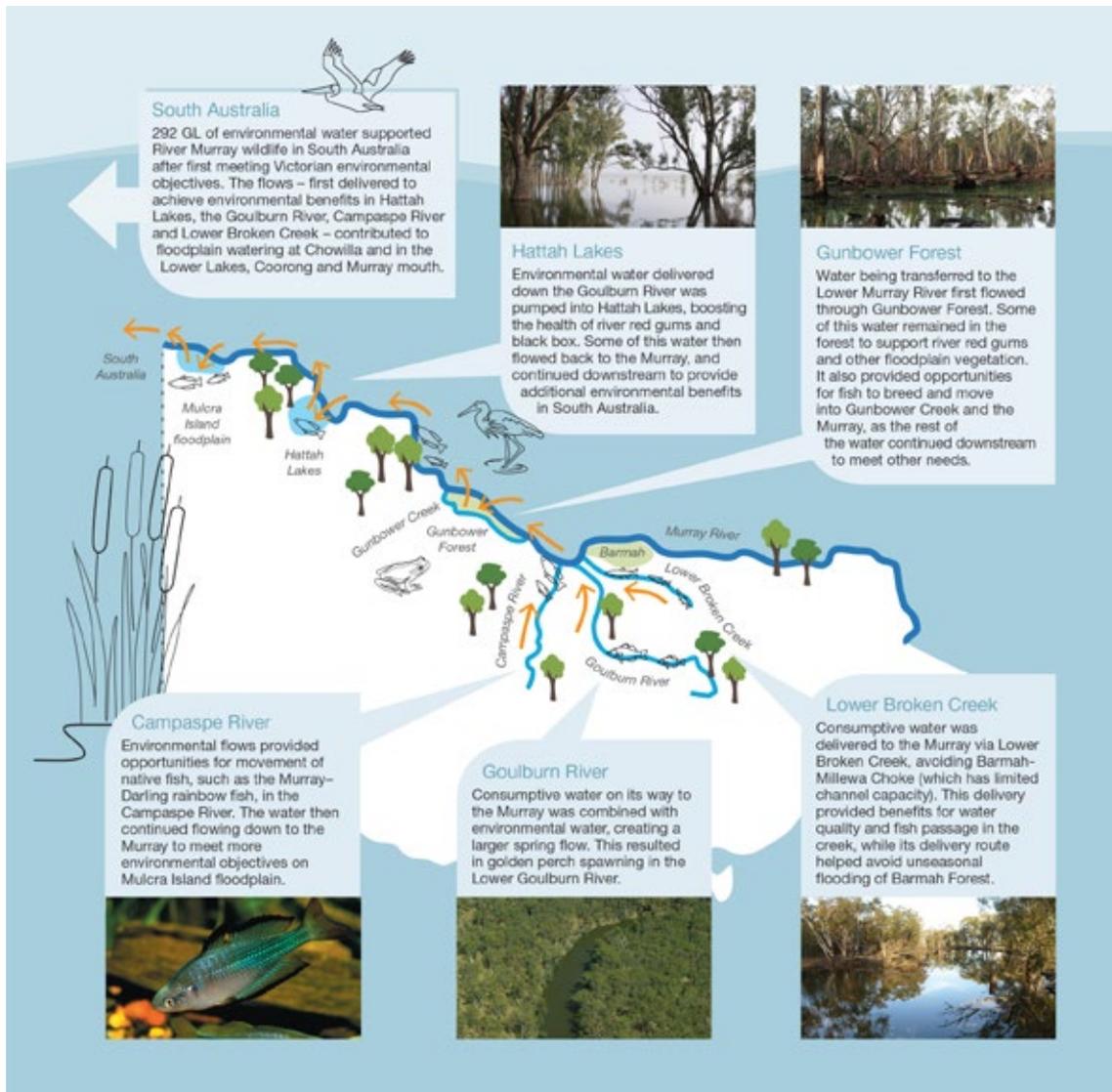


Figure 12-8: Victorian Environmental Water Holder coordinated watering and tools

Source: VEWH

The following is proposed accredited text for the purposes of section 10.27 of the Basin Plan:

When the VEWH undertakes environmental watering in accordance with the obligation under section 10.26 of the Basin Plan, VEWH must ensure that environmental watering in the Victorian Murray water resource plan area and the Northern Victoria water resource plan area is coordinated to ensure that the environmental watering objectives of both plan areas can be achieved.

<<end of accredited text>>

### 12.6.5 Operational arrangements

The planning outlined in [section 12.5](#) supports the on-ground delivery of held environmental water.

VEWH issues seasonal watering statements to the catchment management authorities to authorise 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 Goulburn Broken, North Central and Mallee CMAs are available online at [www.vewh.vic.gov.au/news-and-publications/seasonal-watering-statements](http://www.vewh.vic.gov.au/news-and-publications/seasonal-watering-statements).

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, in the case of wetlands, can veto proposed watering actions in some circumstances. By working together, they can also identify opportunities to use system water to support the delivery of environmental objectives.

The VEWH tracks the amount of water used and the return flows that can be used at downstream sites to maximise benefits. It also monitors changes to the operational context over the year and revises or issues 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 trades 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* (DELWP, 2016).

Water trading allows the environmental water managers to move water to the system where it is needed most, and to smooth out some of the variability in water availability across systems and years. The VEWH's framework for deciding whether to carry over water is also published in its water allocation trading strategy (VEWH, 2018).

Applications to trade by environmental water holders are subject to the same rules as all other allocation trades. The following types of trades are used to manage the water holdings:

- operational trades of the VEWH, Commonwealth Environmental Water Office (CEWO) and the Living Murray allocations to deliver environmental flows, such as from the Goulburn system to the Murray system
- operational trades to deliver environmental water to South Australia
- operational trades of VEWH Snowy entitlements in the Campaspe, Goulburn and Murray allocations for environmental flows in the Snowy River

- trades of the VEWH, CEWO and the Living Murray allocations to enable carryover of environmental allocations from one season to the next
- buying and selling water allocations on the market

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. For more information about individual arrangements for access to water see [section 7.2](#). The Commonwealth Environmental Water Holder and the Murray-Darling Basin Authority cannot hold bulk or environmental entitlements because the Victorian Water Act specifies only certain bodies that can hold these.

