



# Lower Barwon Wetlands Seasonal Watering Proposal 2024-25

FINAL April 2024



*healthy and productive lands and waters  
cared for by thriving communities*

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## Acknowledgement of Country

Corangamite Catchment Management Authority (Corangamite CMA) wishes to acknowledge the Wadawurrung People of the Kulin Nation, Traditional Owners of the land and waters of the lower Barwon River. We pay our respects to their Elders past, present and emerging. We commit to continuing to work with all Traditional Owners to ensure their knowledge and culture is included and valued in Corangamite CMA planning and delivery.

### 1 Context

The Corangamite Catchment Management Authority (CCMA) is pleased to provide the 2024-25 Lower Barwon Wetlands Seasonal Watering Proposal (SWP) for feedback. This SWP outlines CCMA's proposed priorities for the use of environmental water in the lower Barwon River system in 2024-25 (Table 1), as required under section 192A of the *Water Act 1989*. The Victorian Environmental Water Holder (VEWH) will use this SWP to inform the development of the Seasonal Watering Plan 2024-25.

The format of the 2024-2025 SWP is shorter than previous years. The Victorian Environmental Water Holder (VEWH) has amended the SWP guidelines in 2024-25 to reduce the length of the document, whilst still retaining key information relevant to watering. The current water year (2023-24) seasonal review section will not be included in this document as it has been in previous years. Instead, it will be created separately in mid-2024 and will be provided to the VEWH and the Lower Barwon Community Advisory Committee (LBCAC) when completed. Undertaking the seasonal review at the end of the water year will allow for all environmental watering to be reported on after it has occurred, rather than doing a review that misses several months and/or speculates on watering.

The separate seasonal review document will include content on climate, hydrological achievement, ecological observations, and community observations.

Table 1. Summary of priority watering actions for 2024-25

| Reedy Lake   |   |
|--|---|
| Potential Watering Actions   | Timing  |
| <b>Autumn refill to winter full</b> of approximately 0.8m AHD, topping up as required and allowing for some natural variation.   | April to March<br>(Wetland can be refilled and topped up any time from April 2024 through to March 2025)  |
| <b>Draw-down to summer low</b> – gradually reduce water levels to approximately 0.3m AHD. Topping or drawing down as required to maintain approximately 0.3m AHD. Specific timing and rates dictated by expert advice for bird objectives. | December to May<br>(Wetland can be drawn down any time from December 2024, but is likely to occur later than this to ensure minimal impact on waterbird breeding) |
| Hospital Swamps  |   |
| Potential Watering Actions   | Timing  |
| <b>Autumn refill to winter full</b> of approximately 0.5m AHD, topping as required and allowing for some natural variation.  | April to March<br>(Wetland can be refilled and topped up any time from April 2024 through to March 2025)  |
| <b>Drawdown to summer low</b> – gradually reduce water levels to approximately 0.1-0.3 m AHD. Topping up or drawing down as required to maintain 0.1-0.3m AHD. Specific timing and rates dictated by expert advice for bird objectives.    | December to May<br>(Wetland can be drawn down any time from December 2024, but is likely to occur later than this to ensure minimal impact on waterbird breeding) |

Key sections of the SWP that outline planning for the lower Barwon wetlands environmental water entitlement include:

- **Scope of environmental watering** – which describes the range of potential watering actions which may be delivered during 2024-25.
- **Scenario planning** – which describes how the combination of actions may change depending on the climate scenario.
- **Risk management** – this is an important chapter of the proposal and agencies will be asked if the risks identified can be managed in line with the mitigating actions identified as part of their endorsement.

The 2024-25 Lower Barwon SWP contributes to the VEWH’s Seasonal Watering Plan. This is a state-wide plan outlining where, when, and why water for the environment can be delivered throughout Victorian waterways.

