

# Seasonal Watering Proposal



Photo: Nyah Forest,  
Nyah - Vinifera Park

**2024-25**  
**Murray Wetlands**

**mallee**  
catchment management authority

## Document Control

Status	Version	Author	Date	Description
Template	1.0	VEWH	20/11/2023	Prepopulated content incorporated into template ready for issue to CMA.
Draft	1.1	Mallee CMA	01/03/2024	Drafted content to be submitted to VEWB.
Draft 2	1.2	Mallee CMA	18/04/2024	Final Draft distributed to stakeholders for review and endorsement,
Final	1.3	Mallee CMA	19/04/2024	Final to be submitted to VEWB.

### Citation

Please cite this document as:

*Mallee CMA (2024) Seasonal Watering Proposal Murray Wetlands 2024-25, Mallee CMA, Irymple, Victoria*

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## Acknowledgement of Country

Mallee Catchment Management Authority (CMA) acknowledges and respects Traditional Owners, Aboriginal communities and organisations. We recognise the diversity of their cultures and the deep connections they have with Victoria's lands and waters.

We value partnerships with them for the health of people and country.

Mallee CMA Board, management and staff pay their respects to Elders past, present and emerging and recognise the primacy of Traditional Owners' obligations, rights and responsibilities to use and care for their traditional lands and waters.

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**Cover image:** Nyah Forest, Nyah-Vinifera Park.

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# 1 Context

Mallee Catchment Management Authority (CMA) is pleased to present the 2024-25 Murray Wetlands Seasonal Watering Proposal (SWP).

This SWP identifies the Mallee CMA's proposed priorities for use of managed environmental water for the Murray Wetland sites in 2024-25. Information from this document has informed development of the Seasonal Watering Plan 2024-25, available on the Victorian Environmental Water Holder (VEWH) website from 30 June 2024. The Seasonal Watering Plan is the state-wide plan outlining where, when, and why water for the environment can be delivered throughout Victorian waterways, including the Murray Wetlands.

While the format of this SWP differs to previous years, it still retains the key information to outline what environmental flows may be delivered during 2024-25, the rationale for the planning of these and a summary of engagement that occurred, as well as the associated risk management.

The actions outlined in this proposal are informed by ecological objectives and management goals outlined in the site specific, Environmental Water Management Plan (EWMPs). Other environmental themes guiding site selection include providing and supporting refuge and habitat, maintaining site condition and creating resilience. This ensures the ability of sites to 'bounce back' and respond when conditions become more favourable (i.e. flooding/high river). Target flora and fauna include inundation dependent wetland EVC's and terrestrial vertebrates as well as the requirements of waterbirds and frogs, such as habitat and food resources are also a focus.

Planning for environmental watering actions incorporates information around required water regimes, current condition, plus the provision and maintenance of habitat for water dependent species that have critical needs.

In addition to providing water for environmental benefit, delivery of water to the wetlands also supports cultural, social and economic values. These are captured in feedback received from Aboriginal Community, industry and the local community.


Key areas of the proposal are detailed below:

- **Scope of environmental watering** – Describes the range of potential watering actions which may be delivered during 2024-25 (Summary provided in Table 1.1).

Table 1.1.1: Summary of the proposed watering sites in 2024-25 for the Murray Wetlands.

Wetland	Delivery Method	Land Manager
<b>Pumped sites requiring a water allocation</b>		
Bidgee Lagoons	Pumped	Parks Victoria
Bottle Bend Wetlands	Pumped	Parks Victoria
Brickworks Billabong	Pumped	Parks Victoria
Bridge Creek (including Bridge Creek Wetland)	Pumped	Parks Victoria and Private Landowners
Bullock Swamp North	Pumped	Parks Victoria and Private Landowners
Burra North	Pumped	Parks Victoria
Burra South	Pumped	Parks Victoria
Burra South Proper	Pumped	Private Landowners
Koorlong Lake	Lower Murray Water Infrastructure	Parks Victoria
Lake Hawthorn	Lower Murray Water Infrastructure	Lower Murray Water and DEECA
Lake Powell (re-lift into Lake Carpul)	Pumped	Parks Victoria and Private Landowners
Outlet Creek (Karadoc Swamp)	Pumped	Parks Victoria and Private Landowners
Neds Corner Central – Old Tip Wetland, Neds Corner Lagoon and Neds Corner Floodplain	Pumped	Trust for Nature/FPMMAC
Nyah Floodplain	Pumped	Parks Victoria
Brown Swamp (Pound Bend)	Pumped	Parks Victoria
Vinifera Floodplain	Pumped	Parks Victoria
<b>Weir pool sites – no direct allocation required</b>		
Butlers Creek/Baggs Lagoon (Baggs Bridge)	Regulator Operation	Parks Victoria
Ducksfoot Lagoon (Jennings Bridge)	Regulator Operation	Parks Victoria
Cowanna Billabong	Regulator Operation	Parks Victoria
Margooya Lagoon	Regulator Operation	Parks Victoria
Sandilong Creek	Regulator Operation	Parks Victoria, DEECA and Riverside Golf Club

- **Scenario planning** – Describes how the combination of actions may change depending on the climate scenario.

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- **Risk management** – This is an important chapter of the proposal and will be based on the outcomes from the 2024 Shared Operational Risk Workshop – in particular the risk management table.

This document has been developed in consultation with Parks Victoria, First Peoples of the Millewa Mallee Aboriginal Corporation (FPMMAC), Traditional Owners, the Department of Energy, Environment and Climate Action (DEECA), Goulburn Murray Water (GMW), Lower Murray Water and VEWH. We are grateful for their time and input.

## 2 System Overview

The Murray Wetlands are home to hundreds of wetlands, primarily concentrated along the Mallee CMA's 760 km stretch of Murray River frontage between Vinifera and the South Australian border. The system includes a myriad of interconnected creeks, wetlands and floodplains that are ecologically important and reflect the natural character and attributes of the floodplain. Wetland types are diverse and support a high abundance of water dependent species across a landscape, which require regular inundation as part of its natural cycle.

Regulation and diversion of the Murray River flows have substantially reduced the frequency and duration of the high river flow that would naturally inundate the Murray Wetlands. This change to the water regime has been exacerbated by climate change and has reduced the variety and condition of environmental values associated with billabongs and other floodplain habitats.

In the absence of natural flooding, water for the environment is used to maintain and improve the character of certain wetlands. Every year a selection of priority sites that can be actively managed and where ecological benefit can be achieved are selected to receive water.

Water for the environment can be delivered to some wetlands in the region through direct pumping from the Murray River and/ or the use of irrigation supply infrastructure. Most wetlands that receive environmental flows can be managed independently of each other.

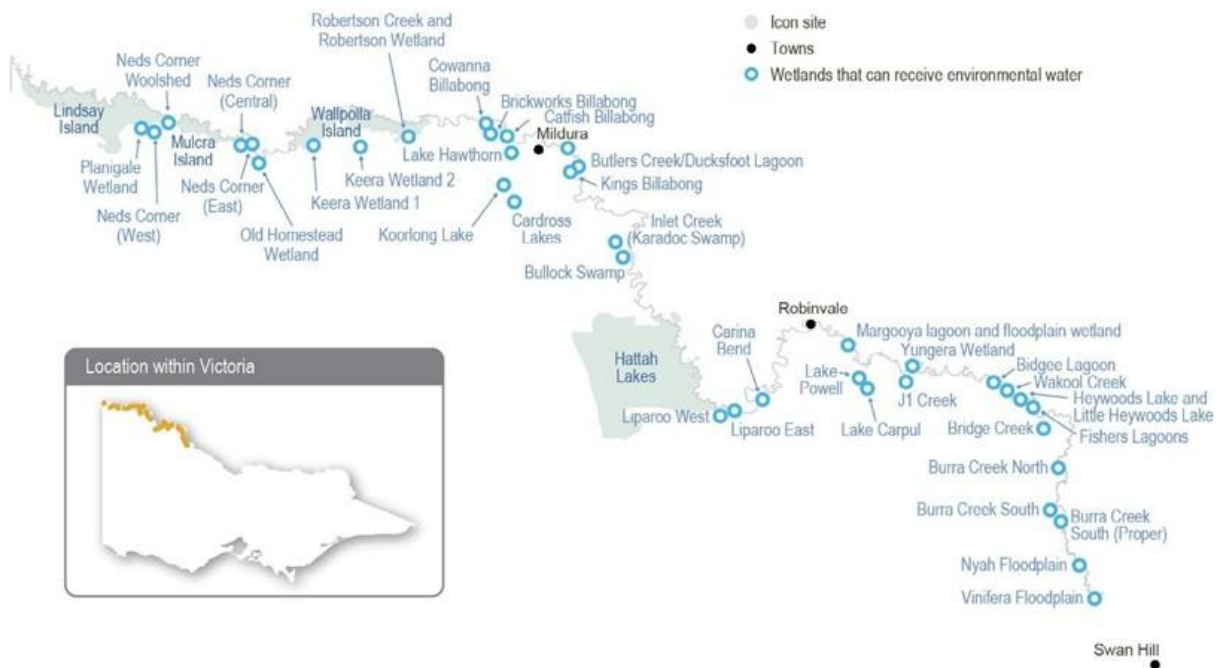


Figure 2.1: The Murray Wetlands system





### 3 Traditional Owner Cultural Values and Uses

Watering of the Murray Wetlands supports cultural values such as traditional food sources, medicines and important species, and it provides opportunities for teaching, learning and storytelling.

In October 2023 site visits were conducted with the First Peoples of the Millewa Mallee (FPMMAC) at Musk Duck Lagoon and Wallpolla Horseshoe Lagoon. Discussions with Traditional Owners covered areas for environmental water within the FPMMAC RAP area for 2024-25. Some of the areas covered in the site visits included outlying creeks, wetlands, floodplains, lakes, lagoons, billabongs and river bends. Activities included asking Traditional Owners to identify areas of importance with pins on a map. The pins were colour coded to help identify different activities and priorities (eg. areas with cultural heritage values, cultural practices, recreation, food gathering etc).

Mallee CMA discussed the proposed 2024-25 watering of the Murray Wetlands during site visits with Traditional Owner groups. Site visits were conducted with Tati Tati Land & Water, Wadi Wadi Land & Water, Dadi Dadi / Weki Weki, Culpra Millie, Munatunga Elders and Wadi Wadi Nation at Lake Powell, Heywood Lake and various places within Nyah and Vinifera in November 2023. These discussions focused on where Traditional Owners would like to see environmental water delivered for 2024-2025 and what activities they undertake at each site (Figure 3.1). The discussions raised a lot of interest in cultural practices and interests to help prioritise areas for environmental water delivery. Discussions covered a range of options for the delivery of environmental flows in 2024-2025 and what the traditional ecological needs are in the current climate. Feedback was positive, with groups in discussions agreeing to the needs and reasoning behind environmental watering. Drawdown and drying were discussed in depth and there was a lot of knowledge sharing before agreement was reached.

Understanding the environmental responses to the recent flooding and identifying and protecting cultural heritage were key topics for discussion. A common foundation of all groups was the importance of water in wetlands for their cultural spirituality and connection to Country.

Some of the other discussions and comments by the Traditional Owner groups included wanting to see more native flora and fauna in the areas, increased opportunities for Indigenous Landcare, training opportunities such as Indigenous Ranger programs, how to protect and preserve Aboriginal Cultural Heritage on the landscape, sharing information and knowledge with the broader community and increased usage by bird watching groups.

Site visits were also conducted at Spences Bend and Bullock Swamp with Nyeri Nyeri in November 2023 where discussion on proposed watering in 2024-2025 generated good discussion on local flora and fauna with recommendations from the group on possible project ideas for the area.

On 6/03/2024, a post “talk water” event was conducted with Traditional Owner groups for 2024/25 SWP for Hattah and the Murray Wetlands.

Overall feedback from Traditional Owners was a desire to have equal decision making on where to put water and Traditional Owners would like to be provided with the SWP information prior to the “Talk Water” events, so that they are able to review it and have a response beforehand.

Some other comments included:

- We want more involvement from the beginning.
- Would like On Country visits to scope out Cultural Areas of sensitivity prior to water delivery. Especially important post floods due to water uncovering sites.

Traditional Owners collectively agreed to have the same list of Cultural Values to be consistent across all sites:

- Cultural Activities

- Native flora and fauna – Birds, reptiles, frogs, kangaroos, possums, turtles, fish
- Fishing
- Bush foods
- Endangered plants and animals
- Change carp control to carp eradication
- Scar trees
- Clay balls
- Plants of cultural significance
- Aquatic vegetation

Several Traditional Owner groups have provided a statement of support for the SWP. Those being:

Munatunga Elders:

**“It is nice to be asked and involved in discussions and decisions about environmental watering with the Mallee CMA”.**

Munatunga elders would like to continue with current process. Including:

- Traditional owners and elders should be involved in discussions and planning before SWPs are written.
- Continue to have On-country field trips where Traditional and elders are able to view the water, the site and the changes in condition of plants etc. Field trips allow Traditional owners and elders to look at the environment and see that environmental watering is having benefit.

Tati Tati/Wadi Wadi Land and Water Seasonal Watering Statement:

In regards to watering of site next year -

“Very happy and excited to know that these sites are going to be watered in the near future”.

“Our level of participation in this project has been excellent and we have been involved from the beginning”.

Dadi Dadi/Weki Weki Seasonal Watering Statement:

“We are happy about the water proposals and sites we visited and discussed at Euston club recently”.


“Hopefully we Traditional Owners and people of interest can venture back out to these sites during and after the watering events to see what outcomes and benefits to the environment and wildlife”.

“We feel positive about this event and engagement thus far”.

Latji Latji Mumthelang Seasonal Watering Statement:

“Regardless of potential rainfall presumed approaching this season, it is imperative to maintain water regimes next year”.

“Watering is very important for our natural environments. It is essential for the health of our floodplains vegetation and can act as a trigger for germination of our indigenous medicinal plants such as Old Man



Weed and various other cultural grasses and trees including the rejuvenation of our billabongs and water systems. A number of bird and fish species also rely on our watering to provide suitable breeding conditions”.

“Everybody should know of the six seasons we live by, and we need to incorporate this knowledge into these watering regimes”.

“Partnerships in the decision-making processes and planning of frameworks would be a good initiative with the implementation of a delegated Corporation representative, forming a funded indigenous advisory group. This would promote and empower outcomes for MCMA incorporating cultural knowledge with a professionally equipped Authorisation. (Walking together to make a better future)”.

“It would be desired if we could have discussions surrounding an implementation of a walking together statement with MCMA”.

#### Tati Tati Land & Water Statement:

“Spokesperson stated Tati Tati Land & Water are very happy and excited to water on country saying it is very positive”.

“Tati Tati Land & Water are also very happy with the level of participation the group is involved and the group really wants to be on country when the water is been delivered”.

#### Wadi Wadi Nation Statement:

“Wadi Wadi Nation is a very strong yes to Country needing watering on most sites, and very happy with participants involvement. If we don’t do anything now, we will lose the lot. When the environmental watering begins it is important for Wadi Wadi representation to be out on site and be involved in the follow ups and monitoring”.

All Traditional Owners with an interest in Murray Wetlands have been invited to make a Seasonal watering Statement. Some groups have not responded or have chosen not to make a statement or comment.

#### FPMMAC (The First People of Millewa Mallee) Seasonal Watering Proposal Statement:

“FPMMAC (The First People of Millewa Mallee) have stated the sites where engagement has occurred regarding SWPs, they are satisfied with the way the Mallee CMA has done business with FPMMAC. And in saying that, the FPMMAC see an opportunity to work more closely with Mallee CMA by working towards a joint partnership agreement on all Mallee CMA business they do on FPMMAC Rap area”.

“The FPMMAC have concerns that other Aboriginal groups are speaking for the RAP area in the water sector. The FPPMAC fought hard for the rights and if other groups have interest in the RAP area there is a legal process for them to follow until then they don't speak for FPMMAC country”.

“FPMMAC participation is as good as it can be given the low FPMMAC water program capacity. It would be great to have funded roles for each nation we have represented and build our program so we can be a joint manager in water”.

“FPMMAC stated there is great work at Mallee CMA but we can always do better with more resources and better partnerships. A big emphasis needs to be that we don't have the resources to have a meaningful input into all SWP as we have a lot of waterways and not enough resources to know what's going on in detail”.







## 4 Social Recreational and Economic Values and Uses

In planning the potential environmental watering actions in Table 7.1 and Table 7.2, the Mallee CMA considered how environmental flows could support values and uses, including:

- Water-based recreation (such as canoeing, fishing and kayaking)
- Riverside recreation and amenity (such as bike riding, birdwatching, bushwalking, camping, Geocaching, photography and running)
- Community events and tourism (such as day trips and sightseeing; education programs for school, TAFE and university students; and citizen science projects about birds, frogs and plants)
- Socioeconomic benefits (such as economic benefits for businesses in the accommodation, beekeeping, food and beverage, ecotourism, hospitality and retail sectors; creating a focal point for socialising; and providing natural, green spaces for the local community).

Water for the environment in the Murray Wetland region plays a vital role in protecting the ecosystems, flora and fauna that are unique to this region. A secondary and equally important role this water plays is in providing natural green spaces for local community. In an otherwise dry environment, water is a major focal point for community and visitors alike. Therefore, it is important to preserve these landscapes and continue to understand how these spaces are used by the community and tourists to fully understand their value. Community currently use these wetlands for social and recreational pursuits such as kayaking, walking, bird watching, a focal point for socialising and for sporting events.





Whilst social, recreational and economic drivers are not the deciding factors when selecting and prioritising sites to receive water, community support can be an important factor in the success of a watering event. Feedback from the community, while not always logistically possible, highlights the importance of these landscapes to the community and the additional benefits of delivering environmental water.

Face-to-face, online communication and community surveys indicate a high level of use of local wetlands and creeks, with a greater connection when water is present. Activities and values associated with watering that were commonly mentioned by local community include walking, water, camping, fishing, bird watching, frogs, kayaking and bike riding (Figure 4.1). Waterbodies which are frequently listed by community as 'favourites' include Kings Billabong, Bottle Bend, Lake Hawthorn, Catfish Billabong, Cardross Lakes and Bullock Swamp (Figure 4.1). All these sites have some connection with environmental watering, indicating the strong link between environmental and social values. However, the list isn't just limited to the sites that receive environmental water annually, sites watered less frequently receive great community support when environmental water is being proposed and delivered in these locations as the benefits of having environmental water present can be seen long after the watering has occurred.



Beneficiary	Connection to the waterway	Values/ Uses/ Objectives/ Opportunities	How have these benefits been considered?
			directly relates to increased eco-tourism opportunities.
Apiarists	Watering supports flowering in native vegetation which is beneficial for bees.	Commercial enterprise	Water delivery benefits vegetation outcomes which support flower production providing abundant resources for bees.
Bird watching	Water provides important habitat for birds, which draws birds and twitches to the region.	Recreation opportunities	Water is regularly delivered to sites for the purpose of meeting waterbird and bird objectives.
Anglers	Increased opportunities for yabbying across the Murray Wetlands	Recreational Food for personal consumption	Delivering water to floodplain and large shallow wetlands regularly results in a boom in yabby abundance. This is utilised by anglers who catch yabbies for personal consumption.
Camping	Water draws people to sites. Increasing the quality and beauty of a region draws tourists to the area.	Recreation Fishing Birdwatching Photography	Water attracts people. Campers, given the option, will generally prefer setting up at a site which contains water, over a site which does not. This provides them with instant access to the water in which to undertake complementary recreational pursuits.
Tourists	Water draws people to sites. Increasing the quality and beauty of a region draws tourists to the area. The local tourism industry benefits as a result of increased tourism.	Recreation opportunities Tour operators	Community consultation and engagement is regularly undertaken as part of the environmental water delivery program.
Research	Studying the wetland, floodplain and rivers during different stages (wet, dry, during drawdown) increased understanding of the natural environment and the requirements of the flora, fauna and processes that reside across these habitats.	Condition monitoring Intervention based projects around watering Large-scale system investigations	Provision of water to sites, and working with researchers to target particular flora, fauna or hydrological outcomes allows them to undertake projects which will better inform future management of the region.
Schools and education centres	Local schools and other education centres such as TAFE and universities incorporate aspects of natural environment in their curriculum. A number of Murray Wetland sites are close to these centres and provide excellent examples of channel and wetland ecology.	Natural resources education (e.g. food webs, effects of flooding, water uses) Recreation/outdoor education (e.g. School camps) Connection with country and indigenous/cultural education.	A number of sites local to Mildura have been used previously by schools and TAFE (e.g. Koorlong Lake, Lake Hawthorn, Kings Billabong/Butlers Creek and Merbein Common). Through delivery of environmental water these education resources remain in school curriculum and assist with learning of the younger generation.