The VEWH's bulk and environmental entitlements provide it with a right to a share of water in storage and enable it to:

- Divert water from a waterway – e.g. to water an off-stream wetland
- Use water in-stream – i.e. to deliver in-river and approved overbank environmental benefits.
- Have downstream use offset by authorised re-credits, as a result of environmental return flows from tributaries or sites upstream (see [section 12.6.6](#))

Water shares provide entitlement holders with a right to a share of the water in storage, but do not provide any right to the delivery of that water. Consequently, any allocation made available to water shares held by the Commonwealth Environmental Water Holder intended for use in Victoria is traded to the VEWH for delivery under its bulk and environmental entitlements.

This legislative arrangement supports coordinated environmental water delivery by requiring environmental water holders to consolidate resources to maximise environmental outcomes. The VEWH does not currently hold any bulk or environmental entitlements in the Ovens or Broken systems, so environmental water delivery is facilitated in these systems through water-use registrations which can be issued to the VEWH in accordance with the *Water (Resource Management) Regulations 2017*.

Some of the largest trades are the Commonwealth environmental water holdings that are traded to the Victorian Environmental Water Holder to deliver water in Victoria, and unused Commonwealth allocations being traded back to the Commonwealth Environmental Water Holder if they are no longer needed in Victoria.

Water trades carried out by the VEWH and other water holders must comply with trading rules that apply to all water entitlements and allocations.

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 flexibility to manage water availability between seasons, and environmental water managers may trade water if they can get better environmental outcomes from projects supported by funds generated from selling water allocation compared with outcomes from having surplus water.

### 12.6.7 Prerequisite policy measures

Prerequisite policy measures (PPMs) are policy measures designed to maximise the beneficial outcomes of the water recovered for the environment under the Basin Plan. Previously referred to as 'unimplemented policy measures', PPMs are defined in section 7.15 of the Basin Plan as measures consisting of a policy to:

- credit environmental return flows for downstream environmental use or
- allow the call of held environmental water from storage during unregulated flow events

PPMs have been enabled for most declared rivers in northern Victoria for close to a decade through provisions in the Victorian Environmental Water Holder's bulk and environmental entitlements and obligations on GMW in its bulk entitlements. The arrangements have been designed to support the use of environmental water to get the best environmental outcomes without impacting on the security of supply to other entitlement holders. The entitlements enable:

- reuse of return flows (the portion of water that returns to the river or water supply system after an environmental water delivery, and which can be reused for further environmental watering downstream)
- use of consumptive water or system water en route to provide environmental benefit from water on its way through the system; an example is Barmah Choke bypass flows being delivered by way of Lower Broken Creek.
- piggybacking environmental water on consumptive water, system water, or above cap water (i.e. environmental water use is accounted as the additional water on top of other water required to meet flow objectives)

Further details about how Victorian prerequisite policy measures are enduring, fully operable and transparent are being prepared in Victoria's policy document which will be finalised by 30 June 2019.

### 12.6.8 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 risks and strategies for management. See **Chapter 9** of the long-term watering plans.

#### 12.6.8.1 Surface water related risks

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 Management of priority environmental assets and priority ecosystem functions in relation to groundwater and groundwater and surface water connectivity

### 12.7.1 Overview

Because of the connections between surface water and groundwater, the Basin Plan requires Victoria to show how it considers these connections and dependencies when managing environmental water. This is to make sure Victoria has the appropriate mechanisms in place to protect priority environmental assets and priority ecosystem functions.

Part 4 of Chapter 10 of the Basin Plan requires that consideration be given as to whether Victoria's North and Murray 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 that depend on groundwater (section 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 (section 10.19 of the Basin Plan)
- there is no structural damage to an aquifer arising from take within the sustainable diversion limit (SDL), and hydraulic relationships and properties between groundwater systems and within groundwater systems are maintained (section 10.20 of the Basin Plan)

The Basin Plan requires that water resource plans be prepared with regard for whether rules are necessary to make sure that environmental watering requirements are met for groundwater-dependent priority environmental assets and ecosystem functions, and where there is a significant hydrological connection between groundwater and surface water. This is a fundamental consideration in groundwater management across Victoria at all levels, including the Victorian Water Act, Ministerial guidelines, statutory management plans and local management plans (see [Chapter 7](#)). In responding to Part 4 of Chapter 10 of the Basin Plan regard was had to these existing arrangements.

Any rules included in the Plan in response to Part 4 of Chapter 10 of the Basin Plan must have the effect of ensuring that the operation of Victoria's North and Murray Water Resource Plan does not compromise the meeting of environmental watering requirements. As is outlined below, Victoria's North and Murray Water Resource Plan does not contain requirements, obligations, measures or strategies that would cause environmental watering to be compromised. However, in considering whether the Plan should include rules to support environmental watering consideration was given to management of emerging risks to the environment.

It was not considered necessary to provide rules in response to the requirement under section 10.17 of the Basin Plan and therefore this requirement is not addressed below.

It was considered necessary to include rules to address the sections 10.18, 10.19 and 10.20 of the Basin Plan. The proposed rules do not duplicate resource management arrangements that exist in Victorian entitlement framework and that form part of general resource management as operational rules in the Goulburn-Murray water resource plan area. The proposed rules in response to sections 10.18, 10.19 and 10.20 of the Basin Plan were considered necessary in addition to existing arrangements that support authorising the taking of groundwater and system management which includes, but is not limited to, environmental watering.

### **12.7.2 Groundwater resources and connectivity with groundwater water**

The Goulburn-Murray water resource plan area forms the southern portion of the large saucer-shaped geological formation that is the Murray geological basin. Similar to the morphology of the Murray-Darling drainage basin, all groundwater flows in a general north and westerly direction from the Victorian highlands and the Great Dividing Range.