## 2 System overview

The estuarine reach of the Barwon River contains a system of wetlands and lakes, including Lake Connewarre, Reedy Lake and Hospital Swamps, Salt Swamp and Murnaghurt Lagoon (Figure 1). For thousands of years, the system has been a place of great significance to the Wadawurrung Traditional Owners. *Paleert Tjaara Dja Let's make Country good together 2020 – 2030* *Wadawurrung Country Plan* acknowledges the special place the system has in their Dreaming: 'The chain of ponds from the Barwon River to Reedy Lake, Hospital Lake, Lake Connewarre and Estuary Bay is connected through water and Black Swan Dreaming'.

Water for the environment can be used to manage water levels in Reedy Lake and Hospital Swamps, which connect to the Barwon River. The environmental entitlement for the lower Barwon wetlands does not provide access to water held in storage. Instead, it allows water to be diverted from the Barwon River into Reedy Lake and Hospital Swamps when river levels are above 0.7m AHD. High water levels in the Barwon River can also result in the natural wetting of the wetlands. Water will be delivered and removed from Reedy Lake and Hospital Swamps using the infrastructure in place to control the movement of water in these systems, and by allowing natural processes such as evaporation to reduce water levels at times. Water monitoring stations are located near the inlet to Hospital Swamps, at 'Big Hole' in Reedy Lake and on the lower Barwon River upstream of the lower barrage. These gauges inform watering actions by measuring water level, electrical conductivity (salinity), temperature, and dissolved oxygen.

Watering decisions are based on scientific recommendations and are influenced by the associated water levels in the lower Barwon River. It is important to note that in average to wet conditions, localised storm water run-off and flows in the Barwon River are expected to overtop riverbanks and flow into the wetlands, regardless of structure operation.

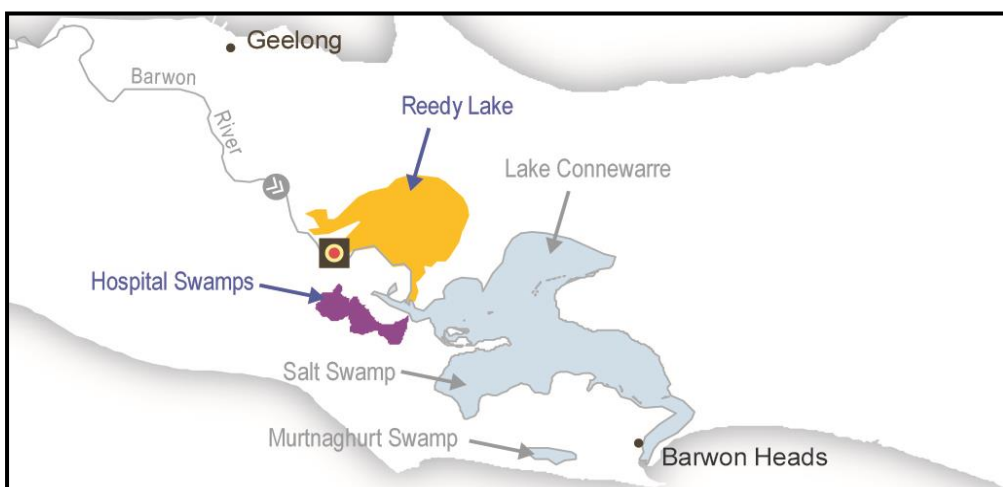


Figure 1. The lower Barwon wetlands

## Reedy Lake

Reedy Lake is a shallow estuarine wetland located at the bottom of the Barwon River system upstream of the township of Barwon Heads. Changes to the hydraulics of Reedy Lake from 1970 until 2016 resulted in annual summer flooding in most years, which changed the natural wetting and partial drying cycle of the wetland. At the time of the Flow Ecology study (Lloyd et al., 2012) there was concern that prolonged periods of full water levels (>0.8m AHD) had reduced vegetation diversity, flooded out threatened communities such as coastal saltmarsh and reduced bird diversity by restricting the formation of shallow wading habitat and sandbars.

The largely full water level regime historically implemented by community had been to enable recreational opportunities for bird watching and duck hunting, rather than holistic ecological outcomes. Figure 2 below outlines the extent of wetland areas that are exposed at various water levels. It should be noted that allowing the wetland to draw down to 0.3m or 0.4m AHD still provides for a large surface area of water, shown by the line separating the orange and yellow zones in Figure 2. Figure 2 illustrates exposed mudflats during 2016-17 partial draw-down.