Table 4.2 Environmental objectives of Murray Wetlands



	Environmental watering will also support water sports activities (e.g. canoeing, kayaking, swimming and boating)
	Environmental watering will also support waterbird-related recreational activities (e.g., twitching, birdwatching)
	Environmental watering will also support angling activities
	Environmental watering will also support peaks in visitation (e.g., camping, or other public activities on long weekends or school holidays)

## 5 Environmental Values and Objectives






The Murray Wetlands contain various streams, billabongs, anabranches, wetlands and swamps. When flooded, waterways and wetlands within these systems provide habitat for native fish, frogs, turtles, waterbirds and water-dependent plants. Terrestrial animals (such as woodland birds) also benefit from improved productivity and food resources when anabranch systems are inundated. Large floodplain wetlands can retain water for several years after receiving inflows; they provide important refuges for wetland-dependent species and support terrestrial animals (such as small mammals and reptiles).

The reduced frequency and duration of floods in the Murray River have degraded the water-dependent vegetation communities throughout the Murray Wetlands, which has, in turn, reduced the diversity and abundance of animals that rely on healthy vegetation for habitat.

Table 5.1: Environmental objectives relevant to the Lindsay-Mulcra-Wallpolla Islands.

Environmental objectives in the Murray Wetlands	Environmental Water Management Plan Objectives
 <b>F1:</b> Increase the populations of Murray hardyhead in permanent wetlands where they are known to persist.	<b>CK1, MC7:</b> By 2030, improve the population of Murray hardyhead ( <i>Craterocephalus fluviatilis</i> ) at Koorlong Lake and Brickworks Billabong
 <b>F2:</b> Maintain populations of other native fish in permanent wetlands.	<p><b>MC1a, BI6:</b> By 2030, protect and restore biodiversity by maintaining representative populations of large-bodied native fish, including Golden Perch (<i>Macquaria ambigua</i>), Silver Perch (<i>Bidyanus bidyanus</i>), Murray Cod (<i>Maccullochella peelii</i>) and Bony Herring (<i>Nematalosa erebi</i>).</p> <p><b>K3, MC1b, CB2a, KB5, NV2a, WB5, MJ4, BI5, PW5:</b> By 2030, protect and restore biodiversity by maintaining representative populations of small-bodied native fish, Unspecked Hardyhead (<i>Craterocephalus stercusmuscarum fulvus</i>), Carp Gudgeon (<i>Hypseleotris spp.</i>), Murray-Darling Rainbowfish (<i>Melanotaenia fluviatilis</i>), Flat-headed Gudgeon (<i>Philypnodon grandiceps</i>), Fly-specked Hardyhead (<i>Craterocephalus stercusmuscarum</i>). And Australian Smelt (<i>Retropinna semoni</i>).</p> <p><b>KB6, SC4:</b> By 2030, improve the population of Freshwater catfish</p>



	<p>(<i>Tandanus tandanus</i>).</p> <p><b>ML3:</b> By 2030, protect and restore recruitment of Silver Perch (<i>Bidyanus bidyanus</i>) and Golden Perch (<i>Macquaria ambigua</i>) at the Margooya Lagoon asset by ensuring that nursery habitat is maintained.</p> <p><b>ML4:</b> By 2030, protect and restore recruitment of small-bodied native fish at the Margooya Lagoon asset, including Unspecked Hardyhead (<i>Craterocephalus stercusmuscarum</i>), Flat-headed Gudgeon (<i>Philypnodon grandiceps</i>), Carp Gudgeon (<i>Hypseleotris klunzingeri</i>), Australian Smelt (<i>Retropinna semoni</i>), by ensuring that habitat diversity, condition and connectivity are maintained, and by the exclusion of large-bodied carp</p>
 <p><b>A1:</b> Maintain populations of native frogs, including the endangered growling grass frog.</p>	<p><b>BB3, K4, CB2b, KB4a, NV2b, PW5b:</b> By 2030, protect and restore biodiversity by maintaining representative populations of frogs.</p> <p><b>KB4b:</b> By 2030, improve biodiversity at the Kings Billabong asset by supporting the life cycle of EPBC listed Growling Grass Frog (<i>Litoria raniformis</i>).</p> <p><b>ML5:</b> By 2030, support water-dependent ecosystem functions that support the creation of vital habitat (breeding) for frogs at the Margooya Lagoon asset.</p>
 <p><b>CN1 :</b> Promote carbon and nutrient cycling to enable wetland processes for food webs.</p>	<p><b>SP5:</b> By 2030, protect and restore connectivity within and between water-dependent ecosystem, including by ensuring that: ecological processes dependent on hydrologic connectivity laterally between watercourses and their floodplains (and associated wetlands) are maintained.</p>
 <p><b>V1:</b> Increase the diversity, extent and abundance of wetland plants.</p>	<p><b>AB2, BB2, BC2, MC4, MJ5, P2a, PB1, NC1, BI4, CB4a, KB1, NV1, SB6, TT2, WB2:</b> By 2030, improve vital habitat by increasing the diversity of aquatic macrophytes present across a range of Water Regime Indicators Groups.</p> <p><b>CK2, LH1, MC8, PW2:</b> By 2030, maintain populations and extent of saline aquatic vegetation at Koorlong Lake, Lake Hawthorn, Psyche Bend Lagoon and Brickworks Billabong including benthic herblands with <i>Ruppia</i> beds containing both <i>R. polycarpa</i> and <i>R. megacarpa</i>.</p> <p><b>PW6:</b> By 2030, reduce the extent of invasive emergent macrophytes (<i>Typha domingensis</i> and Common reed <i>Phragmites australis</i>) to prevent the decline of native vegetation at the Woorlong Wetlands.</p>
 <p><b>V2:</b> Improve the condition of river red gums, black box and lignum communities.</p>	<p><b>BY1, BB4, AB3, BC1, K2, HeL1, K7, MJ1b, MJ3, P1, P2b, PB2, PB3, NC2, NC3, BI3, CB1, CB4b, JCB1, JCB2, ML1, PW4, SC2, SC3, SB1, Sb2, Sb3, TT1, TT3a, TT3b, WB1, WL4:</b> By 2030, improve condition and maintain extent from baseline levels of Lignum (<i>Duma florulenta</i>), River red gum (<i>Eucalyptus camaldulensis</i>), and Black box (<i>E. largiflorens</i>) to sustain communities and processes typical of such communities.</p>
 <p><b>B1:</b> Provide feeding and breeding habitat for a range of waterbird species, including threatened and migratory species and colonial nesting species (such as egrets).</p>	<p><b>BY5, BB1a, BB1b, HeL4, K5b, BI7b CB3b, WL3:</b> By 2030, maintain nesting and recruitment of non-colonial waterbirds (N1, N2, N3 and N4, after Jaensch 2002), by maintaining a mixture of tree, low vegetation/shrubs, and ground/islet nesting habitat.</p> <p><b>BB1a, CK3, HeL3, K5a, MC2, BI7a, CB3b, KB7, WL2, LH2, PW3:</b> By 2030, maintain representative populations of shallow-water</p>



	<p>and deep-water feeding guilds of waterbird (F2 and F3, respectively, after Jaensch 2002), by maintaining a mixture of shallow and deep-water habitats.</p> <p><b>KB9:</b> By 2030, maintain representative populations of piscivores (guild D4, after Jaensch 2002) at Butlers Creek.</p> <p><b>KB10:</b> Protect and restore ecosystem functions of water-dependent ecosystems that support successful breeding of large waders at Ducksfoot Lagoon by providing conditions for breeding and fledging at least 3 times every 10 years at Butlers Creek.</p> <p><b>KB8:</b> By 2030, maintain vital habitat to provide a refugium for listed species of waterbirds at the Kings Billabong asset.</p> <p><b>NV4, WL5:</b> By 2030, maintain nesting and recruitment of colonial waterbirds (N7, after Jaensch 2002) at the Nyah Park and Vinifera Park asset, by maintaining a mixture of tree, low vegetation/shrubs, and ground/islet nesting habitat.</p>
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## 6 Engagement

Mallee CMA engages with a diverse range of project stakeholders in the development of the SWP. Engagement has included face to face meetings with community members and groups, formal meetings with program partners, media releases and newsletter articles, digital content through website and social media, distribution of the key area flyers and online community values surveys.

Various platforms have been utilised to provide engagement opportunities to the key stakeholders including Traditional Owners, Parks Victoria, Victorian Environmental Water Holder, Lower Murray Water, Goulburn Murray Water Authority and landholders. Engagement with these key stakeholders was imperative to the prioritisation and planning process. Due to the interest in water management by communities, it is important proposed watering sites are supported by high quality justification and background information. All meetings between stakeholders and community and Mallee CMA staff provide opportunity for stakeholder feedback. Discussions around rationale for site selection and gathering support for proposed watering were the main objectives of any communications activities with the community.

In developing the 2024/25 SWP engagement plan, the Mallee CMA seized the opportunity to review previous years' efforts, document the lessons learned and implement key changes. Among the changes delivered was earlier engagement of Traditional Owners and community members in the annual environmental water planning process. This approach meant the values and perspectives of Traditional Owners and community members informed preliminary planning and discussions, rather than being incorporated later in the planning phase as had previously been done. This new approach facilitated more meaningful engagement and has helped further build trust between Traditional Owners, community members and the Mallee CMA.

SWP engagement activities commenced in September-November 2023, with all engagement mapped against the [International Association for Public Participation \(IAP2\) Spectrum](#). This ensured all engagement recognised stakeholders' levels of concern in environmental water planning, and clearly stated the promise being made to stakeholders at each participation level.

Using the International Association for Public Participation's (IAP2) spectrum, key stakeholders were engaged at the higher end of the IAP2 spectrum - 'involve' and 'collaborate'. Face to face meetings, where practical, were conducted and online platforms were utilised where restrictions impeded in-person consultation. Joint planning and sharing of information are the key proponents of this type of engagement.

The general public, local council, tourism organisations, recreational clubs and environmental groups were engaged at lower levels, such as 'consult' and 'inform' on the IAP2 spectrum. An interactive map was used at markets and drop in days where community members were asked to identify the values/uses at specific sites and which sites they would like to receive environmental water by placing flag pins on a map where they occurred. Data collected was then factored into Mallee CMA's planning for the 2024/25 SWP. Online surveys, fact sheets and social posts were also used to communicate with those that could not meet face-to-face. These methods of engagement provided an opportunity for the community to provide feedback and outline community values for the sites to better inform current and future water planning.

One method used to engage Traditional Owners and community members was the 'Pins in Maps' activity. Participants were asked to place a coloured pin in a map to represent their values/uses at the various wetlands. The coloured pins corresponded to four categories: recreation, flora/fauna, water, and other. More than 500 responses were collected by undertaking this activity at a wide range of community engagement events including on-Country visits, drop-in sessions, citizen science activities, and local markets.

Additionally, the 'Pins in Maps' activity proved to be an engaging method to initiate place-based conversations about environmental water.



Figure 6.1: 'Pins in Maps' activity used to collect

*community values and uses.*

Following completion of this SWP, Mallee CMA will produce informative community flyers and website updates detailing what sites have been chosen to receive water for the environment water and why. Targeted consultation and engagement activities will be undertaken throughout the coming year with relevant community and stakeholders. This will offer the opportunity for further in-depth and detailed discussions and will help to close the loop on engagement activities conducted earlier in the year.



Table 6.1: Summary of stakeholder engagement that informed this SWP.

Category	Stakeholder(s)	IAP2 level of engagement	Engagement Method	Engagement Purpose
Community groups and environment groups	Mallee CMA Land and Water Advisory Committee	Consult	<ul style="list-style-type: none"> <li>Presentation and discussion of proposed watering sites (14/03/2024).</li> </ul>	Advise the Advisory Committee as to the extent and location of proposed watering sites for 2024-25 and answer any questions.
	OzFish Unlimited	Consult	<ul style="list-style-type: none"> <li>Presentation and discussion of proposed watering sites.</li> </ul>	Alignment of projects and early identification of opportunities and where potential actions may be conflicting.
	Friends of Merbein Common	Consult	<ul style="list-style-type: none"> <li>Presentation and discussion of proposed watering sites.</li> </ul>	Provide the group with the opportunity to provide feedback and important information about what they value about the sites.
	Wider community	Inform/Consult	<ul style="list-style-type: none"> <li>Online – web based and social media</li> <li>Stalls at Sunraysia Farmers Market, Red Cliffs Market and Swan Hill Market</li> <li>Pop up stall in the Mildura City Heart Mall</li> <li>Drop-in days at Nangiloc, Boundary Bend and Lake Cullulleraine.</li> </ul>	Provide the community with the opportunity to provide feedback and important information about what they value about the sites.
Government agencies	Victorian Environmental Water Holder (VEWH)	Collaborate	<ul style="list-style-type: none"> <li>Discussion of SWP guidelines (24/01/2024)</li> <li>Risk Workshop and discussion of proposed sites (19/02/2024)</li> <li>Ongoing discussion as planning progresses.</li> </ul>	Ongoing planning and consultation with input from VEWVH regarding water availability, current and forecast water condition conditions, risk planning and feasibility.
	Parks Victoria (PV)	Collaborate	<ul style="list-style-type: none"> <li>Discussion with key local Parks Victoria Staff regarding proposed sites and seek advice on what they would like to see across their areas of responsibility and any issues with practical logistics.</li> </ul>	<p>Review and update the risk tables relevant to the proposed watering program for 2024-25.</p> <p>Ongoing planning and consultation with input from PV around on-ground management activities, risk planning and site feasibility.</p>

Category	Stakeholder(s)	IAP2 level of engagement	Engagement Method	Engagement Purpose
			<ul style="list-style-type: none"> <li>• Presentation to key staff and discussion of timelines, risks and mitigation measures that are site specific.</li> <li>• Mallee CMA meets monthly with PV.</li> </ul>	
	Department of Energy, Environment and Climate Action (DEECA)	Inform/consult	<ul style="list-style-type: none"> <li>• Bi-monthly meeting regarding EC5 contract</li> <li>• Various progress reports throughout the years on watering milestones and outcomes.</li> </ul>	Share planning and provide opportunity for feedback and comment regarding any operation and/or on-ground works being or planned to be undertaken over the coming year.
	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Collaborate	<ul style="list-style-type: none"> <li>• Multiple meetings; Face-to-face</li> <li>• Email and telephone.</li> </ul>	Discussion around Weir pool manipulation to ensure Mallee CMA watering priorities can be met in conjunction with working with NSW requirements and priorities (Murray Wetlands information given to Mallee CMA representatives)
	Victorian Murray Floodplain Restoration Project (VMFRP) Project Team	Involve	<ul style="list-style-type: none"> <li>• Various meetings and discussions to discuss scheduling of watering events.</li> </ul>	Coordination of activities across the two programs. For the coming year, but also longer-term planning around potential construction and EWMP updates.
	Lower Murray Water (LMW)	Collaborate	<ul style="list-style-type: none"> <li>• Various meetings and discussions to discuss scheduling of delivery.</li> </ul>	Coordination of delivery particularly for delivery to Lake Hawthorn and Koorlong Lake.
	Mildura Rural City Council	Inform	<ul style="list-style-type: none"> <li>• Fact sheet and survey to capture community values for the site and better inform future watering plans.</li> </ul>	Provide information about the planning and delivery of water for the environment and create opportunities for community to provide important information about site values and uses.
	Swan Hill Rural City Council	Inform	<ul style="list-style-type: none"> <li>• Fact sheet and survey to capture community values for the site and better inform future watering plans.</li> </ul>	Provide information about the planning and delivery of water for the environment and create opportunities for community to provide important information about site values and uses.
Landholders/farmers	Bridge Creek	Collaborate	<ul style="list-style-type: none"> <li>• Various meetings and discussions to discuss scheduling of delivery.</li> </ul>	
	Bullock Swamp North			
	Burra South Proper			

Category	Stakeholder(s)	IAP2 level of engagement	Engagement Method	Engagement Purpose
	Lakes Powell and Carpul			Coordination of delivery, timing, deeds of agreement and ensure any concerns are understood.
	Outlet Creek			
	Neighbouring Landholders	Inform	<ul style="list-style-type: none"> <li>• Fact sheet / website information</li> </ul>	To provide information to adjoining landowners and ensure any concerns are understood.
Recreational users	Cabarita Inc.	Inform	<ul style="list-style-type: none"> <li>• Fact sheet / survey</li> </ul>	To provide information to community who value and utilise the sites and how they can obtain further information. Capture community values for the site and other feedback.
	Mildura 4WD Club	Inform	<ul style="list-style-type: none"> <li>• Fact sheet / survey</li> </ul>	To provide information to community who value and utilise the sites and how they can obtain further information. Capture community values for the site and other feedback.
	Mildura Birdlife Club	Inform	<ul style="list-style-type: none"> <li>• Fact sheet / interactive website / survey</li> </ul>	To provide information to community who value and utilise the sites and how they can obtain further information. Capture community values for the site and other feedback.
	Sunraysia Bushwalking Club	Inform	<ul style="list-style-type: none"> <li>• Fact sheet / survey</li> </ul>	To provide information to community who value and utilise the sites and how they can obtain further information. Capture community values for the site and other feedback.
Traditional Owners	First People of the Millewa Mallee Aboriginal Corporation (FPMMAC)	Collaborate	<ul style="list-style-type: none"> <li>• 'Talk Water' event occurred in October 2023.</li> <li>• Second 'Talk Water' occurred in March 2024 to confirm draft proposal and demonstrate how Traditional Owner feedback was incorporated.</li> </ul>	Allow Traditional Owners and community to speak for Country. Opportunity to guide watering operations to benefit items of cultural significances. Two-way sharing knowledge between cultural practices and needs and modern wetlands and floodplain management principles.

Category	Stakeholder(s)	IAP2 level of engagement	Engagement Method	Engagement Purpose
			<ul style="list-style-type: none"> <li>Follow-up face-to-face meetings with community members and Traditional Owners as required.</li> <li></li> </ul>	Discuss cultural values and uses and seek feedback on this section in SWPs.
	Traditional Owners	Involve	<ul style="list-style-type: none"> <li>'Talk Water' event occurred in November 2023</li> <li>Second 'Talk Water' occurred in March 2024 to confirm draft proposal and demonstrate how Traditional Owner feedback was incorporated.</li> <li>Face-to-face meetings with individual Traditional Owners from Swan Hill to the Mildura.</li> </ul>	<p>Provide opportunity for on-country discussions to inform 2024/2025 watering actions.</p> <p>Two-way sharing knowledge between cultural practices and needs and modern wetlands and floodplain management principles.</p> <p>Build and maintain relationships with Traditional Owners, ensuring conduits for two-way communication about watering and ensure operations are effective</p>
	Aboriginal community members	Inform	<ul style="list-style-type: none"> <li>Online – web based and social media</li> <li>Stalls at local markets October to December 2023</li> <li>Aboriginal Reference Group is a committee facilitated by the Mallee CMA represented by various Aboriginal community members. Mallee CMA presented the methodology for engagement and the group provided feedback for changes and improvement (06/03/2024).</li> </ul>	Provide community with the opportunity to provide feedback and important information about what they value about the sites.
Local businesses	Sunraysia Apiarist Association	Inform	<ul style="list-style-type: none"> <li>Fact sheet / letter / website tool</li> </ul>	To provide information to Apiarists about the planning underway for environmental watering and opportunities to ask questions as required.
	Murray Offroad Adventures	Inform	<ul style="list-style-type: none"> <li>Fact sheet</li> </ul>	To provide information for visitors to the area and local community about the upcoming watering events and provide opportunity to provide feedback.



Category	Stakeholder(s)	IAP2 level of engagement	Engagement Method	Engagement Purpose
	Mallee Tours	Inform	<ul style="list-style-type: none"> <li>• Fact sheet</li> </ul>	To provide information for visitors to the area and local community about the upcoming watering events and provide opportunity to provide feedback.
	Mildura Information Centre	Inform	<ul style="list-style-type: none"> <li>• Fact sheet</li> </ul>	To provide information for visitors to the area and local community about the upcoming watering events and provide opportunity to provide feedback.
	Visit Mildura	Inform	<ul style="list-style-type: none"> <li>• Media kit / fact sheet</li> </ul>	To provide information for visitors to the area and local community about the upcoming watering events and provide opportunity to provide feedback.
	Wildside Outdoors	Inform	<ul style="list-style-type: none"> <li>• Fact sheet</li> </ul>	To provide information for visitors to the area and local community about the upcoming watering events and provide opportunity to provide feedback.