There are four SDL resource units in the Goulburn-Murray water resource plan area. These are:

- Goulburn-Murray: Shepparton Irrigation Region SDL resource unit - All groundwater in the Shepparton Irrigation Region Groundwater Management Area to a depth of 25 metres below the land surface
- Goulburn-Murray: Highlands SDL resource unit - all groundwater in the outcropping Palaeozoic rocks (or the in situ weathered horizon where it is within 5 metres of the surface) from the land surface to 200 metres below the surface
- Goulburn-Murray: Sedimentary Plain SDL resource unit - All groundwater from the land surface to 200 metres below the surface or 50 metres below the base of the Tertiary sediments, whichever is the deeper, excluding groundwater in the Highlands Sustainable Diversion Limit Resources Unit
- Goulburn-Murray: deep SDL resource unit - All groundwater, excluding groundwater in the other SDL resource units

For more information see [Chapter 2](#).

Across the Goulburn-Murray water resource plan area hydraulic connection between groundwater and surface water and groundwater dependent ecosystems is highly variable. There is significant hydraulic connectivity between those groundwater resource units that contain a shallow water table or are directly connected to the water table. Water table aquifers



are primarily the Shepparton formation in the Goulburn-Murray: Sedimentary Plain and Goulburn-Murray: Shepparton irrigation region; areas where the Calivil formation is shallow and aquitard layers are absent; areas where fractured rock of the New Volcanics aquifer are present in the south of the Loddon and Campaspe catchments; and in the unconfined fractured rock in the Goulburn-Murray: Highlands area near water ways.

### 12.7.3 Groundwater resources and connectivity with surface water

Groundwater recharges into the Goulburn-Murray: Highlands SDL resource unit from rainfall into the fractured rock aquifers that occur in the margins of the Goulburn-Murray Basin. Generally, flow paths are short to medium and discharge to adjacent waterways or associated alluvial valleys.

Adjoining the Goulburn-Murray: Highlands SDL resource unit is the Goulburn-Murray: Sedimentary Plain SDL resource unit, which includes (from oldest to most recent) the Renmark formation, the Calivil formation, the Shepparton Formation and Coonambidgal Formation aquifer. The most recent units overlie and confine the older deeper units, however, the depth and thickness of each formation also reflects the shape of the basin.

Groundwater recharge occurs to the Goulburn-Murray: Sedimentary Plain SDL resource unit, mostly from rainfall at its southern and eastern boundaries and as a proportion of throughflow from the Goulburn-Murray: Highlands resource unit. This occurs in places such as the Mid Goulburn area around Nagambie and Avenel, the Lower Campaspe area near Axedale and Goornong, and the Mid Loddon area around Newbridge and Bridgewater. At these locations, the Shepparton Formation is thin, more sandy and transmissive, the Deep Lead aquifers are at shallower depths, and surface water to groundwater recharge is high due to the proximity and connectedness of the main rivers in the area.

Recharge into shallow Shepparton Formation aquifer is also influenced by rainfall and irrigation activities however relatively high salinity levels, particularly in the Shepparton Irrigation region SDL resource area water table discharge is a cause of land salinisation and surface water salinity.

The Goulburn-Murray: deep SDL resource unit underlies the Highlands and Sedimentary plain and is not considered significantly hydraulically connected anywhere.

#### 12.7.3.1 Groundwater dependent ecosystems

The known groundwater-dependence of priority environmental assets in Victoria's North and Murray water resource plan areas are provided in [Table 5](#) to [Table 8](#) of [Appendix E](#).

The Groundwater Logic (2018) study documented the existence of area-specific management arrangements within the statutory groundwater management plans and local area plans that cover Victoria's North and Murray water resource plan areas.

For example, the Lower Campaspe Valley Water Supply Protection Area considered groundwater-dependent ecosystems such as river red gum communities along the Campaspe River. These are found primarily along waterways. The Coonambidgal formation that contains the waterway results in limited connection with groundwater away from the waterway, however, it is well connected to the river. Groundwater discharge occurred to surface water is mainly from the shallow more saline Shepparton formation when the water table is high. Restrictions on water use when groundwater level triggers are intended to limit the drawdown of the deeper formations which will result in limited change to groundwater-surface water relationships along the river, whether gaining, losing or variably gaining and losing.

Similar protections such as permissible consumptive volumes, establishment of trigger levels and having due regard for the environment through considerations in section 40 of the Victorian Water Act (see [section 7.1.3](#)) are set in the other groundwater management plans (local

management plans and Water Supply Protection Area water management plans) across the region to protect groundwater-dependent ecosystems.

Sustainable management of groundwater-dependent priority environmental assets also includes protecting these assets from excessive saline inflows and waterlogging. The Shepparton Irrigation Region Groundwater Management Area Plan, where there are many priority environmental assets, has been established to provide land and environmental protection from high watertables, saline groundwater discharge and waterlogging.

Users are encouraged to pump and use groundwater from the shallow Shepparton and Coonambidgal Formations to lower saline groundwater levels across the region. The priority environmental assets are subject to regular and frequent condition monitoring, coinciding with regular and extensive monitoring of watertable levels and quality across the Shepparton Irrigation Region.

The analysis of priority environmental assets in the Groundwater Logic study (2018) concluded that most of these assets across the Victorian Murray and Northern Victorian water resource plan areas are classified as at low risk from excessive pumping or poor resource management.

The study found that no wetlands were classified above a low risk rating and only four river reaches were classified as being moderate to high risk groundwater-dependent ecosystems. These were two Lower Ovens River reaches and two Broken Creek reaches. However, there are management rules in place for the Lower Ovens River which limit trade adjacent to the river, and the Broken Creek reaches are covered by local arrangements in the Shepparton Irrigation Region Groundwater Management Area Plan.

This study concluded that 'no further recommendations for managing effects on groundwater-dependent ecosystems, other than those that are already in place under Victoria's existing water management framework, are considered necessary' (Groundwater Logic, 2018).

#### **12.7.4 Ensuring environmental watering of groundwater dependent environmental assets and ecosystems is protected (BP 10.18)**

Victoria's entitlement framework supports meeting environmental watering requirements as outlined in (see [section 12.2](#)). Section 10.18 of the Basin Plan requires consideration to be given as to whether the Victoria's North and Murray Water Resource Plan could compromise the meeting of environmental watering requirements for groundwater dependent priority environmental assets and priority ecosystem functions.