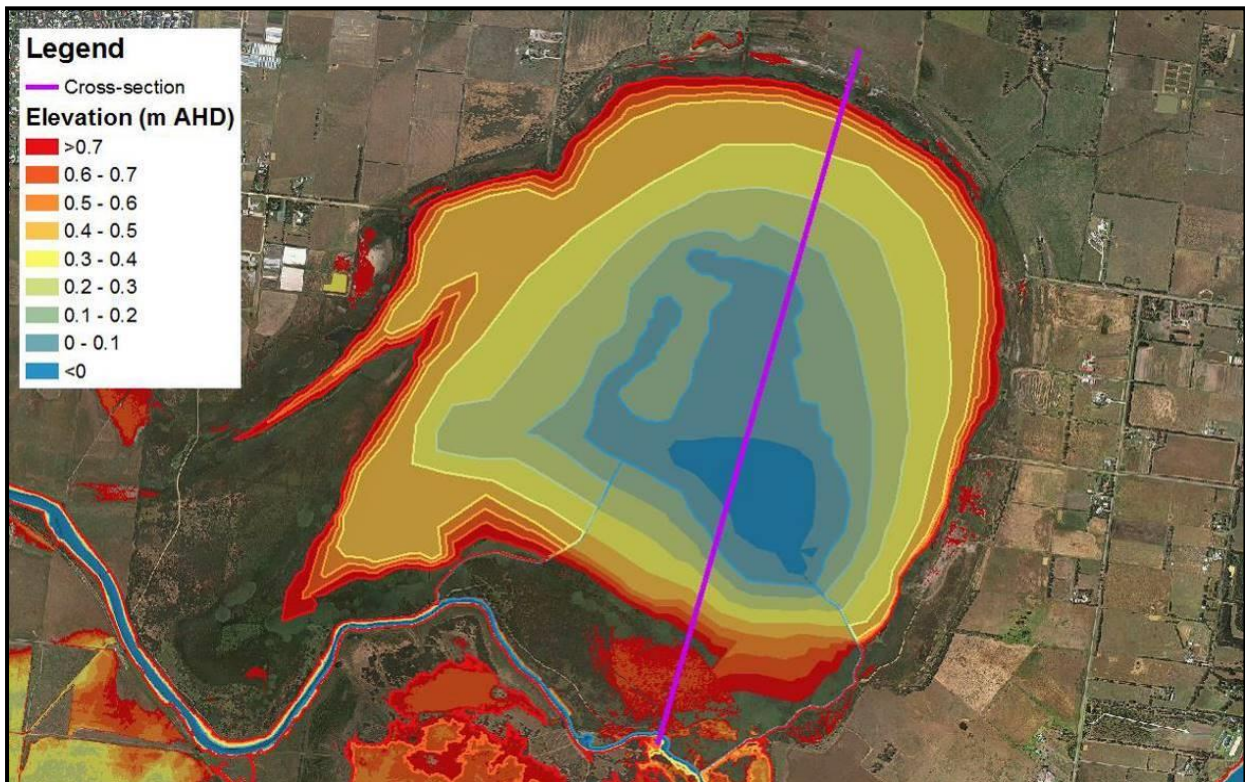


Figure 2. Bathymetry mapping of Reedy Lake, showing water extent at various levels



Figure 3. Reedy Lake mudflats during the implementation of the partial drying regime (S. Vermeeren, 2017)

The currently recommended wetting and partial drying regime for Reedy Lake is intended to support a wider range of habitats and species than in the past. In 2016, Corangamite CMA incorporated a change in management practice by lowering water levels and implementing a partial drying regime at Reedy Lake over the summer-autumn period to start a long-term process to rebalance the diversity of habitats and restore the site's threatened ecological values.