## 7 Scope of Environmental Watering

The prioritisation process for identifying wetlands in this 2024-25 SWP has considered a number of factors. Primary considerations were the current condition of the site, with respect to the current hydrological state, the ecological values present and the expected condition (under pre-regulation watering conditions), an assessment of the site's Environmental Objectives and a comparison of actual watering regimes to recommended optimal watering regimes at each site. Much of this required information is identified in Environmental Water Management Plans (EWMPs) appropriate to that asset. The Environmental Objectives from each site used for 2024/25 were updated late in 2020.


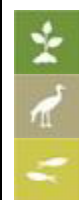
In addition to current environmental condition and long-term objectives, community and Aboriginal objectives are also considered. This information has been received from a wide range of community and stakeholders including landholders and land managers, recreational and special interest groups and Traditional Owners. The approach used to gather this information and outcomes from consultation and communication is detailed in Sections 3,4 and 6.











Special consideration was given to sites that form part of the Victorian Murray Floodplain Restoration Project (VMFRP). These sites will potentially have construction of infrastructure commencing across the 2025-26 year so the ability to undertake environmental watering will be limited or restricted at some sites.

Actions proposed for 2024-25 either relate to operation of structures and/or incorporate aspects of weir pool manipulation (Weir 15) or will require delivery of water through temporary pumping infrastructure. Hydrological compliance for all temporary pumping sites is measured using flow meters on the pumps which are compliant with industry requirements.

A summary of the environmental objectives and flow recommendations for weir pool connected waterbodies for the 2024-25 environmental watering year is in Table 7.1 and wetlands requiring a pumped allocation for the 2024-25 environmental watering year are in Table 7.2. Sites listed in Table 7.3 have been actively managed during the past five years and were considered during the pre-planning stage but were not deemed suitable for delivery in 2024-25. This may be due to reasons including previous watering history, current condition at the site, planned drawdown or a requirement for the site to remain dry to meet environmental and hydrological objectives, suggestions resulting from community and Aboriginal community consultation, logistical limitations and potential future impact on VMFRP planned operations/construction.

Table 7.1: Potential Watering Actions (weir pool connected) for the Murray Wetlands Site in 2024-25. These sites are typically managed via weir pool manipulations and/or regulating structures and are management actions which do not require a specific environmental water allocation.

Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH objectives
<b>Butlers Creek (Baggs Regulator) / Ducksfoot Lagoon (Jennings Regulator)</b>	Spring/summer - Top up and maintain water level to reflect Full-Supply level of the adjacent weir pool by opening the regulators.	All scenarios.	<ul style="list-style-type: none"> <li>Provide a productivity pulse to support the food web</li> <li>Provide conditions to support growth of annual aquatic and emergent vegetation</li> <li>Support communities of fish within the wetland</li> <li>Provide habitat for frogs and waterbirds.</li> </ul>	<p>Butlers Creek, and the adjoining Ducksfoot Lagoon, have a water requirement of annual maintenance of water.</p> <p>This is operated through a cycle of filling/maintaining an open regulator for spring and summer, allowing the water level to mimic that which is occurring in the adjacent weir pool.</p> <p>The regulator will be closed through autumn and winter in order to undertake a natural drawdown phase.</p> <p>This wetland provides habitat for a large number of waterbirds with different habitat and feeding requirements. Some species of conservation significance in Victoria have also been identified across this site. Previous surveys have recorded a strong small-bodied fish community, with some large-bodied native fish also present. Frogs and turtle are also known to reside at this site.</p> <p>As the waterbody is not far from a major population centre (Mildura) it is used by the community extensively for activities such as birdwatching, walking (walking track surrounds the billabong), cycling, angling and camping.</p> <p>This operation does not require a water allocation.</p>	KB9, KB10.	
	Autumn/winter - Allow water level to draw down by closing the regulators.		<ul style="list-style-type: none"> <li>Drying of margins of the waterway, allowing sediments to consolidate</li> <li>Provide conditions to support growth of lakebed herbland</li> <li>Provide a mosaic of feeding habitat for waterbirds</li> <li>Lock nutrients up in the sediment.</li> </ul>			
<b>Cowanna Billabong</b>	Winter/Spring - Allow water level to draw down by closing the regulator.	All scenarios.	<ul style="list-style-type: none"> <li>Drying of margins of the billabong, allowing sediments to consolidate</li> <li>Provide conditions to support growth of lakebed herbland</li> <li>Provide a mosaic of feeding habitat for waterbirds</li> <li>Lock nutrients up in the sediment</li> </ul>	<p>Cowanna Billabong has a water requirement of annual maintenance of water.</p> <p>This is operated through a cycle of filling/maintaining an open regulator for spring and summer, allowing the water level to mimic that which is occurring in the adjacent weir pool.</p> <p>The regulator will be closed through Winter and early Spring to undertake a natural drawdown phase in both Cowanna and</p>	MC1a, MC1b, MC2, MC4.	

Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH objectives
	Spring–Autumn - Top up and maintain water level to reflect Full-Supply level of the adjacent weir pool by opening and closing the regulator.		<ul style="list-style-type: none"> <li>Remove non-native fish species such as Carp and Oriental weatherloach from the wetland.</li> <li>Provide a productivity pulse to support the food web</li> <li>Provide conditions to support growth of annual aquatic and emergent vegetation</li> <li>Support communities of fish within the wetland</li> <li>Provide habitat for frogs and waterbirds.</li> </ul>	<p>Brickworks Billabongs. The regulator will be opened late Spring/Summer/Autumn to allow the wetland to refill and be maintained at weir pool level. This will also be required to support delivery to Brickworks Billabong.</p> <p>This wetland provides habitat for a large number of waterbirds with different habitat and feeding requirements. Some species are of conservation significance in Victoria have been identified to use this billabong.</p> <p>Previous surveys have recorded a strong small-bodied fish community, with some large-bodied native fish also present. Frogs and turtles are also known to reside in this billabong.</p> <p>As the billabong is close to a number of private landholders, and not far from a major population centre, it is used by the community extensively for activities such as birdwatching, walking (walking track surrounds the billabong) and as a site for radio-controlled boat users.</p>		 
Margooya Lagoon	Spring/summer - Top up and maintain water level to reflect Full-Supply level of the adjacent weir pool by opening the regulators.	All scenarios.	<ul style="list-style-type: none"> <li>Provide a productivity pulse to support the food web</li> <li>Provide conditions to support growth of annual aquatic and emergent vegetation</li> <li>Support communities of fish within the wetland</li> <li>Provide habitat for frogs and waterbirds.</li> </ul>	<p>Margooya Lagoon has a water requirement of annual maintenance of water. Ideally this operates on a cycle of filling/maintain an open regulator for spring and summer, allowing the water level to mimic that which is occurring in the adjacent weir pool. For successful filling during regulator opening, weir pool raising at Lock 15 is required (or higher Murray River flow). At regulated flow rates, with the weir pool at full supply level, water does not flow freely into the Lagoon.</p> <p>The regulator will be closed through autumn and winter in order to undertake a natural drawdown phase.</p>	ML1, ML3, ML4, ML5, ML7, ML9.	       
	Autumn/winter - Allow water level to draw naturally when river height decreases.		<ul style="list-style-type: none"> <li>Sediments to consolidate</li> <li>Provide conditions to support growth of lakebed herbland</li> <li>Provide a mosaic of feeding habitat for waterbirds</li> <li>Lock nutrients up in the sediment.</li> </ul>	<p>This lagoon provides habitat for a large number of waterbirds with different habitat and feeding requirements.</p> <p>Previous surveys have recorded a strong small-bodied fish community, with some large-bodied native fish also present. This site has been known to provide nursery habitat for larval large-bodied species such as Golden perch (<i>Macquaria ambigua</i>) and Silver perch (<i>Bidyanus bidyanus</i>). Operation of</p>		




























Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH objectives
				<p>this lagoon, in conjunction with any breeding activity detected in the adjacent river is important for the communities of these species. Frogs and turtle are also known to reside in this lagoon.</p> <p>This operation does not require a water allocation.</p>		
<b>Sandilong Creek</b>	Year round - Top up or maintain water level to reflect Full-Supply level of the adjacent weir pool by opening the regulators. (Close and draw down as required/appropriate to complement management actions).	All scenarios.	<ul style="list-style-type: none"> <li>• Provide a productivity pulse to support the food web</li> <li>• Provide conditions to support growth of annual aquatic and emergent vegetation</li> <li>• Support communities of fish within the wetland</li> <li>• Provide habitat for frogs and waterbirds.</li> </ul>	<p>Sandilong Creek has a minimum watering regime of 2 in every 10 years.</p> <p>Sandilong Creek has generally been retained at weir pool height with the regulators remaining open. Recently the creek underwent drawdown which was used to assist with a Carp management program.</p> <p>Following extensive flooding, manipulation of water level and pest fish control will be required to improve the ecology of the site to return to a system which can support the threatened fish and Freshwater catfish.</p> <p>The site also has important significance to the local community. As the site sits within a golf course it provides a focal point for users.</p>	SC2, SC3.	









Table 7.1 Environmental objectives and flow components (disconnected from weir pool) for the Murray Wetlands site. These sites are typically managed via temporary pumping and/or regulating structures and require an environmental water allocation.










Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH Objectives
<b>Bidgee Lagoon</b>	Top up during spring to target 52.4 m AHD by pumping up to 250 ML.	Average	<ul style="list-style-type: none"> <li>Maintain and increase the health of the adjacent River red gum.</li> <li>Provide conditions to support growth of annual aquatic and emergent vegetation</li> <li>Provide feeding and breeding opportunities for frogs</li> <li>Provide habitat for fish species.</li> <li>Promote carbon and nutrient cycling.</li> </ul>	<p>Bidgee lagoons have an optimal water regime of 3-5 years in ten.</p> <p>The Bidgee Lagoons are of particularly high value in the Mallee, having values identified for all four groups considered in the EWMPs (vegetation, terrestrial fauna, waterbirds and fish). The site also contains two inundation dependent EVCs classified as endangered in the Murray Fan bioregion – Floodplain Grassy Wetland (809) and Riverine Chenopod Woodland (103).</p>	MJ1b, MJ3, MJ4, MJ5	   
<b>Bottle Bend</b>	Fill wetland during spring to target 36.5 m AHD by pumping up to 350 ML.	Dry Average	<ul style="list-style-type: none"> <li>Maintain and increase the health of adjacent Black box</li> <li>Provide conditions to support growth of annual aquatic and emergent vegetation</li> <li>Provide feeding and breeding opportunities for frogs</li> <li>Maintain feeding and nesting opportunities of non-colonial waterbirds.</li> </ul>	<p>Bottle Bend has a watering regime of 5 in 10 years, which is currently not being met. Overbank flooding in spring 2022 and spring 2023 has prevented further decline in condition of riparian vegetation and potential improvements in condition. The wetlands have now dried out and requires a delivery of environmental water.</p> <p>Delivery through spring 2024 will aim to build on the positive effects of recent flooding through improved condition of riparian tree species, specifically Black box and lignum. Inundation will also provide conditions to support growth of aquatic vegetation species, and waterbird and frog habitat.</p>	BB1a, BB1b, BB2, BB4.	   
<b>Brickworks Billabong</b>	Fill in spring/summer to 31.6 m AHD.  Top up as required to maintain water	All scenarios.	<ul style="list-style-type: none"> <li>Recreate wetland habitat to support Murray hardyhead (<i>Craterocephalus fluvialis</i>) populations</li> <li>Re-establish and improve extent and coverage of Ruppia</li> </ul>	<p>Murray hardyhead have not been recorded in this wetland through netting or eDNA for several years (Huntley et al. 2022). Due to this, and recent connection to the Murray River during the flood and the associated invasion of pest fish, a drawdown action began in 2023-24. Due to the necessary drawdown period required to reset this wetland, the subsequent fill will</p>	MC2, MC7, MC8:	 

Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH Objectives
	level between 30.8 and 31.6 m AHD over Summer/Autumn.  Up to 400 ML.		<ul style="list-style-type: none"> <li>Manage salinity within an acceptable range for Murray hardyhead and Ruppia, and</li> <li>Provide shallow water feeding habitat for water birds.</li> </ul>	<p>occur in late Spring and Summer (after draw-down is complete), which is later than in previous years.</p> <p>These actions will ensure the maintenance of aquatic productivity, reduction in pest fish numbers, the persistence of <i>Ruppia</i> sp. and appropriate salinity levels, all of which the fish require for survival.</p> <p>Past research indicates that the target water level to provide optimal condition for Murray hardyhead (<i>Craterocephalus fluviatilis</i>) at Brickworks Billabong is 30.8 –31.6 m AHD.</p> <p>Additionally, water at these sites provides various shallow water and mudflat habitats for wading and feeding habitat by waterbirds birds, including Australian and international migratory birds.</p> <p>The site is close to the Mildura and Merbein townships and as such also provide high levels of amenity, including opportunities for recreational activities including birdwatching, walking and photography, offering reprieve stressful lives.</p>		 
<b>Bridge Creek (including Bridge Creek Wetland)</b>	Fill wetland during spring to 56.5 m AHD by pumping up to 1,580 ML.	Dry Average Wet	<ul style="list-style-type: none"> <li>Provide soil moisture to maintain and improve condition of riparian and floodplain vegetation, specifically River Red Gum, Black Box and Lignum</li> <li>Increase dissolved organic matter, particulate matter and macroinvertebrate productivity</li> <li>Provide shallow-water habitat to provide refuge and feeding habitat for wetland-dependant species including frogs and birds</li> <li>Stimulate aquatic vegetation growth during inundation</li> <li>Provide conditions for semi-aquatic lakebed herbland to establish during drawdown.</li> </ul>	<p>Bridge Creek is a wide creek bed fringed by River Red Gum and, on higher elevations, Black Box and Lignum. The creek and floodplain has a watering regime of 3 in 10 years with water maintain on the floodplain for a minimum of 3 months to improve health of fringing vegetation. The maximum time between events is 7 years. It has received water five time in the previous 10 years, however the target duration has only been met once within the last 10 years.</p> <p>High flows in the River Murray and large scale overbank flooding in spring 2022 inundated the creek and floodplain, likely halting declining condition of riparian vegetation. High river flows again inundated the target area during spring 2023 but did not provide ecological benefit due the floodplain complete drying within one month.</p> <p>Watering in spring 2024 will aim to build on the positive effects of recent flooding through improved condition of riparian tree</p>	P1.	   












Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH Objectives
				<p>species, promote the abundance and diversity in the understorey vegetation community, and support improved condition and seed fall and germination of Black Box.</p> <p>During 'Talk Waters' held in spring 2023, Traditional Owners expressed the importance and urgency of delivering environmental to this site due to the lack of healthy floodplain vegetation.</p>		
<b>Bullock Swamp North</b>	Partially fill during spring to target 38.5 m AHD by pumping up to 1,200 ML.	Dry Average Wet	<ul style="list-style-type: none"> <li>Maintain and increase the health of the adjacent black box and lignum</li> <li>Improve wetland condition</li> <li>Provide feeding opportunities for waterbirds</li> <li>Provide lateral spread of fresh water to refresh local groundwater which will support condition of surrounding black box trees not directly inundated.</li> </ul>	<p>Bullock Swamp has an optimal water regime of 3-5 years in ten.</p> <p>Bullock Swamp North is primarily privately owned and is operated to promote conservation values. The site is under a covenant and one area has been sold as a vegetation offset. There are six bird species of conservation significance known from the Spence's bend are which are directly or indirectly water dependent, including the Regent parrot. A recent (privately funded) vegetation survey found 21 VROTS species at the site.</p> <p>The landholder is very passionate and has contacted the Mallee CMA to request consideration of Bullock Swamp North as a site to receive environmental water in the future.</p>	SB1, SB3	    
<b>Burra Creek North</b>	Fill during autumn to inundate the main creek line by pumping up to 320 ML.	Average	<ul style="list-style-type: none"> <li>Maintain and increase the health of the adjacent red gum and black box</li> <li>Provide habitat and resources for birds, reptiles, bats and frogs</li> <li>Promote carbon and nutrient cycling.</li> </ul>	<p>Burra Creek North and South have an optimal water regime of 3-9 years in ten.</p> <p>Burra Creek supports a high number of directly and indirectly water dependent species, including 25 fauna and four flora species of conservation significance. In addition, 11 microbat species have been recorded from the site – one of the richest mammal groups in the Mallee.</p>	BC1, BC2.	    
<b>Burra Creek South</b>	Fill during autumn to inundate the main creek line by pumping up to 1000 ML.	Average				

Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH Objectives
<b>Burra Creek South Proper</b>	Fill during autumn to inundate the main creek line by pumping up to 75 ML.	Dry Average		The indigenous community and Traditional Owners for this region are very supportive of watering this creek. They see it as providing opportunity to utilise it as an education tool for younger generations.		
<b>Koorlong Lake</b>	Top up as required to maintain water level between 36.7 and 38.0 m AHD over spring–autumn).  Up to 150 ML.	All scenarios.	<ul style="list-style-type: none"> <li>Support Murray hardyhead populations maintain</li> <li>Improve extent and coverage of Ruppia</li> <li>Manage salinity within an acceptable range for Murray hardyhead and Ruppia.</li> </ul>	<p>Due to the presence of the EPBC Act (1999) listed (Endangered) Murray hardyhead at this site, maintenance of permanent water is a top priority. Provision of water will ensure the maintenance of aquatic productivity, the persistence of Ruppia sp. and appropriate salinity levels, all of which the fish require for survival.</p> <p>Past research indicates that the target water level to provide optimal condition for Murray hardyhead (<i>Craterocephalus fluviatilis</i>) at Koorlong Lake is 36.7 –38.0 m AHD. Additionally, water at these sites provides deep, shallow water and mudflat habitats for wading and feeding habitat by waterbirds birds, including Australian and international migratory birds.</p> <p>An initial spring delivery provides a productivity pulse which is timed to support breeding of Murray hardyhead (<i>Craterocephalus fluviatilis</i>). The variability in water level simultaneously supports waterbirds throughout the year.</p>	CK1, CK2.	  
<b>Lake Hawthorn</b>	Top up as required to maintain water level between 33 and 33.3m AHD over spring–autumn)  Up to 1,500 ML.	All scenarios.	<ul style="list-style-type: none"> <li>Maintain and improve extent and coverage of Ruppia</li> <li>Provide shallow water feeding habitat for water birds.</li> </ul>	<p>Past research indicates that the target water level to provide optimal condition at Lake Hawthorn is 33.0 –33.3 m AHD. Provision of water will ensure the maintenance of aquatic productivity and the persistence of Ruppia sp.</p> <p>This site is recognised as supporting high numbers of waterbirds. Water at this site provides various shallow water and mudflat habitat for wading birds. The Lake Hawthorn EWMP lists 60 species of waterbirds recorded using the site, including 16 migratory species.</p> <p>It should be noted that water levels drop quickly over the summer period and considerations need to also include irrigation watering demands and up-coming hot weather.</p>	LH1, LH2.	  



Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH Objectives
<b>Lake Powell (re-lift into Lake Carpul)</b>	<p>Part A: Fill Lake Powell during late autumn/early winter to target 55.05 m AHD by pumping up to 2,000 ML from the Murray River.</p> <p>Part B: Continue to fill Lake Powell during winter/spring by pumping up to 2,300 ML from the Murray River. This will enable filling of Lake Carpul to 52.23 m AHD by re-lifting up to 2,000 ML from Lake Powell.</p> <p>Up to 4,300 ML total will be delivered across 2023-24 and 2024-25.</p>	Dry Average Wet	<ul style="list-style-type: none"> <li>Provide a range of open-water, shallow-water, and emergent vegetation habitats for wetland-dependant species including frogs and birds and support breeding and feeding opportunities</li> <li>Stimulate aquatic vegetation growth during inundation</li> <li>Provide soil moisture to maintain and improve condition of riparian and floodplain vegetation, specifically River red gum, Black box, and Lignum</li> <li>Provide conditions for semi-aquatic lakebed herbland to establish during drawdown</li> <li>Aid nutrient cycling within the wetland to support wetland processes and provide recreational opportunities for nearby communities including kayaking, birdwatching and bush walking.</li> </ul>	<p>Lake Powell and Lake Carpul have a watering regime of 5 in 10 years, which is currently not being met. The wetlands had been dry for 5 years before being inundated by overbank flooding in spring 2022, preventing further decline in condition of riparian vegetation and potential improvements in condition. The wetlands have drawn down significantly and now require a top up delivery of environmental water.</p> <p>Delivery through autumn/winter/spring 2024 will aim to build on the positive effects of recent flooding through improved condition of riparian tree species, specifically River red gum, Black box and lignum. Inundation will also provide conditions to support growth of aquatic vegetation species and lakebed herbland on drawdown. Water delivery will also support waterbird breeding through late winter/early spring.</p> <p>The full delivery to both wetlands (Part A and B) has an expected duration of 215 days with an estimated pump delivery rate of 15-25 ML/d. Watering through autumn/winter/spring will ensure the full delivery has been completed prior to summer where there can be high evaporation and high risk of anoxic black water. Up to 2000 ML will be delivered during the 2023/24 water year to Lake Powell with 2,300 ML being delivered in 2024/25 to both Lake Powell and Lake Carpul.</p>	BY1, BY5.	      
<b>Outlet Creek (Karadoc Swamp)</b>	Fill during spring to inundate the main creek line and surrounding floodrunners by pumping up to 850 ML.	Dry Average Wet	<ul style="list-style-type: none"> <li>Provide soil moisture to maintain and improve condition of riparian and floodplain vegetation, specifically River red gum, Black box, and Lignum</li> <li>Provide suitable habitat for native frog species</li> </ul>	<p>Outlet Creek has a watering regime of inundation every year, which is currently not being met. The creek had been dry for 5 years before being inundated by overbank flooding in spring 2022, preventing further decline in condition of riparian vegetation and potential improvements in condition. The creek has now dried out and requires a delivery of environmental water.</p>	K2, K4, K5, K7.	 



Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH Objectives
			<ul style="list-style-type: none"> <li>Provide open-water habitat as refuge and feeding and breeding habitat for waterbirds.</li> </ul>	Delivery through spring 2024 will aim to build on the positive effects of recent flooding through improved condition of riparian tree species, specifically Swamp Sheek, Black box and lignum. Inundation will also provide conditions to support growth of aquatic vegetation species and waterbird habitat.		 
<b>Neds Corner Central – Old Tip Wetland, Neds Corner Lagoon and Neds Corner Floodplain</b>	Fill during autumn to maximum by pumping up to 250 ML.	Dry Average Wet	<ul style="list-style-type: none"> <li>Provide a range of open-water, shallow-water, and emergent vegetation habitats for wetland-dependant species including frogs and birds and support breeding and feeding opportunities</li> <li>Stimulate aquatic vegetation growth during inundation</li> <li>Provide soil moisture to maintain and improve condition of riparian and floodplain vegetation, specifically Black box</li> <li>Provide conditions for semi-aquatic lakebed herbland to establish during drawdown.</li> </ul>	<p>Neds Corner Lagoon and Old Tip Wetland have a target water regime of 5 in 10 years, which is not currently being met. Neds Corner Floodplain has a target regime of 3 in 10 years but has only received water once in the last five years.</p> <p>High flows in the River Murray and large scale overbank flooding in spring 2022 inundated the wetlands and floodplain, likely halting declining condition of riparian vegetation.</p> <p>Watering in autumn 2025 will aim to build on the ecological benefits from flooding in 2022 and promote the abundance and diversity in the understorey vegetation community and support improved condition and germination of Black Box.</p> <p>This site is of cultural significance and inundation will support cultural values through the improvement of the surrounding vegetation, and provision of habitat for key species of waterbirds. Water delivery at this site will include working closely with the First People of the Millewa-Mallee Aboriginal Corporation as the land manager, and in conjunction with their water delivery to Musk Duck Wetland through the Water is Life trials.</p>	NC3	   
<b>Nyah Floodplain</b>	Fill during autumn to target 63.2 m AHD by pumping up to 2000 ML.	Average	<ul style="list-style-type: none"> <li>Inundate the base and littoral zone of Parnee Malloo Creek to support aquatic and semi-aquatic plant communities</li> <li>Provide a range of habitats and resources for birds, mammals, reptiles and frogs</li> <li>Inundate floodplain adjacent to the Parnee Malloo Creek to promote growth of herb and shrub layers</li> <li>Maintain and improve River red gum condition</li> </ul>	<p>Nyah Floodplain has an optimal water regime of 8-10 years in ten and is not currently being met.</p> <p>Due to a high natural watering frequency, Nyah Floodplain is one of two of the few examples of floodplain dominated by forest (other being Vinifera Floodplain).</p> <p>The site supports a large and diverse array of flora and fauna, including a number of species of conservation significance. These include 14 water dependent flora species known from the sites, as well as 19 directly or indirectly water dependent</p>	NV1, NV2b, NV4.	    






Wetland	Potential watering action	Climatic scenario (s)	Expected watering effects	Rationale	EWMP environmental objectives	VEWH Objectives
			<ul style="list-style-type: none"> <li>Promote carbon and nutrient cycling.</li> </ul>	<p>fauna species, including bats, waterbirds, hollow nesting woodland birds, reptiles, turtles and invertebrates.</p> <p>Future construction of VMFRP infrastructure is a strong consideration of current planned watering as it may be the last opportunity to water this site and build resilience until planned finalisation of VMFRP construction in 2026.</p>		
<b>Brown Swamp (Pound Bend)</b>	Fill wetlands during autumn to 47.0 m AHD by pumping up to 850 ML.	Average	<ul style="list-style-type: none"> <li>Inundate and wet outer fringing Lignum and vegetation communities to improve condition</li> <li>Maintain the health of fringing River red gums and facilitate longevity of River red gum population.</li> </ul>	<p>The Eastern Wetlands (including Brown Swamp) consist of two shallow freshwater marshes. The watering regime for these wetlands is 4 in 10 years. This is not being met, with both wetlands only being inundated in 2 of the previous 10 years.</p> <p>Prior to natural inundation during spring 2022 the wetlands had been dry for five years previous. Inundation during 2022 halted decline in condition of fringing vegetation and helped to improve condition of riparian species and proposed watering for 2023 will continue to promote abundance and diversity in the understorey vegetation community as well as working toward achieving the target water regime for this site.</p>	PB2, PB3.	
<b>Vinifera Floodplain</b>	Fill during autumn to target 63.2 m AHD by pumping up to 1200 ML.	Average	<ul style="list-style-type: none"> <li>Inundate the soils to support aquatic and semi-aquatic plant communities</li> <li>Provide a range of habitats and resources for birds, mammals, reptiles and frogs</li> <li>Inundate floodplain to promote growth of herb and shrub layers</li> <li>Maintain and improve River red gum condition</li> <li>Promote carbon and nutrient cycling.</li> </ul>	<p>Vinifera Floodplain has an optimal water regime of 8-10 years in ten.</p> <p>Due to a high natural watering frequency, Vinifera Floodplain is one of two of the few examples of floodplain dominated by forest (other being Nyah Floodplain).</p> <p>The site supports a large and diverse array of flora and fauna, including a number of species of conservation significance. These include 14 water dependent flora species known from the sites, as well as 19 directly or indirectly water dependent fauna species, including bats, waterbirds, hollow nesting woodland birds, reptiles, turtles and invertebrates.</p> <p>Future construction of VMFRP infrastructure is a strong consideration of current planned watering as it may be the last opportunity to water this sites and build resilience until planned finalisation of VMFRP construction in 2026.</p>	NV1, NV2b, NV4.	   

Table 7.2: Sites which have been actively managed for environmental water delivery across the Murray Wetlands in the past but are not planned for receiving an allocation during 2024-25 across all climatic scenarios.

Waterbody	Potential Watering Action	Rationale
Bullock Swamp South	Drawdown	<p>All of these sites received natural flows during 2023–24. As no water will be delivered through the environmental water program during 2024–25, they will continue to drawdown, and some are likely to enter a dry phase.</p> <p>In combination with planned watering sites, drying these waterbodies will provide a mosaic of habitat types across the broader landscape. This mosaic provides favourable conditions and supports a wider range of species across the landscape. For example, aquatic and semi aquatic vegetation as well as vegetation which grows on exposed mudflats and piscivorous waterbird species which utilise deep water to feed, waders which use shallow water for feeding and exposed mud flats which are favoured by shorebirds.</p> <p>Drying the wetlands will also see the eradication of pest fish species, effectively re-setting the site which will be beneficial for future water delivery and avoid or limit intrusion of pest fish during delivery.</p>
Callanders Swamp		
Cardross Lakes		
Catfish Billabong		
Carina Bend Wetlands		
Fishers Lagoon		
Heywood Lake		
J1 Creek		
Karadoc Swamp		
Little Heywood Lake		
Liparoo East		
Liparoo West		
Lock 9 Wetland		
Planigale		
Robertson Creek		
Robertson Wetland		
Tata North		
Tammit Wetlands		
Sandilong Billabong		
Spences Bend Billabong		
Wakool Creek		
Western Wetlands		
Woolshed Creek		
Woorlong Wetland		
Yungera Wetland		



## 8 Scenario Planning

Scenario planning and prioritisation for 2024-25 for the Murray Wetlands is heavily influenced by a number of critical factors. Foremost is the consideration of the current environmental condition of the landscape. A concerted effort to water across the Murray Wetlands over the last several years, in conjunction with the recent high Murray River has seen improvement in condition, particularly given the 2022-23 floods inundated many wetlands and floodplains that had been dry since flooding in 2016.

From a long-term planning perspective, the influence of the Victorian Murray Floodplain Restoration Project applies significant weight to planning and prioritisation for this year, from early 2025 and into 2026 the proposed start of construction will likely limit our ability to undertake watering across the construction footprint. Extensive flooding during the 2022-23 high flow event will hopefully build resilience into the environment across the VMFRP and other Murray Wetlands sites.

The influence of local weather on water scenario planning and flow triggers is very low across the Murray Wetlands area. Local water availability is highly dependent on conditions experienced in the upper catchments, the resulting in-flow and flow in the adjacent Murray River. Local rainfall, with the exception of extreme rainfall events, has limited to no effect on flooding and inundation of local floodplain and wetlands across the Murray Wetlands. Temperature, particularly during the warmer months also has little bearing on scenario planning. Even during milder conditions, evaporation in the region is still high, thus not a strong factor influencing decision making.

Water availability is a strong consideration during scenario planning. As all water for the Murray Wetlands comes from upstream storages, there is some ability to predict water availability locally at the Murray Wetlands. Included in consideration is carryover water, forecasting and inflows. Carryover is particularly important to consider for early year demands (i.e., early spring). The availability of high river flows, and unregulated flows in the Murray River past the Murray Wetlands sites also ensures higher confidence in water availability, and increases the likelihood of following a higher usage water scenario. System demands and shortfalls are most likely to impact on environmental water delivery during dry periods or when water availability is lower.


The nature of the Murray Wetlands system means that there is little need for consideration of high-priority carryover for the majority of the sites. The natural ephemeral nature of the landscape allows for periods with no water which are generally considered part of the natural cycle. However, there is an exception for the Critically Endangered Murray Hardyhead (*Craterocephalus fluviatilis*) site (Koorlong Lake) and Lake Hawthorn. These sites are required to be kept within an operating range to either sustain a Murray Hardyhead population or to maintain populations of saline aquatic vegetation.

Use of natural cues is also a strong consideration driving scenario planning. It is one of the foremost factors when undertaking weir pool manipulation planning. Naturally, low flows in the Murray River would see lower water level in the river and drying of anabranch creeks. This can be replicated by lowering the weir pools. Alternately, during high flows, water level is increased, and off-channel creeks receive flows (i.e. weir pool raising). Natural flows also influence some aspects of wetland, and more so, floodplain inundation planning.

### 8.1 Drought

A Drought scenario is enacted when the Probability Of Exceedance (POE) is 99%. This means that the inflows are the lowest on record. The main watering objective is to 'Avoid irretrievable loss of key environmental assets. The underlining management objectives are to:

- Avoid critical loss of species, communities and ecosystems
- Maintain key refuges
- Avoid irretrievable damage or catastrophic events.



The wetlands being planned for delivery under this scenario have reached a critical point in their cycle where inundation is now considered essential to avoid loss of environmental character.

At this point, we do not envisage a drought scenario in 2024–25 is feasible. For this to occur there needs to be a significant shift that indicates no in-flows are forecast for the system over a 12-month period.

## 8.2 Dry

A Dry scenario is enacted when the Probability Of Exceedance (POE) is 90%. This means that the inflows are in the bottom 10% of all years. The main watering objective is to 'Ensure priority river reaches and wetlands have maintained their basic functions'. The underlining management objectives are to:

- Maintain river functioning with reduced reproductive capacity
- Maintain key functions of high priority wetlands
- Manage within dry spell tolerances
- Support connectivity between sites.

As well as addressing sites deemed essential under a Drought scenario, sites under a Dry scenario look to continue to build resilience and maintain key functions of wetlands.

## 8.3 Average

An Average scenario is enacted when the Probability Of Exceedance (POE) is 50%. This means that the inflows are on average with most years. The main watering objective is to 'Ecological health of priority river reaches and wetlands have been protected or improved'. The underlining management objectives are to:

- Enable growth, reproduction and small-scale recruitment for a diverse range of flora and fauna
- Promote low lying floodplain river connectivity
- Support medium flow river and floodplain functional processes.

As well as addressing sites deemed essential under Drought and Dry scenarios, sites under an Average scenario look to promote floodplain connectivity and processes and look to enable recruitment and improve condition of flora and fauna.

Particular flow triggers used in the consideration for acceptance of this scenario are linked to modelled natural flows. Modelled natural flows in the River Murray, at Lock 15,  $\geq 23,000$  ML/d by early August, will facilitate decisions to trigger an Average scenario. Unregulated flows in the River Murray in the two months prior to August should also be a strong consideration for triggering an Average scenario. The reason for these considerations is to replicate natural conditions, which would start to see off-channel creeks to engage, which would generally lead to low level floodplain connectivity as time, and inflow increases.

Current indications have the 2024-25 water year starting with this scenario with high expected carry over and average rainfall forecast.

## 8.4 Wet

A Wet scenario is enacted when the Probability Of Exceedance (POE) is 10%. This means that the inflows are in the top 10% of all years. The main watering objective is to 'Improve the health and resilience of aquatic ecosystems. The underlining Management objectives are to:

- Enable growth, reproduction and large-scale recruitment for a diverse range of flora and fauna
- Promote higher floodplain river connectivity
- Support high flow river and floodplain functional processes.





It is anticipated that under a Wet scenario, inundation of majority of low-lying wetlands will occur via overbank flooding. The occurrence of overbank flooding or “natural inundation” results in a lower requirement for delivery of environmental water via pumping. In some instances (i.e. Lake Hawthorn, Koorlong Lake), delivery may still be required as these sites are not on the river Murray floodplain and will not be inundated through natural flooding.

High flows in the Murray River, which result in the removal of the weirs between Swan Hill and the South Australian border, indicate conditions where a Wet scenario should be triggered. This occurred during the 2022-23 and 2023-24 seasons.

Table 8.1: Proposed environmental watering actions for the Murray Wetlands under each climatic scenario for 2024-25.

Climate Scenario	Drought		Dry		Average		Wet*	
Expected climatic conditions and water availability	POE 99%		POE 90%		POE 50%		POE 10%	
Expected river conditions (including unregulated water, consumptive water, etc.)	Base level river flows in line with minimum operational requirements resulting in regulated conditions.		Low River Murray flows with little to no inflows from storages or tributaries (other than operational releases) resulting in regulated conditions. River Murray flows unlikely to naturally inundate off-channel wetlands and anabranches.		High river flows resulting from controlled releases from storage or minor spills and/or high tributary inflows. River Murray flow may be operating under either regulated or unregulated conditions. Wetlands, anabranches may receive natural inundation.		Large spills from upstream storages and/or high tributary inflows resulting in unregulated conditions and removal of all weirs. Wetlands, anabranches and floodplain likely to received natural inundation	
Environmental objectives	Maintain critical wetland habitat		Maintain and protect critical habitat at key sites		Maintain condition of floodplains		Provide inundation of vegetation communities for growth and germination	
Priority watering actions/wetlands expected to be delivered 2024/25	Tier 1		Tier 1		Tier 1		Tier 1	
	Brickworks Billabong	400	Bottle Bend*	350	Bidgee Lagoon*	250	Brickworks Billabong	400
	Koorlong Lake	150	Bridge Creek	1,580	Bottle Bend*	350	Bridge Creek	1,580
	Lake Hawthorn	1,500	Brickworks Billabong	400	Brickworks Billabong	400	Bullock Swamp North	1,200
			Bullock Swamp North	1,200	Bridge Creek	1,580	Koorlong Lake	150
			Koorlong Lake	150	Bullock Swamp North	1,200	Lake Hawthorn	1,500
			Lake Hawthorn	1,500	Burra Creek North*	320	Lake Powell (Re-lift to Lake Carpul)	2,300
			Lake Powell (Re-lift to Lake Carpul)	2,300	Burra Creek South*	1,000	Outlet Creek (Karadoc Swamp)	850
			Outlet Creek (Karadoc Swamp)	850	Burra Creek South Proper*	75	Neds Corner Central	250
			Neds Corner Central	250	Koorlong Lake	150		
					Lake Hawthorn	1,500		
					Lake Powell (Re-lift to Lake Carpul)	2,300		
					Outlet Creek (Karadoc Swamp)	850		
					Neds Corner Central	250		
					Nyah Floodplain*	2,000		
					Brown Swamp (Pound Bend)	850		
					Vinifera Floodplain*	1,200		
Estimated environmental water requirement	2,050 ML		8,580 ML		14,275 ML		8,230 ML	

\*These sites will have been naturally inundated under a wet scenario and will not require delivery.

Table 8.2: Proposed management of wetlands and off-channel systems connected to the weir pool, prioritised under each climatic scenario.

Climate Scenario	Drought		Dry		Average		Wet*	
<b>Wetlands managed via weir pool manipulation</b> R – Connected during weir pool raising F – Connected at full supply level O – Regulator operation D – Drying phase N – Natural flooding	Butlers Creek	O	Butlers Creek	O	Butlers Creek	O	Butlers Creek	N
	Cowanna Billabong	O	Cowanna Billabong	O	Cowanna Billabong	O	Cowanna Billabong	N
	Ducksfoot Lagoon	O	Ducksfoot Lagoon	O	Ducksfoot Lagoon	O	Ducksfoot Lagoon	N
	Margooya Lagoon	O	Margooya Lagoon	O	Margooya Lagoon	O	Margooya Lagoon	N
	Sandilong Creek	O	Sandilong Creek	O	Sandilong Creek	O	Sandilong Creek	N

\* Under a wet scenario the relevant weirs will be stripped, and unregulated flows will have already achieved desired inundation and ecological outcomes for all weir pool managed sites. All regulating structures will be open under this scenario.

## 9 Risk Management

The risk management section is specifically targeted at the proposals for watering discussed earlier and should be reassessed if changes are made to the watering schedule.

Table 9.1: Risk assessment of watering the Murray Wetlands for 2024-25.

Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
Environment	Extended periods of high demand could lead to system or delivery shortfalls which reduce access for environmental water deliveries, resulting in failure to complete planned actions.	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Planned deliveries can be interrupted and rescheduled with minimal impact on outcomes</li> <li>Weir pool manipulations may be curtailed in high demands periods</li> <li>Consult MCMA to prioritise watering actions that will have outcomes severely affected if delivery is interrupted and liaise with DEECA and MDBA to plan avoidance of interruptions</li> </ul>	MCMA MDBA VEWH	Low	Static
Environment	Maintenance activities by the storage operator or constructing authority affect the ability to deliver water to sites.	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Monitor maintenance activities and schedules to identify possible issues and reschedule deliveries actions if required to minimise any disruption.</li> <li>Provision of early advice of planned maintenance actions.</li> <li>Ensure consultation with storage operator on watering plan development</li> </ul>	MCMA Storage Operator MCMA	Low	Static
Reputational	Access routes into public park areas may be inundated by delivery of environmental water, leading to potential impacts on recreational opportunities for park users.	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Watering proposals to identify potential impacts (e.g. flooding footprint overlaid with key land roads and recreational assets) and ensure proposed watering plans are communicated to land mgrs.</li> <li>Land Managers implement the required management activities prior to and during environmental watering events. This includes: <ul style="list-style-type: none"> <li>identification of impacted assets</li> <li>preparation of resources required (e.g. signage, maintenance of alternative recreational sites) to implement road, walking track and campsite closures and to direct users to alternative sites</li> <li>communication of planned events, access closures and alternative recreational opportunities</li> </ul> </li> </ul> <p><i>*Note that insufficient resources may limit the land manager's ability to implement management activities. Increased resources may reduce the likelihood of the risk description occurring.</i></p>	MCMA  Parks Vic	Low	Static

Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
Business Costs	Park visitor vehicles cause damage to tracks, or to other assets in the surrounding landscape, due to off-road activity (by users going off track to avoid floodwaters) during and after environmental watering	Likely	Moderate	Medium	Land Managers: <ul style="list-style-type: none"> <li>implement management activities to prevent access to flooded roadways (e.g. close roads, communicate planned events, install signage)</li> <li>repair damage during and after environmental watering events</li> <li>consider rationalisation of road networks to remove unwanted access tracks and improve the standard of retained tracks.</li> </ul> <i>*Note that insufficient resources may limit the land manager's ability to implement management activities. Increased resources may reduce the likelihood of the risk description occurring.</i>	Land Manager	Low	Static
Legal	Access routes into public park areas may be inundated by delivery of environmental water, leading to potential economic impacts on commercial operators.	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Communication and advice to commercial operators to alert them of environmental watering, via Land Manager as licensing authority.</li> </ul>	MCMA	Low	Static
Environment	Delivery of greater volumes than ordered may result in an overdraw of environmental water account, leading to water not being available as per approved watering statement to complete subsequent planned actions	Unlikely	Minor	Low	<ul style="list-style-type: none"> <li>Monitor ABA balances and undertake regular communications with CMA as part of usage monitoring and portfolio management activities.</li> <li>Monitor deliveries in progress to ensure that they align with ordered/approved volumes. This may include consultation via the OAG to cover all sites</li> </ul>	VEWH MCMA	Low	Static
Business Costs	Costs exceed approved VEW funding for delivery actions at a site basis, leading to impacts on watering activities (including possibly cessation of deliveries).	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Develop accurate costings including allowances for planned risk mitigation actions and tracking of actuals against estimates.</li> <li>Reallocate funding, based on proposals developed by MCMA.</li> <li>Ensure specifications for service providers include coverage of contingency measures</li> </ul>	MCMA VEWH MCMA	Low	Static
Environment	Cost and/or time required to undertake cultural heritage assessments and implementation of any required actions may prevent watering actions being undertaken at a site leading to failure to achieve environmental benefits  <i>Note: There are also reputational risks if effective engagement and management of cultural values issues in not undertaken with T.O's</i> <i>Time for undertaking assessments is</i>	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Develop accurate costings including allowances for planned risk mitigation actions, and tracking of actuals against estimates.</li> <li>Undertake early assessments to identify potential cultural heritage issues and include in planning, with appropriate contingency allowances</li> <li>Reallocate funding within the overall funding contract, based on proposals developed by MCMA.</li> </ul> <i>Note: potential future recognition of joint management arrangements with TOs may see a need for provision of funding.</i>	MCMA MCMA VEWH	Low	Dynamic



Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
	<i>biggest risk to implementing watering actions</i>							
Legal	Failure to recognise cultural heritage issues at a site targeted for watering may result in necessary permits and approvals not being obtained, leading to prosecution and fines.	Likely	Moderate	Medium	<ul style="list-style-type: none"> <li>Undertake desktop reviews and site assessments of footprint of activities being undertaken with archaeologists, traditional owners and land managers, to identify approval needs and contingency measures - standard practice for all sites.</li> <li>Obtain any necessary formal approvals/permits and implement required actions.</li> <li>Monitor developments from VFMRP assessment process and adapt and apply procedures as required (noting that some of this information has not yet been entered into ACHRIS).</li> <li>Apply MCMA cultural heritage site assessment process.</li> </ul>	MCMA	Low	Dynamic
Environment	Total cost of proposed delivery actions exceeds the funding that can be provided by VEWH, limiting scope of the program and not achieved planned environmental outcomes	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Prioritise funding and site selection in line with available resources.</li> <li>Undertake preliminary assessment of costs during development of proposals and scoping of the plan.</li> </ul>	VEWH	Low	Static
Reputational	Reporting of water usage and updating of water register lags behind deliveries, leading to possible overuse of environmental entitlements and incorrect reporting of “water used/available” in the water market, with implications for efficient functioning of the water market.	Possible	Major	Medium	<ul style="list-style-type: none"> <li>Post estimated usage to water register during or immediately after delivery and adjust for actuals as soon as possible.</li> <li>Review water accounting processes to identify any opportunities for improvement.</li> <li>Regular reporting of delivery volumes and progress to VEWH</li> </ul>	GMW Storage Operators MCMA	Low	Static
Environment	Pumping of environmental deliveries into wetlands results in erosion downstream of pump discharge, leading to water quality impacts and the need to suspend watering actions and rectify the damage.	Likely	Minor	Low	<ul style="list-style-type: none"> <li>Ensure delivery routes downstream of pump sites can withstand the proposed flow rates without unacceptable impacts.</li> <li>Armouring and other protections may be installed if required.</li> <li>Implement ramp up and ramp down phases for flows to reduce erosion risks</li> </ul>	MCMA	Low	Dynamic
Environment	Failure of delivery infrastructure or water monitoring assets (including water meters) may result in interruptions to watering actions, leading to failure to achieve environmental objectives. (includes failure of temporary works)	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Ensure asset ownership is clear and asset owners undertake pre-event inspections and maintain assets as required. *</li> <li>Undertake operational monitoring during each event and respond as necessary to prevent failures. This may include float switches to prevent high water levels, and trail cameras for real time monitoring if risk level warrants.</li> </ul>	MCMA / Asset Owner	Low	Dynamic

Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
					<ul style="list-style-type: none"> <li>• Ensure levees designs are fit for purpose and address trafficability needs or control traffic access to levees etc. to ensure safety</li> <li>• Require inspections to ensure temporary levees are built according to specifications during construction, and prior to commencement of delivery</li> <li>• Site selection for pump and meter to minimise potential for damage, including protection of meter from falling tree limbs or other damage if required.</li> <li>• Develop agreed accounting process to estimate delivery volumes in the event of meter damage/data loss</li> </ul> <p><i>*Note that insufficient resources are likely to limit the asset owner's ability to perform maintenance and inspections. Increased resources may reduce the likelihood of the risk occurring.</i></p>	VEWH/ GMW		
Safety	<p>Failure of levees installed as part of delivery infrastructure or water monitoring assets may result in injury to the public or staff. (includes failure of temporary works and levees)</p> <p><i>Note: these events could also lead to interruption/abandonment of watering actions leading to failure to achieve environmental objectives, however safety issues pose highest risk</i></p>	Possible	Major	Medium	<ul style="list-style-type: none"> <li>• Ensure asset ownership is clear and asset owners undertake pre-event inspections and maintain assets as required.</li> <li>• Undertake operational monitoring during each event and respond as necessary to prevent failures.</li> <li>• Ensure levee designs are fit for purpose and address trafficability needs or control traffic access to temporary levees etc. to ensure safety</li> <li>• Adapt and apply levee design standards being developed as part of VMFRP program</li> <li>• Require inspections to ensure temporary levees are built according to specifications during construction, and prior to commencement of delivery</li> </ul> <p><i>*Note that insufficient resources are likely to limit the asset owner's ability to perform maintenance and inspections. Increased resources may reduce the likelihood of the risk occurring.</i></p>	MCMA / Asset Owner	Low	Dynamic
Reputational	Noise impacts from temporary pumping installations lead to complaints and adverse publicity, and potentially EPA noise pollution enforcement actions	Unlikely	Minor	Low	<ul style="list-style-type: none"> <li>• Site selection and pump placement to minimise noise impacts.</li> <li>• Selection of quiet pumping equipment and installation of noise suppression measures.</li> <li>• Ensure that pumping contractors check and maintain equipment</li> <li>• Consider curtailing pumping during peak camper visitation periods for public land sites.</li> </ul>	MCMA	Low	Dynamic

Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
Safety	Water delivery infrastructure (including temporary pumps etc.) creates safety risks for public.  <i>Note: Water deliveries may also encourage increased visitation to particular sites.</i>	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Install safety barricades and implement suitable traffic control measures</li> <li>Provide alert in the appropriate "changed conditions" sections of the PV website.</li> </ul>	MCMA/asset owner PV	Low	Static
Environment	Changes in seasonal conditions (esp. from dry to wet) and moving to expanded watering action scenarios may lead to difficulties in planning and implementing necessary actions, limiting the potential scope of watering actions resulting in failure to achieve environmental benefits	Unlikely	Minor	Low	<ul style="list-style-type: none"> <li>Monitoring climate forecasts and developing contingency plans for possible changes to actions.</li> <li>Identify any potential changes to proposed actions arising through SCBEWC</li> <li>Communicate potential for changes to watering actions to stakeholders and the wider community.</li> <li>Review MCMA register of structures and ensure that structures are adjusted/operated as necessary in light of changed conditions.</li> <li>Implement more responsive procurement processes to allow adaptation to changing conditions (e.g. ability to promptly engage pumping contractors)</li> </ul>	MCMA VEWH MCMA MCMA  MCMA	Low	Dynamic
Legal	Environmental deliveries cause unauthorised inundation of private land, resulting in impacts on farm activities and assets.	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Update and ensure currency of any applicable agreements covering inundation of private land.</li> <li>Review previous watering events to identify any high-risk locations and develop specific actions as appropriate.</li> <li>Undertake site inspections prior to commencement of deliveries to identify new risk areas for action (including consideration of risks to property access routes).</li> <li>Inform landholders of intended watering actions and provide a contact number to call if they become aware of issues during the event.</li> </ul>	MCMA	Low	Static
Environment	Other environmental water managers' competing priorities and objectives may limit the ability to achieve intended objectives.  (e.g. weir pool lowering prevents deliveries to Lindsay/Wallpolla)	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Early communication of priorities and objectives to other environmental water managers, and development of combined NSW/Vic watering proposals to SCBEWC</li> <li>Participation and co-ordination through various forums including OAGs.</li> <li>Studies to quantify relative benefits and impacts of competing actions.</li> </ul>	MCMA	Low	Dynamic
Business Costs	Insufficient resources available (including staff, funding for maintenance of roads, regulators, pumping etc), across partner organisations to deliver all planned environmental watering actions, leading to cancellation or interruptions of deliveries	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Partners notify the CMA and VEW of resourcing constraints in advance of deliveries and VEW convenes OAG meetings to consider implications and potential solutions</li> <li>Continue to actively prioritise actions to match available resources and ensure key actions are delivered.</li> <li>Reallocation of tasks and available funding.</li> </ul>	MCMA  MCMA MCMA	Medium	Dynamic

Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
	and/or impacts to roads and infrastructure etc (esp. in PV areas). <i>Note:</i> - This risk relates to unplanned resource shortfalls, for example where Parks staff are diverted to bushfire duties with no advance warning. - Causes of risk may also include shortage of service providers, rather than just staff shortages.							
Environment	The time required to for planning, approvals, procurement and implementation of watering actions may delay or prevent timely commencement of spring watering actions, limiting achievement of environmental objectives.  <i>Note: This issue may affect multiple locations - moderate consequence. Construction activities associated with the VMFRP are also likely to shorten the available window for deliveries. For 2024-25, additional cultural heritage risk assessments will need to be undertaken to assess flood impacts.</i>	Likely	Moderate	Medium	<ul style="list-style-type: none"> <li>• Early planning and prioritisation of actions.</li> <li>• Providing advice and early warning to each organisation of the actions proposed to understand the approvals expected to be required from each organisation.</li> <li>• Land managers to provide confirmation of approval requirements.</li> <li>• Streamlining annual watering plan approvals process.</li> <li>• Ensuring minimum water levels are maintained in critical wetlands prior to the end of the water year to provide a buffer against delays.</li> </ul> <i>Note: Especially relevant for PV environmental and cultural access approvals.</i>	MCMA MCMA  Land Managers VEWH MCMA	Low	Dynamic
Service Delivery	Environmental water deliveries may impact adversely on infrastructure or land management works (e.g. fire mgmt. works, kangaroo census and culls etc.) that are being undertaken by other stakeholders.	Likely	Moderate	Medium	<ul style="list-style-type: none"> <li>• Early planning and communications of proposed actions with land managers and other stakeholders to minimise likelihood of impacts, and scheduling of proposed works outside of planned delivery periods.</li> </ul>	MCMA	Low	Static

Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
Environment	Environmental deliveries create improved conditions for existing non-native species (e.g. carp, invasive species, feral animals) and over-abundant native species (e.g. kangaroos, Red Gum encroachment) leading to adverse environmental impacts.  Note: The likelihood of this risk increases when a sequence of dry years concentrate pest animal on environmental watering sites.	Likely	Moderate	Medium	<ul style="list-style-type: none"> <li>Study/understand life history of species and develop high level management strategies.</li> <li>Develop and implement site specific management strategies aimed at eradication/control of existing populations (e.g. carp management strategy, willow removal program, water-lily spraying program, feral animal programs) in high risk locations. This mitigation may also require collaborative effort from private landholders and could offer opportunities for community participation but may be limited by availability of resources by partners.</li> <li>Implement pest reduction efforts prior to delivery of water, to ensure increases in populations remain within "tolerable" levels</li> </ul> <i>(Note: This risk is still rated as <b>medium</b> after mitigation actions.)</i>	DELWP MCMA or Land Manager	Medium	Static
Environment	Introduction of pest plants through works (including importation of fill) to establish pump sites and levees results in environmental impacts.	Possible	Major	Medium	<ul style="list-style-type: none"> <li>Ensure machinery is cleaned in accordance with PV plant hygiene protocols.</li> <li>Use weed free or appropriately treated fill that complies with PV specifications.</li> <li>Where possible, stockpile temporary levee fill on site and reuse to avoid importing weeds</li> <li>Provide advice to PV of intended works and ensure their inclusion in the PV environmental access agreement.</li> </ul>	MCMA	Low	Static
Environment	Under either wet or dry conditions, access to temporary pumping sites in parks will deteriorate, reducing access and limiting watering actions	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Coordination and advice PV on proposed delivery sites.</li> <li>Repair track damage, including targeted fixes</li> </ul>	MCMA PV	Low	Static
Reputational	Failure to demonstrate the benefits of environmental watering and/or community concerns over environmental watering actions reduce community support for environmental watering.	Likely	Moderate	Medium	<ul style="list-style-type: none"> <li>Communicate the key objectives and benefits of environmental watering to the community through a range of channels.</li> <li>Publicise watering activities undertaken or in progress, and ensure LMW has information on watering actions in a form that can be provided to their customers.</li> <li>Install explanatory signage on environmental watering at key sites.</li> <li>Share communications materials and key messages between partners.</li> <li>Tailor messaging for 24-25 to explain why watering after floods is positive</li> </ul>	MCMA MCMA Land mgr or MCMA All	Low	Static



Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
Cultural Heritage	Environmental water deliveries and/or associated operational and monitoring actions result in damage to unknown cultural heritage sites.	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>• Apply MCMA standard cultural heritage operational assessment procedures to proposed watering sites.</li> <li>• Targeted site inspections with TOs, with regard to potential erosion and flood impacts from 22-23</li> <li>• PV assessment of cultural heritage aspects of watering proposals</li> </ul>	MCMA	Low	Static
Safety	Negative community sentiment in relation to government decisions/actions creates a safety risk for staff involved in environmental watering actions	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>• Timely sharing of information on known aggressive individuals or groups amongst all partners.</li> <li>• Share incident reports promptly to all partners</li> <li>• Ensure operational staff are informed of issues/risks and appropriate responses</li> </ul>	All	Low	Dynamic
Safety	Access routes into public park areas may be inundated by delivery of environmental water, leading to potential safety risks for park users and Parks Vic staff (e.g. by driving through flooded waterways).	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>• Erect warning signage and implement road closures supported by public advice on changed conditions.</li> <li>• Consider installation of track closure gates and gauge boards at high-risk sites</li> <li>• Undertake information programs to warn the public not to drive through flood water.</li> <li>• Identify non-flooded alternative sites for public use.</li> </ul>	Parks Vic	Low	Static
Safety	People camping on floodplains may be displaced by environmental water deliveries and may be aggressive towards e-water staff as a result  Note: Where English is not a first language, individuals may be concerned and feel frightened or threatened, and react accordingly	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>• Timely sharing of information on known aggressive individuals or groups amongst all partners.</li> <li>• Share incident reports promptly to all partners</li> <li>• Ensure operational staff are informed of issues/risks and appropriate responses</li> <li>• Ensure safe operational procedures for staff are followed</li> <li>• Providing information on watering actions in multiple languages</li> </ul>	All	Low	Static
Environment	Volumes delivered are insufficient to meet hydrologic targets due to multiple factors, for example high losses at very dry sites, hot weather causing excessive evaporation, antecedent conditions and inflow rates.	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>• Review historic deliveries and incorporate learning from those to accurately estimate demands.</li> <li>• Monitor deliveries and Seek approval from VEWH for reallocation of water between sites and/or watering statements as required.</li> </ul>	MCMA	Low	Dynamic

Risk category	Risk description	Pre-Mitigation Risk			Mitigation actions	Lead organism. for action	Residual Risk Rating	Risk type Static/ Dynamic
		Likelihood	Consequence	Risk Rating				
Environment	Surface or groundwater discharge from saline sites exceeds the targets in the BSM2030 leading to impact on the environment or consumptive users locally	Unlikely	Minor	Low	<ul style="list-style-type: none"> <li>• Revise watering options and/or implement monitoring and operational actions to prevent and limit impacts</li> <li>• Monitor salinity impacts due to 23-24 flooding and adjust plans accordingly</li> </ul>	MCMA	Low	Static

## 10 Approval, Endorsement and Consent

WATERWAY MANAGER APPROVAL OF THE SEASONAL WATERING PROPOSAL	
I, the authorised representative of the agency shown below, approve the Seasonal Watering Proposal for the lower Murray wetlands system in 2024-25.	
SIGNED FOR AND ON BEHALF OF MALLEE CATCHMENT MANAGEMENT AUTHORITY	
Signature of authorised representative:	
Name of authorised representative: James Kellerman	
Position of authorised representative: General Manager Operations and Community	
Date: 19/4/2024	

ENDORSEMENT OF THE SEASONAL WATERING PROPOSAL				
I, the authorised representative of the agency shown below, approve the Seasonal Watering Proposal for the lower Murray wetlands system in 2024-25.				
Role	Endorsing partner	Representative Role	Status Date	Notes/ Comments
Storage Manager	Goulburn Murray Water	Andrew Shields <i>River Operations Manager</i>	<input checked="" type="checkbox"/> Endorsed. Date: 18/04/2024	<i>Endorsement via letter.</i>
Water Corporation	Lower Murray Water	Vijay Ignatius <i>Manager Water Quality and Environment Title</i>	<input checked="" type="checkbox"/> Endorsed. Date: 12/04/2024	<i>Endorsement via letter.</i>
Land Manager	Mildura Rural City Council	Bonnie Pettett <i>Environmental Sustainability Coordinator</i>	<input checked="" type="checkbox"/> Endorsed. Date: 19/04/2024	<i>Endorsement via letter.</i>
Land Manager	Parks Victoria	Don Arnold <i>District Manager North West</i>	<input checked="" type="checkbox"/> Endorsed. Date: 19/04/2024	<i>Endorsement via email.</i>
Land Manager	DEECA	Aaron Walder <i>Senior Project Officer Land and Built Environment</i>	<input checked="" type="checkbox"/> Endorsed. Date: 19/04/2024	<i>Endorsement via email.</i>
Land Manager	Trust for Nature	Greg Ogle <i>Conservation Program Manager</i>	<input checked="" type="checkbox"/> Endorsed. Date: 19/04/2024	<i>Endorsement via letter.</i>
Traditional Owner	First People of the Millewa Mallee Aboriginal Corporation	Ken Knight <i>Interim Chief Executive Officer</i>	<input checked="" type="checkbox"/> Endorsed. Date: 19/04/2024	<i>Endorsement via letter.</i>

CONSENT TO USE OF CONTENT					
Role	Endorsing partner	Content	For use in the		Notes
			Seasonal Watering Proposal	Seasonal Watering Plan	
Traditional Owner	Dadi Dadi Weki Weki	Chapter 3	<input checked="" type="checkbox"/> Consent provided. Date: 08/04/2024	<input checked="" type="checkbox"/> Consent provided. Date: 08/04/2024	
Traditional Owner	Wadi Wadi Land & Water	Chapter 3	<input checked="" type="checkbox"/> Consent provided. Date: 08/04/2024	<input checked="" type="checkbox"/> Consent provided. Date: 08/04/2024	
Traditional Owner	Tati Tati Land & Water	Chapter 3	<input checked="" type="checkbox"/> Consent provided. Date: 08/04/2024	<input checked="" type="checkbox"/> Consent provided. Date: 08/04/2024	
Traditional Owner	Latji Latji Mumthelang	Chapter 3	<input checked="" type="checkbox"/> Consent provided. Date: 10/04/2024	<input checked="" type="checkbox"/> Consent provided. Date: 10/04/2024	
Traditional Owner	Wadi Wadi Nation	Chapter 3	<input checked="" type="checkbox"/> Consent provided. Date: 10/04/2024	<input checked="" type="checkbox"/> Consent provided. Date: 10/04/2024	

CONSENT TO USE OF CONTENT					
Role	Endorsing partner	Content	For use in the		Notes
			Seasonal Watering Proposal	Seasonal Watering Plan	
Traditional Owner	Munatunga Elders	Chapter 3	<input checked="" type="checkbox"/> Consent provided. Date: 05/04/2024	<input checked="" type="checkbox"/> Consent provided. Date: 05/04/2024	

## 11 References

VEWH (2021). *Victorian Environmental Watering Program Risk Management Framework*. Victorian Environmental Water Holder.