In approving a new groundwater licence or a trade regard must be had to the need to protect the riparian and riverine environment under section 40 of the Victorian Water Act. For all licence applications for take and use, the Minister or delegate is obliged to have regard to adverse effects on waterways, the environmental water reserve and to protect the environment, and must not approve an application if it is likely to have a significant impact.

To provide guidance to delegates considering these obligations when assessing groundwater take and use licence applications in areas without a management plan the Minister released Guidelines for Groundwater Licensing and the Protection of High-Value Groundwater-Dependent Ecosystems (DELWP, 2015). These guidelines outline the decision-making process when assessing a new groundwater licence or a trade of a groundwater licence to protect groundwater-dependent ecosystems and consider imposing conditions on the groundwater take and use licence to mitigate those impacts. This set out the requirements for assessing the risk posed by a groundwater licence application to high value ecosystems depending on groundwater and takes a risk-based approach to identify where a proposed groundwater take may result in an impact to a groundwater-dependent ecosystem. The application of this policy ensures that the groundwater ecosystems are not compromised by the taking of groundwater. The Guidelines are outlined below.



Where there is an approved statutory management plan in place for a declared Water Supply Protection Area, the Guidelines for Groundwater Licensing and the Protection of High-Value Groundwater-Dependent Ecosystems are not applied as the prescriptions contained in the relevant management plan apply to all licencing decisions in the Water Supply Protection Area to which the management plan applies.

A statutory management plan is prepared and approved by the Minister following declaration of a Water Supply Protection Area under section 27 of the Victorian Water Act. These plans are prepared to regulate the management of water resources in the declared area. To ensure that statutory management plans meet the requirements of section 10.18 of the Basin Plan, Victoria's North and Murray Water Resource Plan includes a rule that identifies the matters that must be considered when developing prescriptions for a statutory management plan.

As identified above in [section 12.7.1](#) it is not considered that Victoria's North and Murray Water Resource Plan requires would compromise the meeting of environmental watering requirements for groundwater dependent priority environmental assets or priority ecosystem functions. However, rules have been included to address potential emerging risks that may arise during the operation of the Plan to support adaptive water resource management. The rules in response to section 10.18 of the Basin Plan contained in Victoria's North and Murray Water Resource Plan applies to decisions to issue or transfer (trade) a take and use licence for groundwater in the Goulburn-Murray water resource plan area.

As outlined below the proposed rules require the following:

- where no management plan is in place for a declared Water Supply Protection Area, to carry out an assessment to determine the existence of medium or high risk that the take of groundwater in relation to a new licence or the transfer of a licence will have an adverse impact on high value ecosystems dependent on the relevant groundwater and manage that risk; and
- where a management plan is being prepared for a declared Water Supply Protection Area, to consider whether prescriptions are necessary in a management plan to address any risks to the meeting of environmental watering requirements for priority environmental assets and priority ecosystem functions

The application of the Guidelines for Groundwater Licensing and the Protection of High Value Groundwater-Dependent Ecosystems (DELWP, 2015) which is outlined above is consistent with the proposed rule outlined below. The Upper Ovens Case Study provided below in [section 12.7.5](#) demonstrates how the rules provided in that Plan are consistent with the proposed rules below.

### **Ministerial Guidelines for Groundwater Licensing and the Protection of High Value Groundwater Dependent Ecosystems (DELWP, 2015)**

The guidelines are used to determine the likelihood and consequence of any proposed groundwater take impacting on high value ecosystems. The decision maker is required to follow these steps:

- STEP 1. Determine the licence application area and identify any high value ecosystems
  - Determine whether the aquifer is confined or unconfined. Interactions with groundwater-dependent ecosystems mostly occur with unconfined aquifers, so if the aquifer is confined the assessed risk is low
  - Identify any features within that area such as rivers, springs, soaks or terrestrial vegetation containing high value ecosystems
- STEP 2. Determine any likelihood that the proposed groundwater extraction will interact with the feature
- STEP 3. Determine the consequence of the proposed groundwater extraction on the feature
- STEP 4. Determine the risk to the high value ecosystems dependent on groundwater
- STEP 5. Determine how risk will be managed for any groundwater licence applications with a risk assessment of medium or high

Note that these risk mitigations are suggested as examples in the guidelines:

- a) altering the area of impact, such as reducing the entitlement volume, locating the bore in a deeper aquifer, re-siting the bore, undertaking investigations to improve information on the local aquifer
  - b) changing the likelihood, such as increasing the set back distances, modifying the pumping schedule
  - c) changing the consequence, such as modifying the pumping schedule, developing offsets, developing options for supplementing surface water flows
  - d) reducing the risk evaluation through licence conditions
  - e) deciding to undertake further analysis to gain better information and improve the risk analysis
  - f) providing alternative supply to 'at-risk' areas to maintain the high value ecosystem
- STEP 6. Consult with relevant catchment management authority
  - STEP 7. Make final decision

**The following is proposed accredited text for section 10.18(3) of the Basin Plan:**

1. This rule only applies where a statutory management plan has not been approved under section 32A of the *Water Act 1989* (Vic) and groundwater dependent ecosystems have been identified as high value in the Goulburn-Murray water resource plan area.
  - a) the Minister must undertake a risk assessment to determine whether the issue of a new licence or transfer of an existing licence will have a medium or high risk of having an adverse impact on the groundwater dependent ecosystem;
  - b) where a medium or high risk under paragraph (1), before issuing a take and use licence or approving the transfer a take and use licence for the take of groundwater the Minister must consider whether conditions should be imposed on the take and use licence to modify
    - i) the adverse consequences of the take including pumping schedules, offsets, options for supplementing surface water flows;
    - ii) the adverse impact of the take including reducing the entitlement volume or location of the bore
2. Where a water supply protection area has been declared under section 27 of the *Water Act 1989* (Vic) and a statutory management plan for that area has been approved under 32A of the *Water Act 1989* (Vic) the rule under (1) above does not apply.
3. The Minister may prepare guidelines under section 30 of the *Water Act 1989* (Vic) for the preparation of a draft management plan for an area declared under section 27 of the *Water Act 1989* (Vic) to require the consultative committee to consider the matters in paragraph (4) when developing a draft statutory management under section 31 of the *Water Act 1989* (Vic).
4. The guidelines may require the consultative committee to consider whether the draft statutory management plan should include prescriptions for groundwater management having regard to:
  - a) groundwater dependent priority environmental assets and priority ecosystem functions as identified in the Northern Victoria Long-Term Watering Plan and the Victorian Murray Long-Term Watering Plan;
  - b) any risks to meeting environmental watering requirements for those groundwater dependent priority environmental assets and priority ecosystem functions as a result of groundwater take in the area
5. Prescriptions identified in accordance with paragraph (4) may include:
  - a) a requirement to undertake monitoring;
  - b) the period and frequency over which the monitoring should occur;
  - c) the locations at which monitoring should occur;