*“The implementation of a wetting and drying regime through the use of environmental water is the most important management activity to protect the ecology of the Lower Barwon Wetlands” (Lloyd et al., 2012).*

The recommendations from the Flow Ecology study (Lloyd et al., 2012) included an initial ten years of wetting and drying to ‘reset’ the Reedy Lake wetland, followed by a four-year cycle that involved a full wet year every one in four years. Because of community opposition at the time, the ten-year ‘reset’ was not implemented and instead the ‘longer term’ four-year cycle was implemented in 2016 as a trial. The 2019-20 watering year was the final year of the four-year cycle with the wetland maintained at the recommended fill level all year. Some adaptations to timing were also made to accommodate shared benefits.

The Lower Barwon Review (Sherwood et al., 2020) recommended adoption of Lloyd’s original, longer-term four-year cycle regime in Reedy Lake, with its original timing, until FLOWS recommendations are updated. However, it also recommended avoiding a complete drying year and that when drawing down there is a later start to the drawdown at a slower rate..

## Hospital Swamps

The Hospital Swamps (Figure 4) ecosystem has retained its ecological character and biodiversity values predominantly due to the regulated management (by graziers and others) of the natural wetting and drying regime since the 1970s (Lloyd et al., 2012). Since the entitlement was established, Corangamite CMA has continued to implement the historical wetting and drying regime. Variable climatic conditions over the past eight years have also provided a level of seasonal fluctuation in conditions, which provides additional environmental benefits to existing watering activities (i.e., floods, fresh events and extended drying events).

As an outcome of the watering regime, the wetland's internationally significant waterbird population and diversity have been maintained and the diverse ecological vegetation communities have remained largely unchanged since the 1980s. The water regime of Hospital Swamps is seen as currently beneficial to the ecosystem values of the site (Lloyd et al., 2012). This has been confirmed by the Lower Barwon Review (Sherwood et al., 2020). The environmental values of the wetland are in good condition, supporting large areas of threatened subtropical and temperate coastal saltmarsh and a diversity of fish and waterbird populations.



*Figure 4. Hospital Swamps, March 2020*



### 3 Traditional Owner cultural values and uses

The lower Barwon wetlands are part of *Wadawurrung* country. Corangamite CMA is continuing to work with Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) to support their values and uses of the wetlands, and to refine our understanding of how the water regimes in the lower Barwon wetlands can support their aspirations. Corangamite CMA met with WTOAC in early 2024 at the beginning of the planning process. WTOAC has reviewed and approved relevant section content in this SWP and the proposed watering. WTOAC are also members of the broader LBCAC.

The Barwon River has important social, cultural and economic values. Wadawurrung people place a high cultural value on the Barwon River. Many Wadawurrung people in the region have a connection and a long history with the river. Under the Aboriginal Heritage Act (2006) and Aboriginal Heritage Regulations (2007) any waterway or Ramsar listed site is recognised as sensitive.

In 2018, Corangamite CMA engaged representatives from WTOAC to inform part of the Upper Barwon, Yarrowee and Leigh rivers FLOWS study update (Alluvium, 2021) and to assist in capturing Aboriginal values within each of the waterway reaches that are relevant to Wadawurrung Country. Many of these values, notably culturally significant species, are also common to wetlands of the Barwon River system.

WTOAC released *Paleert Tjaara Dja Let's make Country good together 2020 – 2030 Wadawurrung Country Plan* in 2020. Important cultural values and recommendations identified for the lower Barwon wetlands include:

- culturally significant wetland species such as brolga, black duck, black swan, short-finned eel, common reed, and bull rush
- recognition of wetlands as meeting, ceremony, and trade places
- maintaining water holes and refuge pools
- maintaining access to culturally important story places and ceremonial places
- protection of artefact sites
- use of appropriate Wadawurrung language for places of cultural importance
- increased opportunities for the Wadawurrung to be involved in monitoring and evaluation activities
- inclusion of the Wadawurrung in all communication about releases of water for the environment and other wetland-related activities.

*Paleert Tjaara Dja* acknowledges the special place Reedy Lake and Hospital Swamps have in Wadawurrung Dreaming: “The chain of ponds from the Barwon River to Reedy Lake, Hospital Lake, Lake Connewarre and Estuary Bay is connected through water and Black Swan Dreaming”.