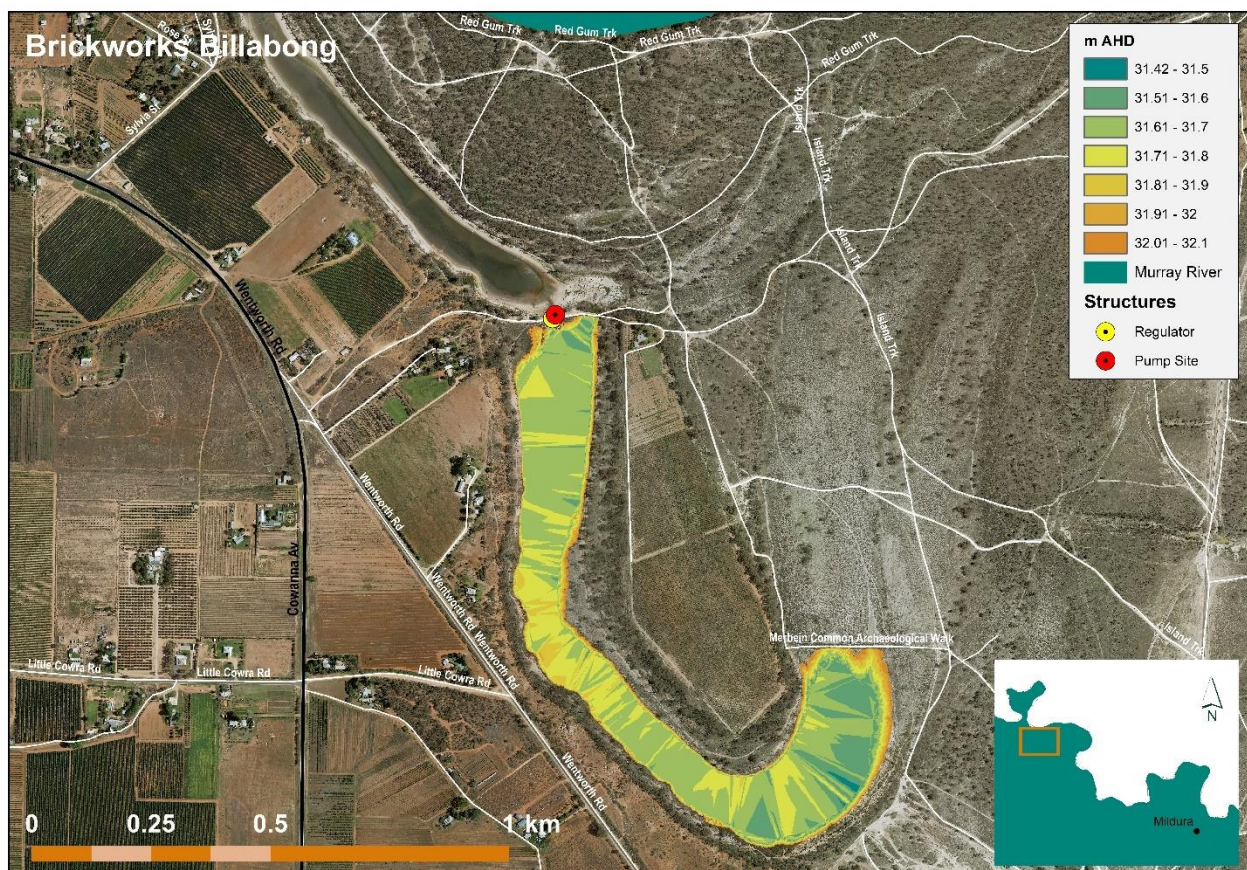
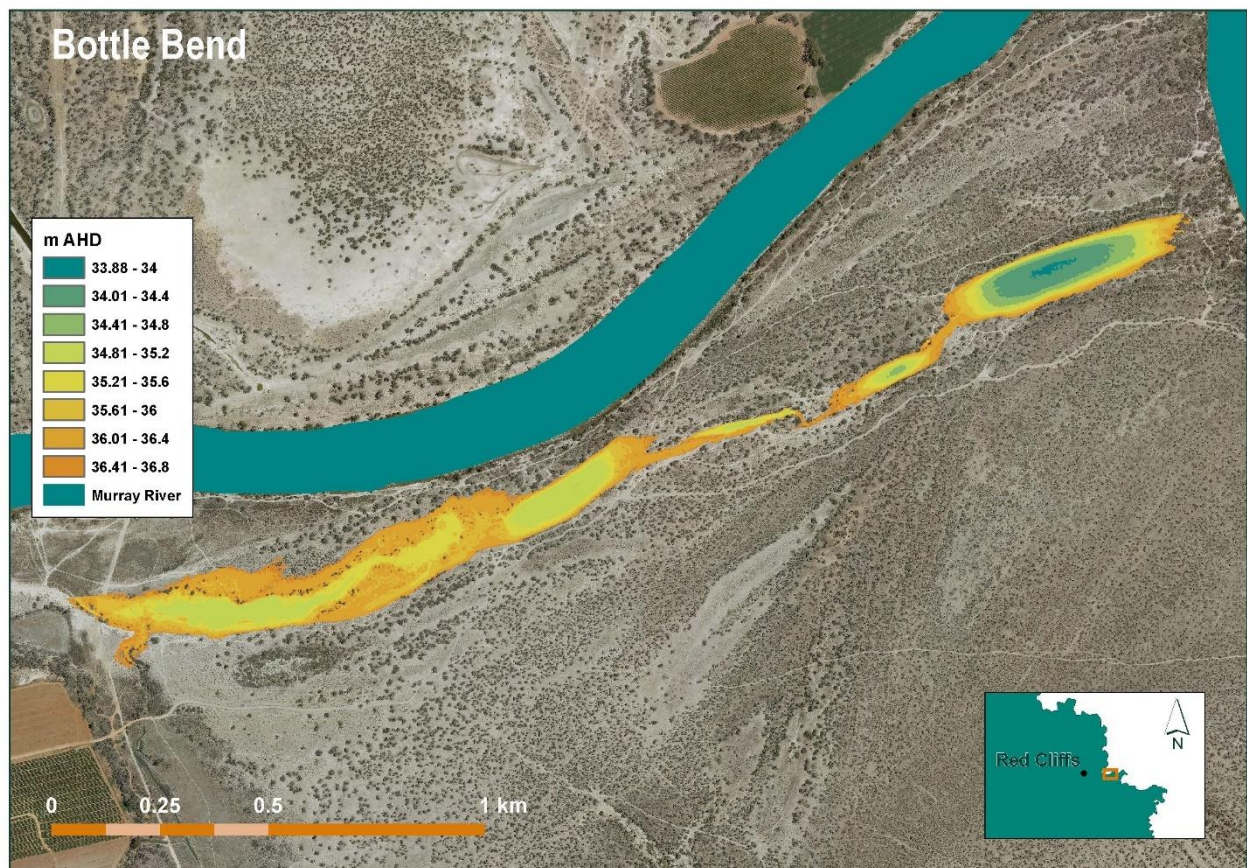


## 12 Appendices

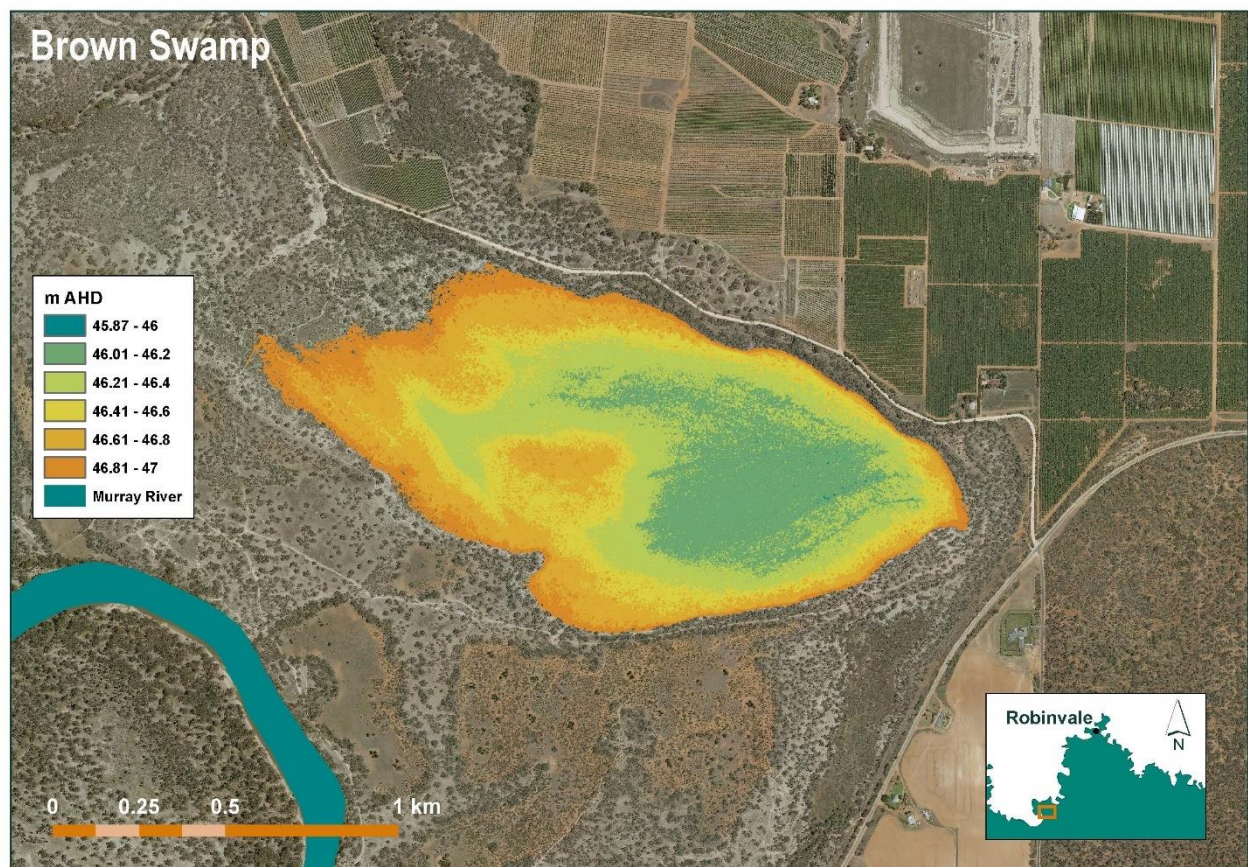
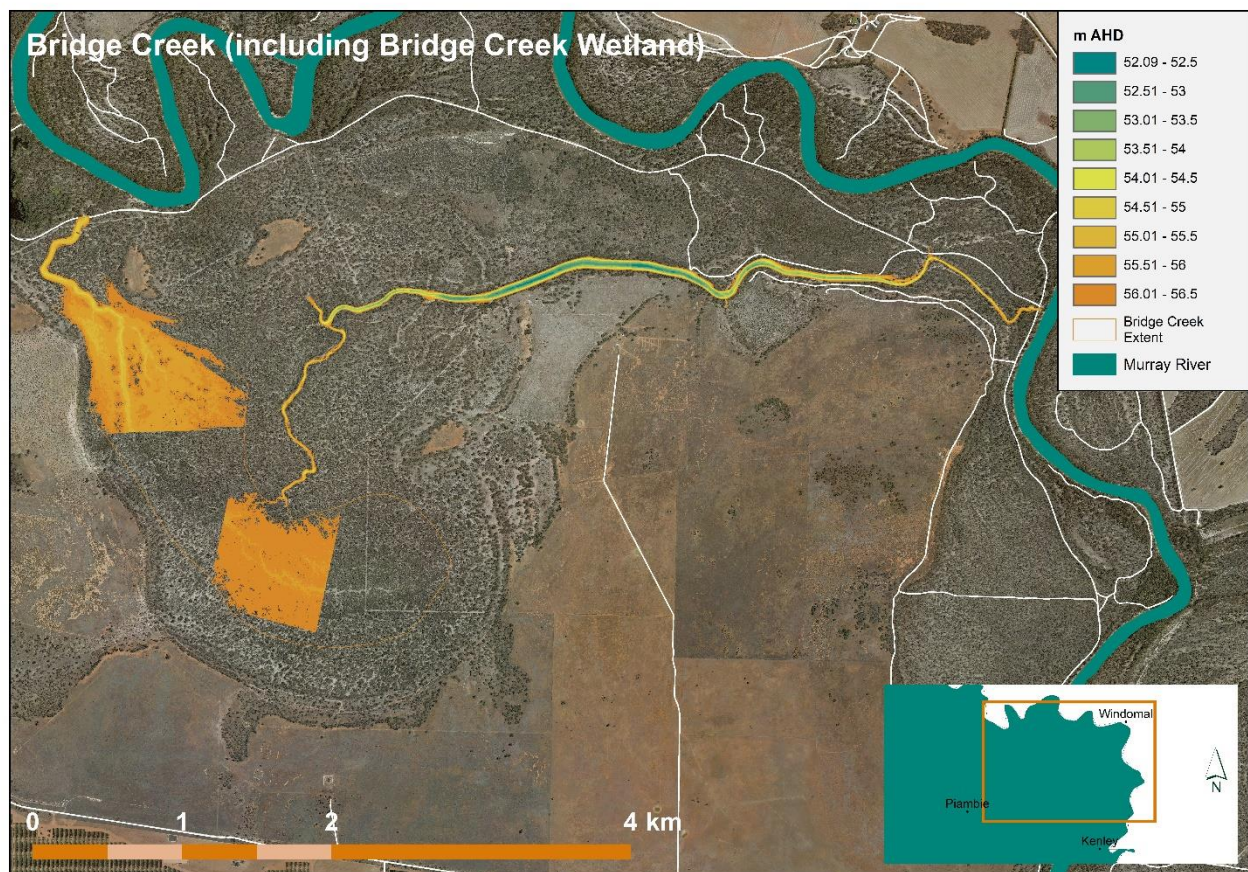
### Appendix 1 - Maps