- d) identified trigger levels to reflect when extraction would pose a risk to the aquifer;
  - e) restrictions that may be applied to the extraction of groundwater under a take and use licence and how the restrictions will be applied;
  - f) conditions on the transfer of take and use licences within or into the relevant water supply protection area
6. In considering a draft statutory management plan under section 32A, the Minister must consider whether the prescriptions included in the draft plan address the types of risks referred in paragraph (4) if identified for the water supply protection area relevant to the draft plan.
7. References to sections of the *Water Act 1989 (Vic)* do not have the purpose of including those sections as part of the response but are included for reference only.

**Note:** for environmental watering obligations and requirements see the response in Column 3 to section 10.26 of the Basin Plan in Victoria's North and Murray Index Table and the supplementary material discussed in Column 5.

<<end of accredited text>>

### **12.7.5 Ensuring environmental watering requirements are met when there is a significant connection between surface water and groundwater (BP 10.19)**

Section 10.19 of the Basin Plan requires consideration to be given as to whether Victoria's North and Murray Water Resource Plan could compromise the meeting of environmental watering requirements where a significant hydrological connection between surface water and groundwater has been identified.

Surface water and groundwater are connected across the Goulburn–Murray water resource plan area to varying degrees and some of this variation is described in [section 12.7.3](#). The hydrologic cycle is evidence that rainfall recharges the groundwater systems and provides streamflow, while groundwater baseflow from the water table sustains streams in between rainfall and runoff events. Many groundwater-dependent ecosystems are also maintained from groundwater resources. The surface water sustainable diversion limit resource units are closely connected to their adjacent groundwater sustainable diversion limit resource units and groundwater planning considers the impact on surface water and groundwater-dependent ecosystems when managing licences and allocations.

In the Central Victorian Mineral Springs Groundwater Management Area, hydrochemistry and isotopic studies have shown (Hagerty, 2008) that the highlands Deep Lead aquifer is rapidly recharged through the overlying basalt aquifer. The studies also show the strong connection between groundwater systems and surface water, with groundwater discharge dominating streamflow at low flows.

Statutory groundwater management plans and local management plans consider the interaction between the surface water and groundwater systems through the application of the Victorian Water Act, regulations and the supporting guidelines. For example, in the Upper Ovens area, the surface water and groundwater resources are managed conjunctively in recognition of the strong degree of connection between the surface water and shallow groundwater systems.

There is a high degree of connectivity between the larger SDL resource units, especially the units horizontally and vertically adjacent to each other. This is shown in [Table 12-3](#).

**Table 12-3: Surface water to groundwater connectivity**

	Connected to these groundwater SDL resource units		
<b>SS2 Victorian Murray</b>	GS8b – Goulburn-Murray: Highlands	GS8c – Goulburn-Murray: Sedimentary Plain	
<b>SS3 Kiewa</b>	GS8b – Goulburn-Murray: Highlands	GS8c – Goulburn-Murray: Sedimentary Plain	
<b>SS4 Ovens</b>	GS8b – Goulburn-Murray: Highlands	GS8c – Goulburn-Murray: Sedimentary Plain	
<b>SS5 Broken</b>	GS8a – Goulburn-Murray: Shepparton Irrigation Region	GS8b – Goulburn-Murray: Highlands	GS8c – Goulburn-Murray: Sedimentary Plain
<b>SS6 Goulburn</b>	GS8a – Goulburn-Murray: Shepparton Irrigation Region	GS8b – Goulburn-Murray: Highlands	GS8c – Goulburn-Murray: Sedimentary Plain
<b>SS7 Campaspe</b>	GS8a – Goulburn-Murray: Shepparton Irrigation Region	GS8b – Goulburn-Murray: Highlands	GS8c – Goulburn-Murray: Sedimentary Plain
<b>SS8 Loddon</b>	GS8b – Goulburn-Murray: Highlands	GS8c – Goulburn-Murray: Sedimentary Plain	

Across the border, Victorian groundwater SDL resource units are connected to equivalent groundwater SDL resource units in New South Wales where they have similar hydrogeological profiles. The four NSW groundwater SDL resource units that are situated along the border with their Victorian equivalents are shown [Table 12-4](#).

**Table 12-4: Victoria – NSW Groundwater Connectivity**

NSW SDL Resource Units	Victorian Groundwater Resources	Victorian SDL Resource Units
<b>GS20 – Lachlan Fold Belt MDB</b>	Hydrogeologically equivalent to GS8b – Goulburn-Murray: Highlands	GS8b – Goulburn-Murray: Highlands GS8c – Goulburn-Murray: Sedimentary Plain
<b>GS27a – Lower Murray Shallow Alluvium</b>	Hydrogeologically equivalent to GS8a – Goulburn-Murray: Shepparton Irrigation Region and GS8c – Goulburn-Murray: Sedimentary Plain	GS8a – Goulburn-Murray: Shepparton Irrigation Region GS8c – Goulburn-Murray: Sedimentary Plain
<b>GS27b – Lower Murray Deep Alluvium</b>	Hydrogeologically equivalent to GS8c – Goulburn-Murray: Sedimentary Plain	GS8c – Goulburn-Murray: Sedimentary Plain

NSW SDL Resource Units	Victorian Groundwater Resources	Victorian SDL Resource Units
<b>GS46 – Upper Murray Alluvium</b>	Hydrogeologically equivalent to GS8c – Goulburn-Murray: Sedimentary Plain	GS8c – Goulburn-Murray: Sedimentary Plain

Note the connections between the NSW and Victorian units occur at the boundary of the units – that is, the connectivity and potential flow of groundwater will occur at the NSW-Victorian border.