## 4 Social recreational and economic values and uses

In planning the potential environmental watering actions in Table 2, Section 6 and 7, Corangamite CMA consulted widely with stakeholders to ensure it considered shared benefits, including social, economic, and recreational values relevant to environmental flows management in the lower Barwon wetlands. Opportunities for social, recreational, and economic values and uses are incorporated into planning and watering decisions if they do not compromise environmental outcomes.

Expert advice (such as the 2012 environmental FLOWS study for the lower Barwon wetlands and the 2020 Lower Barwon Review) emphasised that the entire lower Barwon recommended watering regime – providing a fill to the wetlands and allowing water levels to draw down at the right times – would have to be implemented to improve biodiversity and protect the long-term health of the wetlands. This may mean it is not possible to meet some community expectations for shared benefits that don't maintain or improve environmental outcomes. Corangamite CMA manages water levels in the wetlands to meet ecological requirements which have shared benefits that support a range of social, economic, and recreational values and uses, including:

- water-based recreation (such as boating, duck hunting and fishing)
- wetlands recreation and amenity (such as birdwatching and spending time outdoors)
- community events (including Traditional Owner events) and tourism
- socioeconomic benefits (such as commercial fishing)

Table 2. Social, recreational, and economic shared benefits for the lower Barwon wetlands in 2024-25

| <b>Waterway</b>                | <b>Beneficiary</b>  | <b>Connection to the wetlands</b>  | <b>Values / uses / objectives / opportunities</b>   | <b>How have these benefits been considered?</b>   |
|--------------------------------|---|--|---|---|
| Reedy Lake and Hospital Swamps | Bird watchers and members of the community with an interest in the conservation of birds and their habitats | Reedy Lake and Hospital Swamps are important sites for spending time in the field watching and recording birds.  | Birdwatchers value the opportunity to see rare species, threatened species, breeding birds, the spectacle of large numbers of birds, and to contribute to scientific monitoring and photography. Reedy Lake is a site of national importance for species such as Australasian bittern and migratory shorebirds. | The wetting and drying watering regime at the wetlands supports a diversity of habitats and therefore conservation goals and observation opportunities.                     |
| Reedy Lake and Hospital Swamps | Recreational duck hunters   | Reedy Lake and Hospital Swamps are part of the Lake Connewarre State Wildlife Reserve and have a long history of game hunting. Ducks are the primary target, and generations of duck hunters have enjoyed duck hunting season at the lower Barwon wetlands, particularly Reedy Lake, returning to the same hide locations over many years. | Reedy Lake and Hospital Swamps provide habitat for duck species that are permitted to be hunted by law. They are designated locations for that activity as managed by the Victorian Game Management Authority.  | The overall watering regime supports a healthy ecosystem, including ducks. It is expected that more breeding will occur during 'summer full' years.                         |
| Reedy Lake and Hospital Swamps | Commercial eel fishers and recreational fishers   | Reedy Lake and Hospital Swamps are the site of a commercial eel fishing licence. (There is a second  | A healthy eel and fish population is important to the viability of the eel business and provides opportunities for recreational fishing.  | The overall watering regime supports a healthy ecosystem, including eels. The eel fishery would prefer permanently full wetlands, but the wetland cannot be maintained in a |

| Waterway | Beneficiary | Connection to the wetlands   | Values / uses / objectives / opportunities | How have these benefits been considered?   |
|----------|-------------|--|--|--|
|          |             | <p>licence in the adjacent Barwon River and Lake Connewarre).<br/>Recreational fishers also have a history of fishing at the wetlands.</p> |  | <p>permanently full state, as this has a negative impact on other species and the productivity of the wetlands as a whole.</p> <p>Corangamite CMA has undertaken complementary measures in recent years to improve fish and eel connectivity in the wetlands in order to support the short-finned eel species. These have included two fishways on the lower Barwon breakwater which incorporate eel ropes and matting and a first time fishway on Reedy outlet with an integrated eel ramp.</p> <p>Other Corangamite CMA management activities (funded by the VEWH) support access to the wetland sites through track and channel maintenance/upgrades for efficient and effective water delivery which can be utilised by other recreational and commercial stakeholders for their desired purposes.</p> |

## 5 Notable feedback

Support for the lower Barwon wetlands SWP was received from Wadawurrung Traditional Owners Aboriginal Corporation, Parks Victoria and the Department of Energy, Environment and Climate Action. Geelong Gun and Rod do not support the proposal citing a number of concerns which were all responded to in the feedback register by Corangamite CMA.