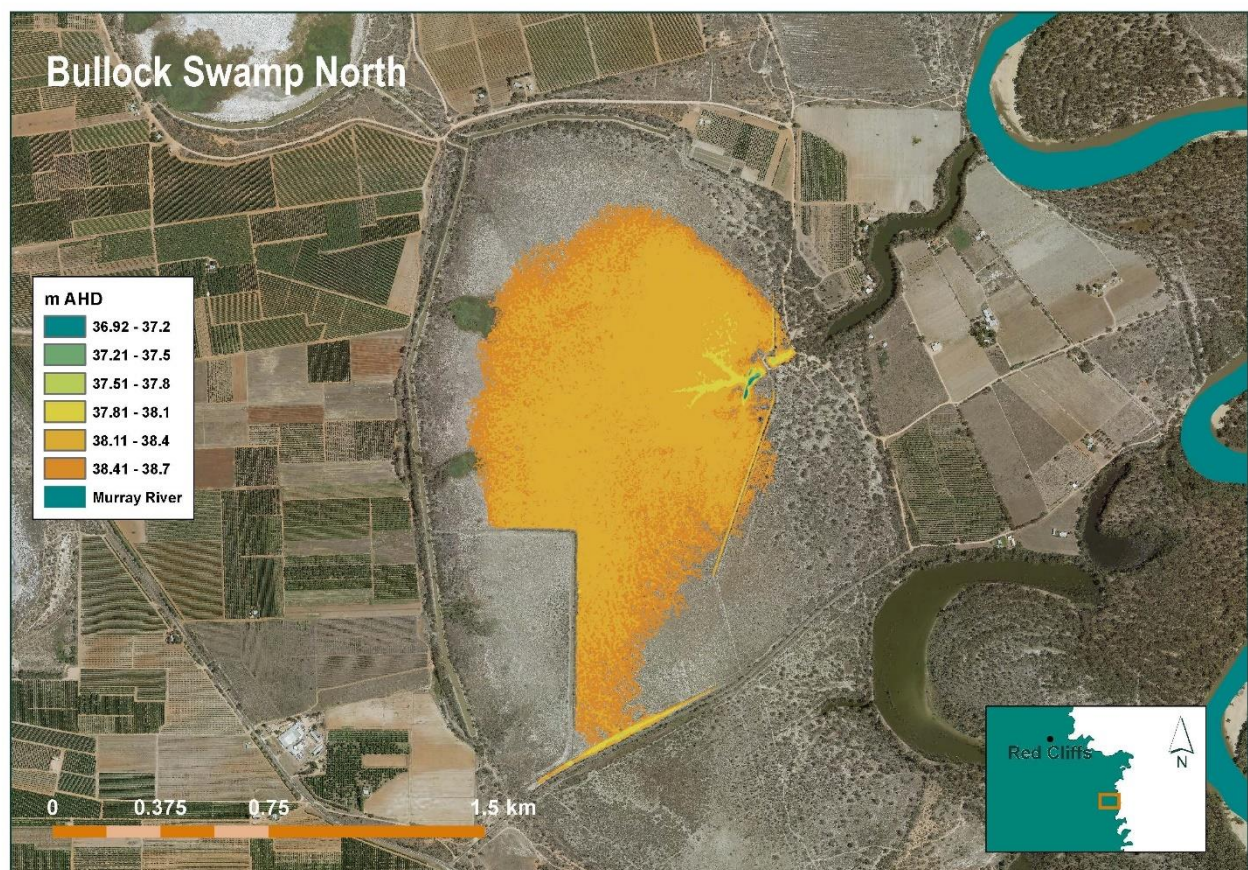




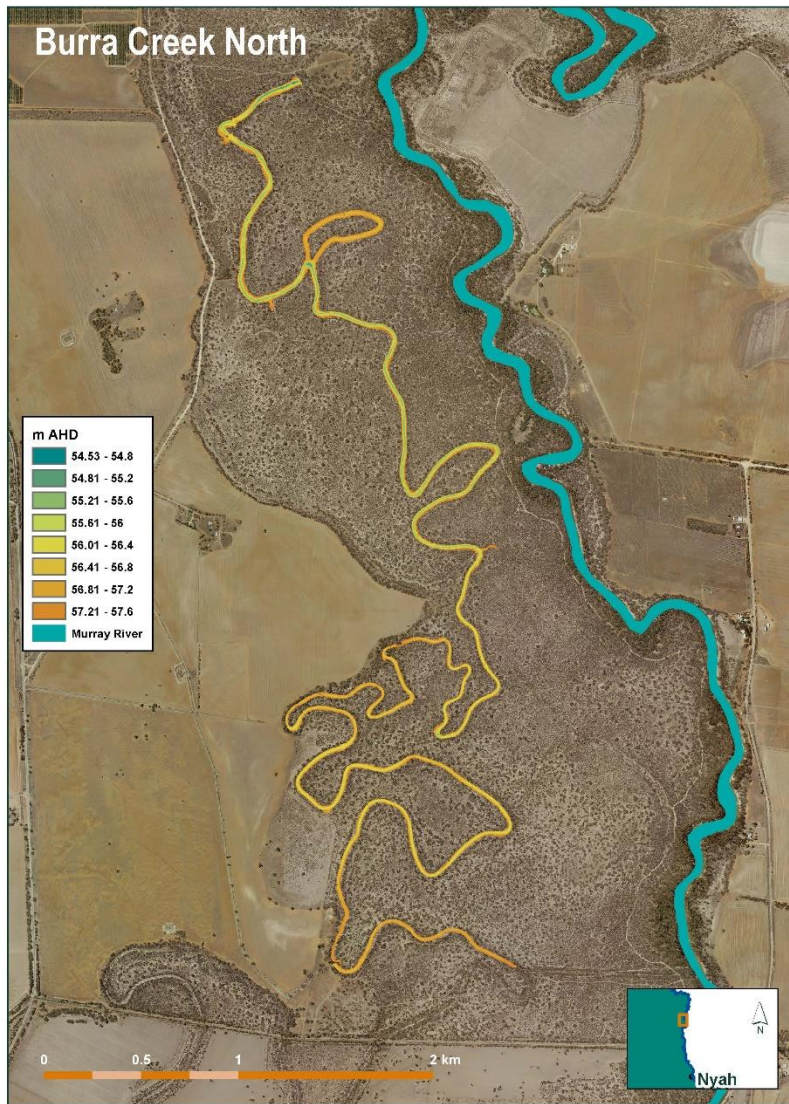


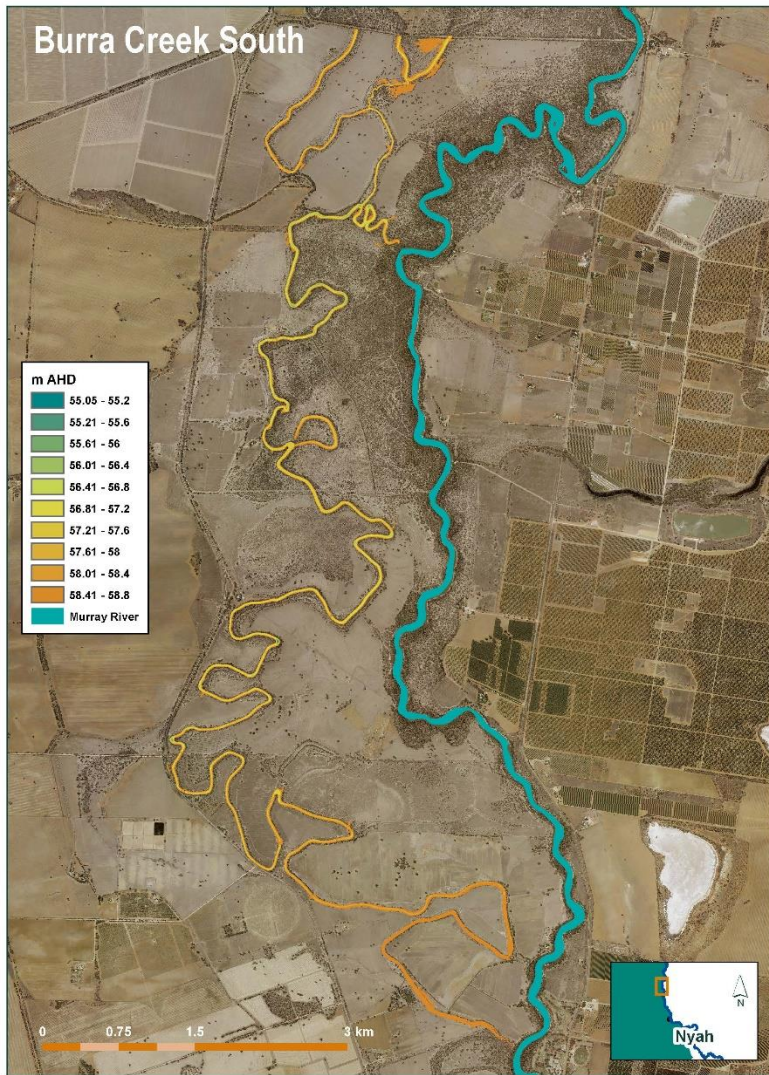






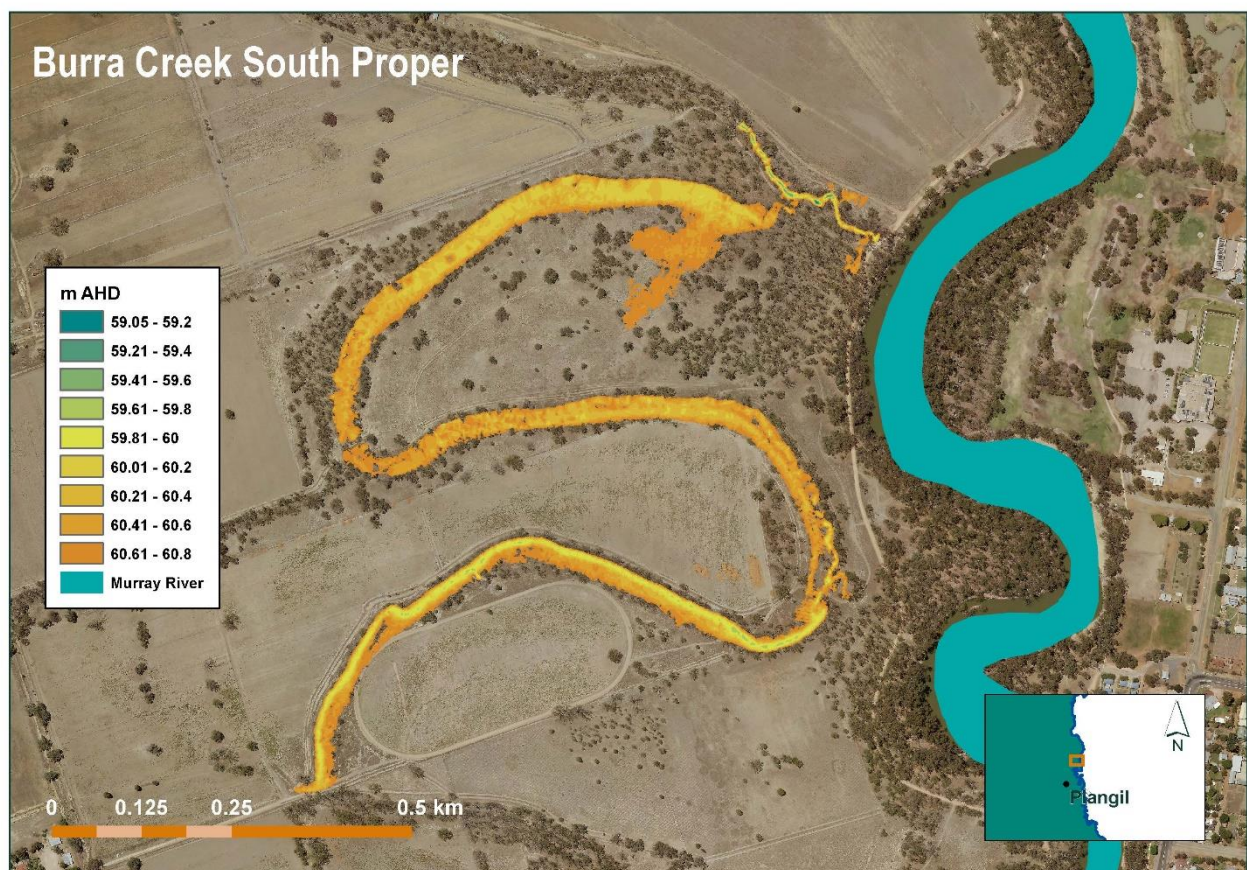




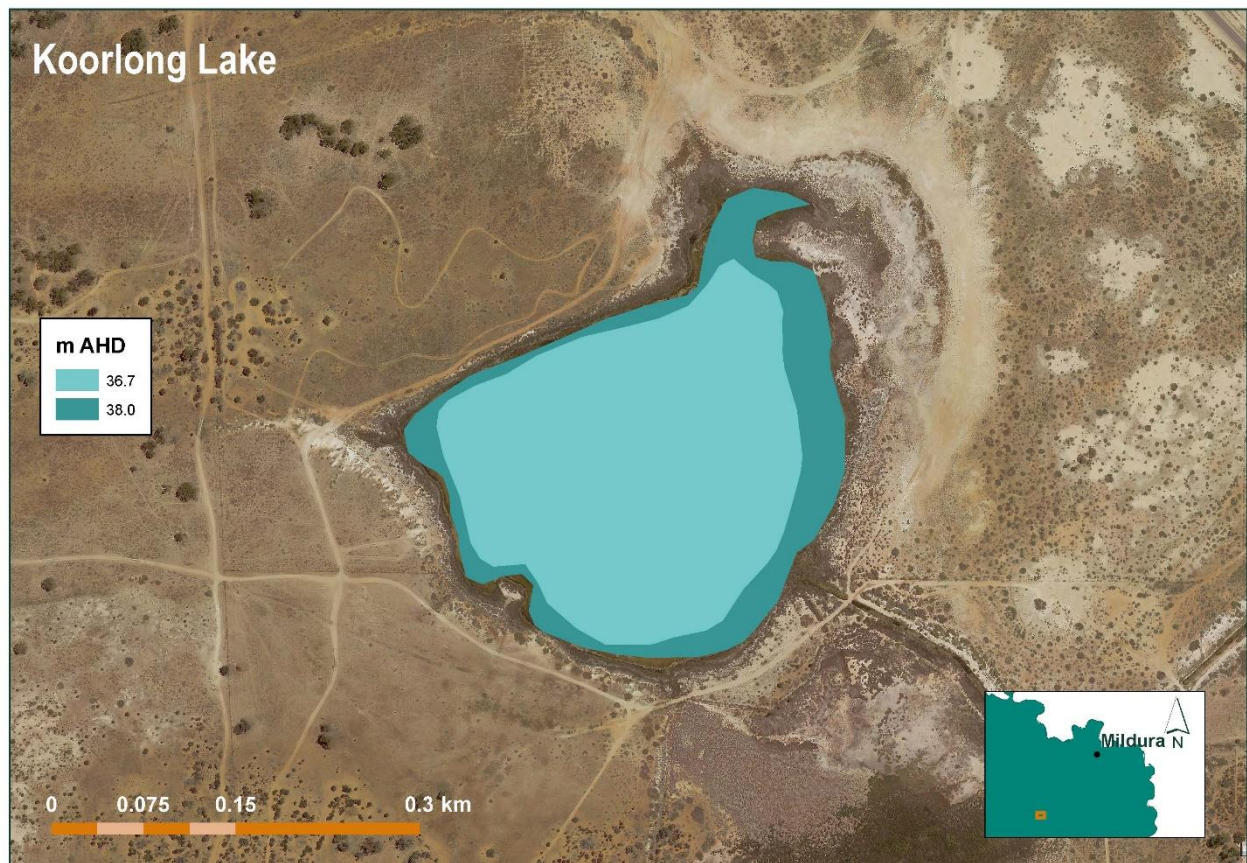




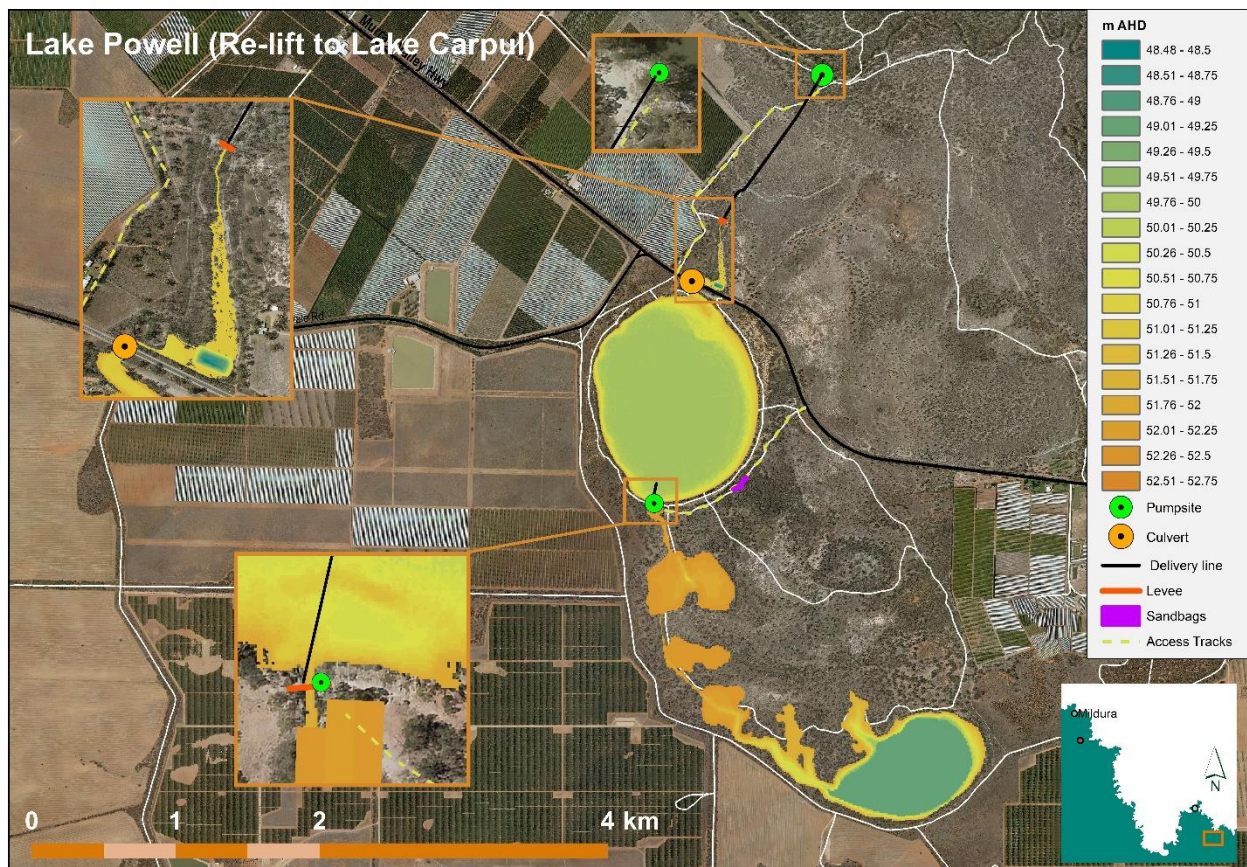
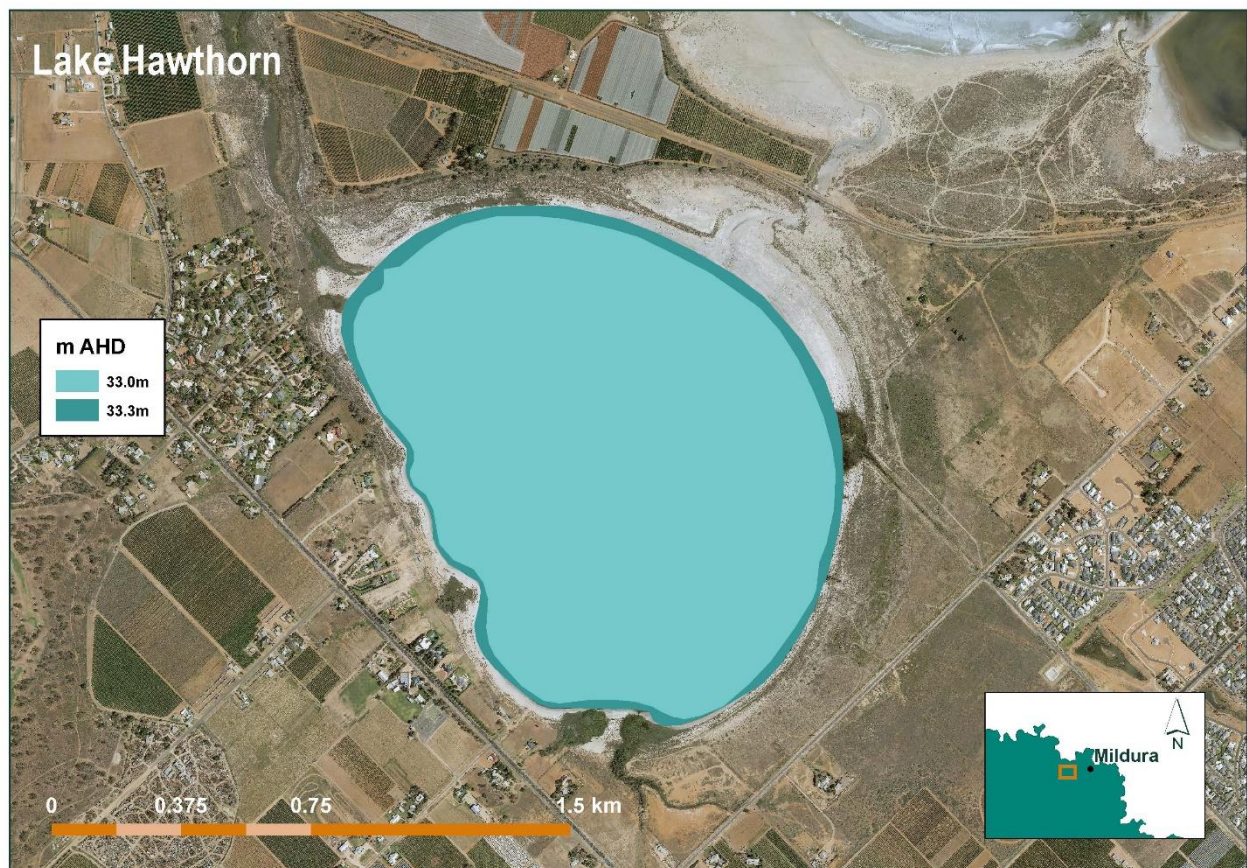
## Burra Creek South Proper