For example, groundwater from the Deep Lead aquifers in the Katunga Water Supply Protection Area unit, being part of the Goulburn-Murray: Sedimentary Plain SDL resource unit, does flow beneath the River Murray and feeds part of the NSW Lower Murray Deep Alluvium SDL resource unit. This is illustrated in various technical studies across the riverine plains area of the Murray geological basin, including investigations of regional groundwater flow across the Basin by Evans (1989), Macumber (1991) and Tickell (1987).

Others have constructed hydrogeological maps that synthesise existing hydrostratigraphic, outcrop geology and geophysical information to understand the cross-border interactions of the groundwater systems in place. This includes, the Murray Basin Hydrogeological Map Series (Evans W. W., 1990), the Bendigo 1:250,000 Hydrogeological Map (Dimos, 1994), and the (Rural Water Commission of Victoria & Fisher, 1990)).

In approving a new groundwater licence or a trade regard must be had to the need to protect the riparian and riverine environment under section 40 of the Victorian Water Act. For all licence applications for take and use, the Minister or delegate is obliged to have regard to adverse effects on waterways, the environmental water reserve and to protect the environment, and must not approve an application if it is likely to have a significant impact.

To support consideration of applications for new or transfer of existing licences the Minister released Guidelines for Groundwater Licensing and the Protection of High-Value Groundwater-Dependent Ecosystems (DELWP, 2015) which provide a framework for assessing risks and determining measures to manage those risks where the taking of groundwater will have adverse impacts on surface water flows. The Guidelines for Groundwater Licensing and the Protection of High-Value Groundwater-Dependent Ecosystems (DELWP, 2015) are not applied as the prescriptions contained in the relevant management plan apply to all licencing decisions in the Water Supply Protection Area to which the management plan applies.

As discussed, under the Victorian Water Act the Minister can declare a water supply protection area for areas that require intensive management and monitoring because of risks associated with groundwater extraction. There are four water supply protection areas in the Goulburn-Murray water resource plan area these are the Upper Ovens, Katunga, Loddon Highlands and Lower Campaspe Valley Water Supply Protection Areas.

These areas have had Water Management Plans prepared and approved by the Minister for Water. The prescriptions in these statutory management plans protect existing users and the environment by setting triggers based on groundwater use or groundwater levels. When the prescribed triggers are met, annual allocations may be announced in accordance with the Water Management Plan that allow users to pump a proportion of their entitlement (see for example the Upper Ovens Case Study below).

### **Case Study – Upper Ovens Water Supply Protection Area**

The Upper Ovens Water Supply Protection Area Water Management Plan (GMW, 2012) has been developed to conjunctively manage the surface water and groundwater resources in this area, given the very connected manner of both systems. The Upper Ovens Water Supply Protection Area Water Management Plan recognises that groundwater in the unconsolidated sedimentary aquifer and surface water resources within the main stream systems are highly connected. The plan has established a water sharing regime with a focus on low flow periods where there are increased risks to the environment and other water users.

The Upper Ovens Water Supply Protection Area Water Management Plan addresses the impact of groundwater extraction on groundwater-dependent ecosystems. It does this through prescriptions in the Water Management Plan:

- Prescriptions 2-7 - Describe the rules relating to taking surface water or groundwater under an all-year licence while restrictions are in place
- Prescription 18-25 - Describes the rules relating to issuing a new licence
- Prescription 27-30. - Describe rules relating to the transfer of a licence
- Prescription 35- Describes the rules relating to the transfer of a groundwater licence to a surface water licence
- Prescriptions 36 - Describes the rules relating to the transfer of a surface water licence to a groundwater licence
- Prescription 37-38 - Describes the rules relating to any transfers between a surface water licence in Management Zone 1 to an all-year groundwater licence in Management Zone 2 and all-year groundwater licence in Management Zone 2 to a surface water licence in Management Zone 1
- Prescription 44-48. Describes how the Corporation must meter take by consumptive users-
- Prescription 49 - Describes how the Corporation must ensure that an appropriate monitoring program is undertaken to ensure that flows in the catchment and groundwater levels are recorded, the water sharing regime is able to be implemented, the relationship between groundwater levels and stream levels can be observed

The extent and types of groundwater-dependent ecosystems in the Upper Ovens River catchment are not completely understood, although freshwater meadows and shallow freshwater marshes are expected to be supported. Given the low levels of current development related to the total water resources in the Upper Ovens catchment, it is expected that groundwater-dependent ecosystems would be relatively undisturbed as far as their water requirements are concerned.

From historic data, groundwater use from the unconsolidated sedimentary aquifer lowers groundwater levels by a small amount (0.25 m), however natural and seasonal variation in groundwater levels is around two to three metres and the impact of extraction on groundwater levels is only an issue in extremely dry years when periods of low flow conditions exist for the river.

As a result, these rules or prescriptions have been established that limit the use of groundwater from the connected groundwater and surface water resources when low flow periods exist. This has been done by linking surface water and groundwater extraction with restrictions on extraction to protect further loss of surface flow. This provides protection to groundwater-dependent ecosystems in and along the river reaches.

As identified above in [section 12.7.1](#) it is not considered that Victoria's North and Murray Water Resource Plan would compromise the meeting of environmental watering requirements where significant hydrological connections between surface water and groundwater have been identified. However, rules have been included to address potential emerging risks that may arise during the operation of the Plan to support adaptive water resource management.

The rules in response to section 10.19 of the Basin Plan contained in Victoria's North and Murray Water Resource Plan applies to decisions to issue or transfer (trade) a take and use licence for groundwater in the Goulburn-Murray water resource plan area.

As outlined below the proposed rules require the following:

- where no management plan is in place for a declared Water Supply Protection Area, to carry out an assessment to determine the existence of medium or high risk that the take of groundwater in relation to a new licence or the transfer of a licence will have an adverse impact on surface water flows as it relates to environmental ecosystems; and
- where a management plan is being prepared for a declared Water Supply Protection Area, to consider whether prescriptions are necessary in a management plan to address any risks to the meeting of environmental watering requirements where a significant hydrological connection between surface water and groundwater has been identified

The application of the Guidelines for Groundwater Licensing and the Protection of High Value Groundwater-Dependent Ecosystems (DELWP, 2015) which is outlined above is consistent with the proposed rule outlined below. The Upper Ovens River management plan case study provided above demonstrates how the rules provided in that Plan are consistent with the proposed rules below.

**The following is proposed accredited text for section 10.19(3) of the Basin Plan:**

1. This rule only applies where a management plan for a water supply protection area has not been approved under section 32A of the *Water Act 1989* (Vic) and where a significant hydrological connection between surface water and groundwater has been identified in the Goulburn-Murray water resource plan area and groundwater extraction has been identified as affecting surface water flow relating to a high value ecosystem:
  - a) the Minister must undertake a risk assessment to determine whether the issue of a groundwater take and use licence or transfer of groundwater take and use licence will have a medium or high risk of having an adverse impact on the high value ecosystem;
  - b) where a medium or high risk under paragraph (1) is identified, before issuing or approving the transfer a take and use licence for the take of groundwater the Minister must, in consultation with the relevant catchment management authority, consider whether conditions may be imposed on the take and use licence to modify:
    - i) the adverse consequences of the take (which may include pumping schedules, offsets, options for supplementing surface water flows);
    - ii) the adverse impact of the take (which may include reducing the entitlement volume or location of the bore).
2. Where a water supply protection area has been declared under section 27 of the *Water Act 1989* (Vic) and a statutory management plan for a water supply protection area has been approved under section 32A of the *Water Act 1989* (Vic) the rule under (1) above does not apply.
3. Where a water supply protection area has been declared under section 27 of the *Water Act 1989* (Vic) the Minister may prepare guidelines under section 30 of the *Water Act 1989* (Vic) relating to the preparation of a draft statutory management plan for that declared area to require the consultative committee to consider the matters in paragraph (4) when developing a draft statutory management under section 31 of the *Water Act 1989* (Vic).
4. The guidelines may require the consultative committee to consider whether the draft statutory management plan should include prescriptions for groundwater management having regard to:
  - a) any significant hydrological connection between groundwater and surface water; and
  - b) any risk to meeting environmental watering requirements as a result of groundwater take in the area.
5. Prescriptions identified in accordance with paragraph (4) may include:
  - a) a requirement to undertake monitoring;
  - b) the period and frequency over which the monitoring should occur;

- c) the locations at which monitoring should occur;
  - d) identified trigger levels to reflect when extraction would pose a risk to the aquifer;
  - e) restrictions that may be applied to the extraction of groundwater under a take and use licence and how the restrictions will be applied;
  - f) conditions on the transfer of take and use licences within or into the relevant water supply protection area.
6. In considering a draft statutory management plan under section 32A, the Minister must consider whether the prescriptions included in the draft plan address the types of risks referred in paragraph (4) if identified for the water supply protection area relevant to the draft plan.
7. References to sections of the *Water Act 1989 (Vic)* do not have the purpose of including those sections as part of the response but are included for reference only.

**Note:** for environmental watering obligations and requirements see the response in Column 3 to section 10.26 of the Basin Plan in Victoria's North and Murray Index Table and the supplementary material discussed in Column 5.

<<end of accredited text>>

### 12.7.6 Protecting the productive base of groundwater

Section 10.20 of the Basin Plan requires consideration to be given as to whether the content of Victoria's North and Murray Water Resource Plan would compromise:

- the structural integrity of an aquifer, whether within or outside the water resource plan area, arising from take within the long-term annual diversion limit for an SDL resource unit and
- hydraulic relationships and properties between groundwater and surface water systems, between groundwater systems and within groundwater systems

Water resources management across the Goulburn-Murray water resource plan area considers the integrity of the aquifer from which the resource is extracted and also the overall hydraulic relationships between groundwater and surface water systems and between and within groundwater systems. This is achieved through the Victorian Water Act, statutory management plans and local management plans that provide for managing the resource sustainably, prevent undue depletion and protect the integrity of the aquifer and the interests of existing water users and the environment.

By preventing undue depletion, such as by restrictions on allocation when water level triggers are met, the magnitude of groundwater level decline is limited and in Victoria such triggers consider both licensed and private rights users, and where identified, the environment and water ways. These preserve aquifer integrity (such as excessive de-pressurisation or de-watering resulting in subsidence and compaction) and hydraulic relationships, such as hydraulic gradients that limits risks of migration of saline groundwater towards fresher groundwater. These were both considered in the development of the Katunga WSPA Management Plan (see case study below)

The plans achieve this through the same mechanisms that protect groundwater levels and quality, such as trigger levels, restrictions and regular sampling, testing and monitoring. In all

cases, impacts on existing consumptive and environmental users will be detected from the regular sampling and monitoring before there is any impact on the structural integrity of the aquifer.

### **Case Study – Katunga WSPA**

The Katunga Water Supply Protection Area was declared in 1999. Several iterations of water resources planning have occurred in the years since, with recent amendments in 2017 providing a consolidated groundwater management plan. The plan was developed to protect the consumptive and environmental users of groundwater across and next to the plan area.

Intensive development and pumping of the Deep Lead aquifer in this region from the mid-1980s resulted in an observed decline of around 10 metres in the potentiometric surface of this aquifer. As well as declining water availability and the potential for bores to run dry, excessive groundwater pumping can lead to increased salinity through induced inter-aquifer flow and aquifer matrix compaction, affecting its structural integrity.

The Katunga Water Supply Protection Area management plan was developed to manage and control the risks that excessive groundwater development could have on the available water and its quality and the overall condition of the aquifer itself. The plan includes rules or 'prescriptions' that control the amount of take, or which describe the monitoring or management activities to sustain the resource.