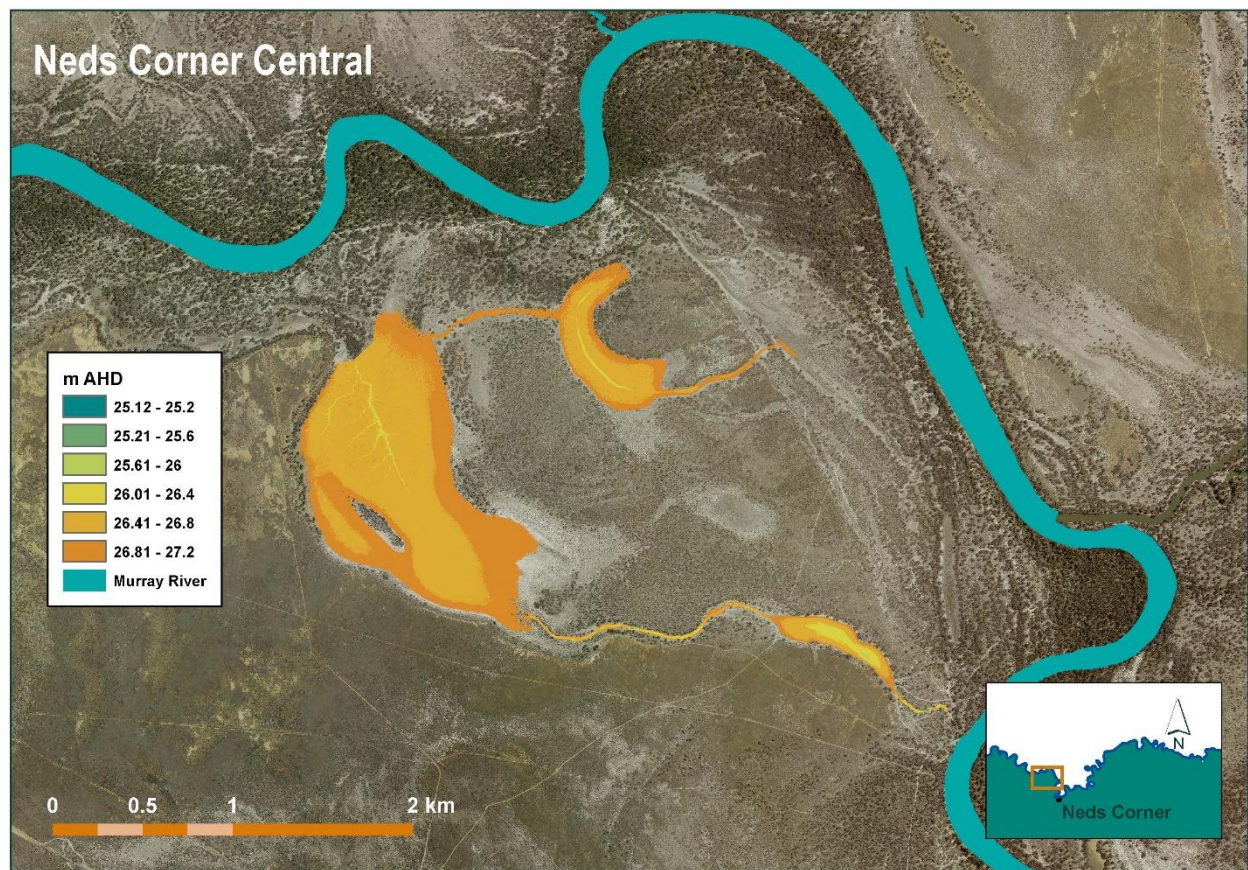
## Koorlong Lake



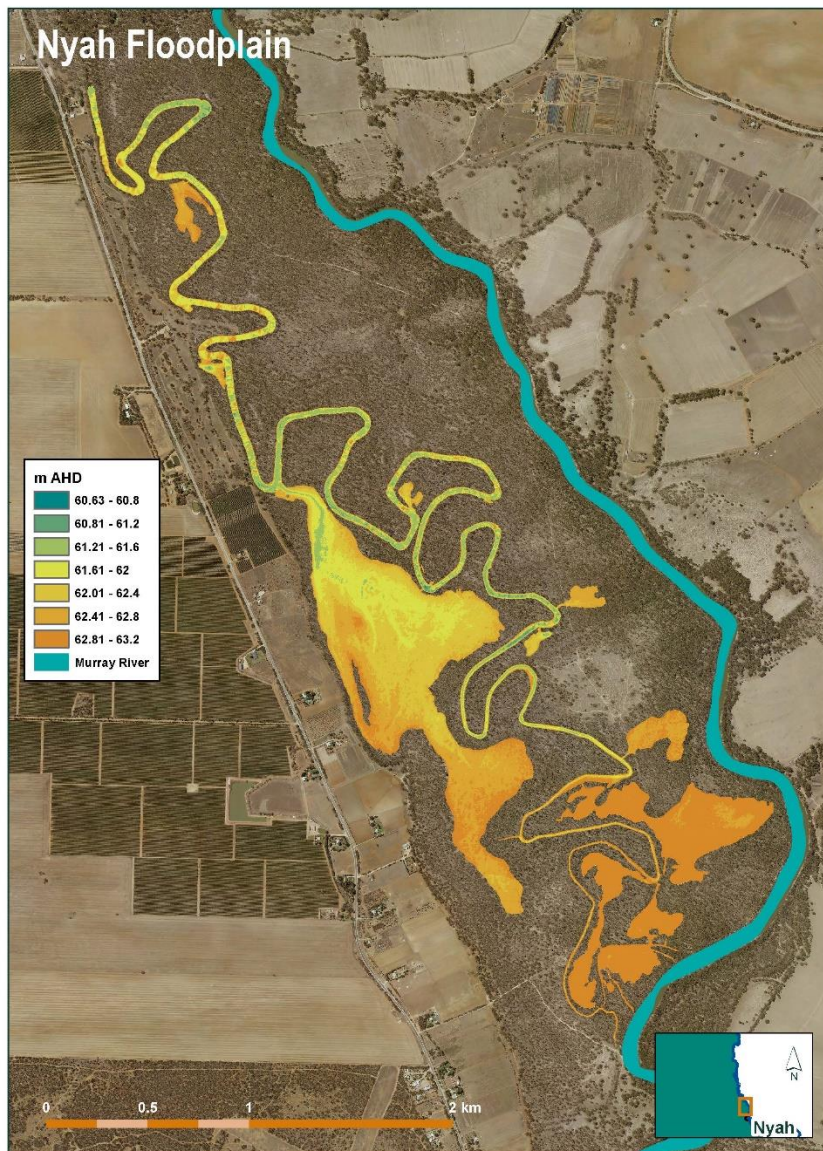




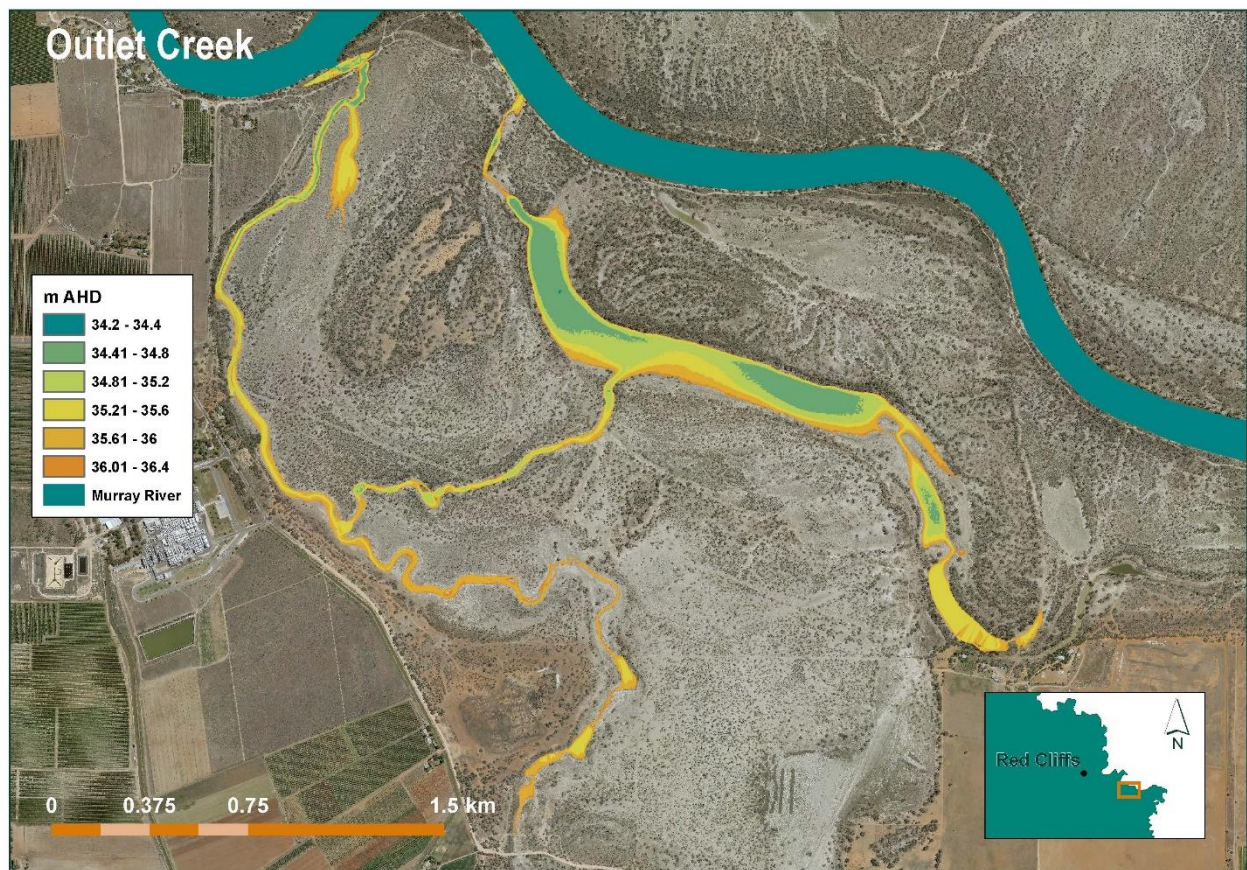















## Appendix 2 - Acronyms and abbreviations

Abbreviation	Description
AHD	Australian Height Datum
DEECA	Department of Energy, Environment and Climate Action
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVC	Ecological Vegetation Class
FFG	<i>Flora and Fauna Guarantee Act 1988</i>
LMW	Lower Murray Water
LTWP	Long-term Watering Plan
MCMA	Mallee Catchment Management Authority
MDB	Murray-Darling Basin
MDBA	Murray-Darling Basin Authority
MDBC	Murray-Darling Basin Commission
ML	Megalitres
ML/d	Megalitres per day
POE	Probability of Exceedance
VEWH	Victorian Environmental Water Holder
VMFRP	Victorian Murray Floodplain Restoration Project

## Appendix 3 - Glossary

Term	Description
Australian Height Datum (AHD)	Height above sea level
Blackwater	A natural occurrence caused by the breakdown of plant matter causing the water to discolour. The water turns black and can have very low levels of dissolved oxygen, which can stress or kill fish and other animals that breathe underwater.
Carryover	Unused water of which entitlement holders are allowed to retain ownership into the following season, according to specified rules.
Consumptive water	Water owned by water corporations or private entitlement holders held in storages and actively released to meet domestic, stock, town and irrigation needs.
Drawdown	Water released from a dam or reservoir at the end of the irrigation season for the purposes of its operation and/or maintenance.
Environmental objectives	Measurable target outcomes for each environmental value in the system, to be achieved by ongoing implementation of one or more watering actions as well as complementary actions (such as controlling invasive species or installing fishways). Target outcomes may take years or several decades to achieve.

Term	Description
Environmental water management plan	A plan developed by a waterway manager setting long-term environmental objectives and based on consultation with key stakeholders, local community and advisory groups to inform the seasonal watering proposal for the particular system.
Expected watering effect	The physical, chemical, biological or behavioural effect expected from a potential environmental watering action. Each potential environmental watering action will have one or more expected watering effects.
Land manager	An agency or authority responsible for conserving natural and cultural heritage on public land including parks and reserves (such as Parks Victoria and DELWP).
Low flow	A relatively stable, sustained and low flow in a river, generally being its minimum natural level.
Megalitre	One million (1,000,000) litres.
Operational release	A release made from a major storage to enable the water distribution system to operate or to make water available to consumptive water users
Potential environmental watering action	An environmental flow component that has been identified for a particular system in a particular year.
Program partners	Are those organisations with a responsibility for delivering some part of the environmental watering program. It includes waterway managers, storage managers, land managers, environmental water holders. In some areas, Traditional Owners, scientists and community members may also be program partners.
Recruitment	The increase in plants or animals when they survive to the settlement or maturity stage.
Seasonal watering plan	The VEWHS annual operational document, that outlines potential environmental watering across the state in the forthcoming water year.
Seasonal watering proposal	This document. An annual proposal outlining the regional priorities for the use of water for the environment in each water year that is submitted by waterway managers to the VEWHS for consideration in its seasonal watering plan.
Seasonal watering statement	A statement by the VEWHS authorising a CMA to apply or use water from its water for the environment entitlements consistently with the seasonal watering plan.
Shared benefits	The many cultural, economic, recreational, social and Traditional Owner benefits of environmental watering.
Stakeholders	Are those organisations or individuals with a keen interest in the environmental watering program, who are engaged by one of the program partners during planning, delivery or reporting.
Storage manager	An organisation appointed by the Minister for Water to operate major water storages in a particular river basin, to deliver water to entitlement holders
Tier 1	Potential environmental watering actions that are required this year to achieve intended environmental objectives, given current environmental conditions and the planned environmental watering strategies under each climate scenario.
Unregulated or Natural flow	A natural streamflow that cannot be captured in a major reservoir or storage.
Victorian Environmental	The independent statutory body responsible for holding and managing Victorian water for the environment entitlements and allocations.



Term	Description
Water Holder (VEWH)	
<i>Water Act 1989</i>	The legislation that governs water entitlements and establishes the mechanisms for managing Victoria's water resources.
Water entitlement	The right to a volume of water that can (usually) be stored in reservoirs and taken and used under specific conditions.
Water for the environment	Water available for environmental purposes including entitlements held by the VEWH, passing flows and unregulated flows.
Water year	The same as a financial year: from 1 July to 30 June the next year.
Waterway manager	The agency or authority (such as a CMA or Melbourne Water) responsible for the environmental management of a catchment or waterway.
Waterway or Wetland	A river, wetland, creek, floodplain, estuary or other body of water.

## Appendix 4 - Guidance Material

**Table 2 Risk likelihood rating table adapted from (DELWP, 2019)**

Likelihood		Description	Probability
Almost certain	1	<ul style="list-style-type: none"> <li>The event is expected to occur in most circumstances and/or</li> <li>Risk will occur within the next 6 months/or several times a year and/or</li> <li>Controls associated with the risk are extremely weak and/or non-existent and without control improvement the risk will eventuate.</li> </ul>	75-100
Likely	2	<ul style="list-style-type: none"> <li>The event is likely to occur in most circumstances and/or</li> <li>Risk will occur in the next 12 months/or once or twice a year and/or</li> <li>The majority of the controls associated with the risk are weak and without control improvement it is likely the risk will eventuate.</li> </ul>	50-74
Possible	3	<p>The event might occur and/or</p> <ul style="list-style-type: none"> <li>Risk will occur in the next 24 months/or once in two years and/or</li> <li>Some controls need improvement and if there is no improvement it is possible the risk will eventuate.</li> </ul>	25-49
Unlikely	4	<ul style="list-style-type: none"> <li>The event could occur at some time and/or</li> <li>Risk will occur in the next 60 months/or once in five years and/or</li> <li>Controls environment is strong with few control gaps and requires assurance check to maintain control effectiveness.</li> </ul>	0-24

**Table 3 Risk Rating matrix (DELWP 2019).**

Likelihood		Consequence			
		Minor	Moderate	Major	Extreme
		1	2	3	4
Almost certain	1	Medium (4)	High (8)	Extreme (12)	Extreme (16)
Likely	2	Low (3)	Medium (6)	High (9)	Extreme (12)
Possible	3	Low (2)	Medium (4)	Medium (6)	High (8)
Unlikely	4	Low (1)	Low (2)	Low (3)	Medium (4)

**Table 4 Risk consequence (DELWP, 2019)**

Rating Risk		Environment	Business Costs	People		Political/ Reputational	Legal	Service Delivery	Cultural Heritage
				Safety and Wellbeing	People and Culture				
Minor	1	<ul style="list-style-type: none"> <li>Limited effect on the natural and/or built environment and/or the environment suffers harm for up to 5 years.</li> <li>Environmental recovery on a minor scale up to 5 years.</li> <li>Mostly impacts environmental values at a single location in an individual system.</li> </ul>	<ul style="list-style-type: none"> <li>Cost impact on total budget of up to 5%.</li> </ul>	<ul style="list-style-type: none"> <li>Minor injuries or illness (physical/ mental) requiring first aid or medical attention of staff, visitor, contractor, or member of the public.</li> </ul>	<ul style="list-style-type: none"> <li>Staff complaints, passively upset, and uncooperative.</li> <li>10-15% staff turnover with minor loss of skills, knowledge, and expertise.</li> </ul>	<ul style="list-style-type: none"> <li>Adverse localised public and political interest.</li> <li>Limited attention on a single issue in local media over a short period.</li> </ul>	<ul style="list-style-type: none"> <li>Non-compliance with legislation or breach of duty of care, identified externally and either: <ul style="list-style-type: none"> <li>resolved internally with no further escalation; or</li> <li>resulting in minor compensation, and/or negative precedent.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Minor short-term impact on business unit's delivery of services/functions.</li> <li>Customers/stakeholders/ communities slightly inconvenienced.</li> <li>Up to 1 day impact on business unit's critical activities.</li> <li>Minor impact (up to 10% delay) on project or program milestones.</li> </ul>	<ul style="list-style-type: none"> <li>Limited potential impact on heritage sites/artefacts</li> <li>Exposure of previously unknown cultural heritage items</li> </ul>
Moderate	2	<ul style="list-style-type: none"> <li>Moderate effect on the natural and/or built environment and/or environment suffers harm for 5-10 years.</li> <li>Environmental recovery on a small scale and/or over a period 5-10 years.</li> <li>Impacts environmental values at multiple locations in an individual system.</li> </ul>	<ul style="list-style-type: none"> <li>Cost impact on total budget between 5-10%.</li> </ul>	<ul style="list-style-type: none"> <li>Significant injury or illness (physical/ mental) requiring inpatient hospitalisation of staff member, visitor, contractor, or member of the public.</li> </ul>	<ul style="list-style-type: none"> <li>Low morale, disengagement, increased absenteeism, and workplace conflict.</li> <li>15-25% staff turnover with loss with resignations of some key staff.</li> </ul>	<ul style="list-style-type: none"> <li>Adverse localised negative public and political attention.</li> <li>Short term negative local media attention.</li> <li>Local community concern on a single issue over a sustained period.</li> </ul>	<ul style="list-style-type: none"> <li>Non-compliance with legislation or breach of duty of care resulting in: <ul style="list-style-type: none"> <li>external investigation or report to responsible authority; and/or</li> <li>prosecution or civil action, with one of moderate level of compensation or moderate level of negative precedent.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Moderate impact on business unit's delivery of services/functions.</li> <li>Customers/stakeholders/ communities inconvenienced.</li> <li>Up to 3 days impact on business unit's critical activities.</li> <li>Significant impact (10-20% delay) on project or program milestones.</li> </ul>	<ul style="list-style-type: none"> <li>Moderate potential impact on heritage sites/artefacts</li> <li>Damage to previously unknown cultural heritage items or values</li> </ul>
Major	3	<ul style="list-style-type: none"> <li>Major effect on the natural and/or built environment and/or environment suffers harm for 10-20 years.</li> <li>Environmental recovery on a large scale and/or over a period of 10-20 years.</li> <li>Impacts regional environmental values or affects connected systems.</li> </ul>	<ul style="list-style-type: none"> <li>Cost impact on total budget between 10-20%.</li> </ul>	<ul style="list-style-type: none"> <li>Extensive and/or permanent injury or illness (physical/ mental) of staff member, visitor, contractor, or member of the public.</li> </ul>	<ul style="list-style-type: none"> <li>Major morale issues, high absenteeism.</li> <li>25-50% staff turnover with resignations of key staff.</li> <li>Staff are not skilled to meet priorities.</li> </ul>	<ul style="list-style-type: none"> <li>Serious adverse public attention at State/National level.</li> <li>Negative State/National media on one or more issues over a prolonged period.</li> <li>Repeated displeasure by the Minister.</li> <li>Medium-term negative public interest (correspondence and phone calls) and political interest (in Parliament).</li> </ul>	<ul style="list-style-type: none"> <li>Non-compliance with legislation or breach of duty of care resulting in: <ul style="list-style-type: none"> <li>external investigation or report to responsible authority;</li> <li>public inquiry (i.e. Royal Commission/ Parliamentary Committee);</li> <li>prosecution or civil action with high level compensation and high-level negative precedent; and/or</li> <li>sanctions imposed by external regulator.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Ongoing difficulties in delivering the business unit's services/functions.</li> <li>Major impact on customers/ stakeholders/ communities</li> <li>Up to 10 days impact on business unit's critical activities</li> <li>Major impact (20-50% delay) on project or program milestones</li> </ul>	<ul style="list-style-type: none"> <li>Major potential impact on heritage sites/artefacts</li> <li>Damage to known cultural heritage items or values</li> </ul>
Extreme	4	<ul style="list-style-type: none"> <li>Very serious effect on the natural and/or built environment and/or environment suffers long term harm (20+ years).</li> </ul>	<ul style="list-style-type: none"> <li>Cost impact on total budget between &gt;20%.</li> </ul>	<ul style="list-style-type: none"> <li>Single or multiple deaths or severe permanent disability or illness (physical/mental) of staff, visitor,</li> </ul>	<ul style="list-style-type: none"> <li>Organisation wide morale issues and absenteeism.</li> <li>&gt;50% staff turnover.</li> </ul>	<ul style="list-style-type: none"> <li>Very serious public outcry at State/National level.</li> <li>Negative State/National media over a prolonged period.</li> <li>Breakdown of public confidence in the Government /</li> </ul>	<ul style="list-style-type: none"> <li>Non-compliance with legislation or breach of duty of care resulting in: <ul style="list-style-type: none"> <li>prosecution or civil action leading to imprisonment of an officer;</li> <li>public inquiry (i.e. Royal Commission/ Parliamentary Committee)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Long term and severe impact on delivery of services/functions</li> <li>Severe impact on customers /stakeholders/communities</li> </ul>	<ul style="list-style-type: none"> <li>Very serious potential impact on heritage sites/artefacts</li> </ul>





	<ul style="list-style-type: none"> <li>• Environmental recovery on a very large scale and/or over a long period (20+ years).</li> <li>• Impacts environmental values state-wide.</li> </ul>		contractor, or member of the public.	<ul style="list-style-type: none"> <li>• Staff are not skilled to meet core corporate outputs.</li> </ul>	department / Minister or key project/program. <ul style="list-style-type: none"> <li>• On-going or prolonged negative public interest (correspondence and phone calls) and political interest (in Parliament).</li> </ul>	<ul style="list-style-type: none"> <li>• uninsured compensation payments</li> <li>• negative precedent requiring very serious impact and major reform to the department; and/or</li> <li>• severe sanctions imposed by external regulator.</li> </ul>	<ul style="list-style-type: none"> <li>• More than 10 days impact on business unit's critical activities</li> <li>• Vital or very serious delays (&gt;50% delay) to program/project delivery or project/program objective is not met</li> </ul>	<ul style="list-style-type: none"> <li>• Destruction of cultural heritage items or values</li> </ul>
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