These prescriptions include:

- Prescription 1: A limit on groundwater licences, with a maximum permissible consumptive volume set at 60,577 ML/yr. Zone limits are also set on some highly-developed zones within the Water Supply Protection Area
- Prescription 2: Restrictions on taking groundwater, based on review of groundwater levels within State Government groundwater observation bores. Trigger levels are set and varying groundwater allocation percentages are announced based on these levels, ranging from 70 per cent to 100 per cent allocation
- Prescription 3: Rules governing the transfer of licences to reduce the intensity of groundwater development in specific management zones
- Prescription 4: Metering of licensed take, to provide accurate information on the extent to which entitlements are accessed
- Prescription 5: Regular groundwater level monitoring to understand the impacts of high intensity groundwater pumping on water levels
- Prescription 6: Regular groundwater salinity monitoring, to understand and manage any impacts that may reduce the water quality, from over-pumping or leakage of saline groundwater from adjacent aquifers
- Prescription 7: Annual reporting to make sure that the ongoing resource management for this area is completely transparent and made publicly available

These prescriptions have been developed to protect the resource from declining water availability and quality.

In terms of prioritising risks, the risk to aquifer integrity is ranked much lower than the risk of groundwater shortage or of increasing groundwater salinity. This is purely due to the effect that more prominent risks have themselves become indicators that aquifer integrity could be compromised.

The Katunga Water Supply Protection Area management plan includes prescriptions to protect water quantity and water quality. The monitoring systems put in place and the associated triggers and rules apply to protect the groundwater resource from these quantity and quality impacts. It would take an intensive and prolonged decline in water levels to lead to impacts in the structural integrity of the aquifer, which the currently-prescribed rules and procedures will detect at a very early stage.

Owing to the high levels of development in the area, and the prominence of this plan among the community, actions such as reduced allocations to respond to deteriorations in water levels and quality will also provide protection from any risk to the structural integrity of the aquifer.

The Katunga case study provided here is consistent for the other statutory groundwater management plans across the Goulburn-Murray water resource plan area, where management prescriptions are in place to provide early warning and an adaptive response to any critical decline in water levels or any substantial increase in groundwater salinity.

In respect of section 10.20 the Basin Plan requires a rule that provides protection to ensure there is no structural damage to an aquifer arising from groundwater take.

Victoria considers there are no structural risks to the aquifers because the amount of take is limited by the Permissible Consumptive Volumes set for intensive use areas, and this level and prescriptions included in management plans will not cause significant aquifer drawdown and therefore structural risk to the aquifers.

As a result, it is not considered necessary to include rules in Victoria's North and Murray Water Resource Plan to respond to section 10.20 of the Basin Plan. However, section 10.21 of the Basin Plan requires that a rule to meet the objectives of section 10.20 must be included in a water resource plan that relates to the Goulburn-Murray: Sedimentary Plain SDL resource unit.

The rule identified to meet the objectives of section 10.21 of the Basin Plan for the Goulburn-Murray: Sedimentary Plain SDL resource unit has been applied to the whole Goulburn-Murray water resource plan area by including it as a response to section 10.20(3) of the Basin Plan.

This supports Victoria's approach to water resource management which is fundamentally consistent across the State, but adaptable enough to respond to localised issues. Therefore, where a risk arises to the structural integrity of an aquifer and the hydraulic relationships within groundwater systems or between groundwater and surface water, the Minister may prepare guidelines that require setting prescriptions in a statutory management plan where a Water Supply Protection Area has been declared.

The current statutory management plans in place in the Goulburn-Murray water resource plan area are consistent with the rules to respond to section 10.20 of the Basin Plan, see for example the Katunga Case Study outlined above.

**The following is proposed accredited text for section 10.20(3) of the Basin Plan:**

1. The Minister may prepare guidelines under section 30 of the *Water Act 1989 (Vic)* for the preparation of a draft statutory management plan for an area declared under section 27 of the *Water Act 1989 (Vic)* to require the consultative committee to consider the matters in paragraph (2) when developing a draft statutory management under section 31 of the *Water Act 1989 (Vic)*.
2. The guidelines may require the consultative committee to consider whether the draft statutory management plan should include prescriptions for groundwater management having regard to:
  - a) The risk to the structural integrity of the aquifer because of the level of take in the area;
  - b) The risk to maintaining the hydraulic relationships and properties between groundwater and surface water systems, between groundwater systems and within groundwater system within the area
3. Prescriptions identified in accordance with paragraph (2) may include:
  - a) a requirement to undertake monitoring;
  - b) the period and frequency over which the monitoring should occur;
  - c) the locations at which monitoring should occur;
  - d) identified trigger levels to reflect when extraction would pose a risk to the aquifer;
  - e) restrictions that may be applied to the extraction of groundwater under a take and use licence and how the restrictions will be applied
4. In considering a draft statutory management plan under section 32A, the Minister must consider whether the prescriptions included in the draft plan address the types of risks referred in paragraph (2) if identified for the water supply protection area relevant to the draft plan.
5. References to sections of the *Water Act 1989 (Vic)* do not have the purpose of including those sections as part of the response but are included for reference only.

<<end of accredited text>>

### 12.7.7 Addressing risks

Section 10.22 of the Basin Plan requires consideration as to whether rules are necessary in the Goulburn-Murray water resource plan area to address risks identified in the risk assessment. **Chapter 5** sets out the current and future risks to the condition and continued availability of water resources. The risk assessment report is at **Appendix B**.

The risk assessment examined risks for matters identified under Part 4 of Chapter 10 of the Basin Plan.

#### 12.7.7.1 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 (10.20) 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. Based on the previous section describing the productive base of groundwater, 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 SDL resource units:

- Goulburn-Murray: Shepparton Irrigation Region
- Goulburn-Murray: Highlands
- Goulburn-Murray: Sedimentary Plain
- Goulburn-Murray: deep

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 Victoria's North and Murray water resource plan area 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 Victorian Environmental Water Holder required by the Victorian Water Act

**The following is proposed accredited text for section 10.22(b) of the Basin Plan:**

No rules have been identified to address climate change risks identified in response to subsection 10.41(1). 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 Victoria's North and Murray Risk Assessment Report at **Appendix B** of Victoria's North and Murray Comprehensive Report.

Rules have not been included in Victoria's North and Murray Water Resource Plan as there are no rules considered necessary to address the risks identified as the strategies identified in Victoria's North and Murray Risk Assessment Report at **Appendix B** of Victoria's North and Murray Comprehensive Report are considered most appropriate.

<<end of accredited text>>