Individuals or organisations can contact Corangamite CMA at [info@ccma.vic.gov.au](mailto:info@ccma.vic.gov.au) to request a copy of the Lower Barwon Wetlands SWP 2024-25 Comments Register.

A letter of endorsement for the SWP was received from Parks Victoria, this can be found in Appendix 1.

## 6 Environmental values and objectives

Reedy Lake and Hospital Swamps form part of the internationally recognised Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site, which is used by many thousands of migratory birds from around the world. The wetlands support 47 known threatened plant and animal species and communities. These include some of Victoria’s rarest species (such as the brolga, orange-bellied parrot, Australasian bittern, growling grass frog, Australian grayling, and dwarf galaxias) and subtropical and temperate coastal saltmarsh communities. Reedy Lake also supports a range of vegetation communities, including coastal saltmarsh, herbfields, and reed beds.

Reedy Lake was naturally a partly ephemeral system, but river regulation meant the lake was nearly permanently wet from the 1970s until 2016. Wetting and drying regimes are now recommended to maintain the lake’s ecological character and diverse habitats.

Following a four-year (2016-17 to 2019-20) watering regime trial at Reedy Lake, the Lower Barwon Review in 2020 proposed to implement a long-term, seasonally adaptive water regime that avoids complete drying. At Reedy Lake, this means having the wetland full for a quarter of all years and having a partial drawdown in summer and autumn in three-quarters of all years. The review’s recommendations informed 2024-25 watering actions and future directions.

Hospital Swamps comprises five wetland basins that support important ecological processes and significant ecological values, including large areas of threatened coastal saltmarsh and diverse waterbird communities. Hospital Swamps has retained a more natural wetting and drying pattern. As a result, the swamp’s vegetation community has remained largely unchanged since the 1980s.

### Environmental objectives in the lower Barwon wetlands



F1 – Provide habitat for fish breeding and growth and improved conditions for migration and dispersal when wetlands are connected to the Barwon River.

F2 – Reduce carp populations.



CN1 – Maintain nutrient cycling and improve lake productivity.






V1 – Increase the diversity of ecological vegetation communities in the wetlands and increase the recruitment of aquatic vegetation.

V2 – Increase the growth and extent of coastal saltmarsh, herbfields, and lignum shrubland ecological vegetation communities.

V3 – Retard colonisation of tall reed in low-lying areas and increase open-water habitat.

V4 – Provide varying water levels and conditions to promote soil salinisation and support the persistence and growth of threatened salt-dependent ecological vegetation

|   |  |
|---|--|
|   | communities.   |
|  | B1 – Provide suitable feeding and breeding habitat for waterbirds, including mudflats and shallow water for wading birds, flooded vegetation, and wetland fringes.<br>B2 – Maintain waterbird breeding events. |
|  | MI1 – Increase the waterbug population and its biomass.  |
|  | WQ1 – Provide flushing inflows to remove accumulated salts.<br>WQ2 – Maintain surface water and groundwater interactions.  |

## 7 Engagement

Corangamite CMA has led the engagement for developing this SWP. Even though this proposal is strongly underpinned by technical expertise and advice, local knowledge and input adds significant value to the proposal.

Corangamite CMA established the Lower Barwon Community Advisory Committee (LBCAC) in 2013 to provide local knowledge and insights that combine with the technical studies and monitoring results to help Corangamite CMA develop the SWP. The LBCAC is an enthusiastic and dedicated group of individuals, clubs, businesses, and government representatives with a broad combination of skills including technical, historical, and on-ground knowledge, and an understanding of government policy and community values. It is the primary vehicle for engaging the public, agency partners and other qualified individuals in the development of the SWP. LBCAC is also engaged on key projects that relate to SWP development, such as the Lower Barwon Review (Sherwood et al., 2020), the Water Salt Balance for the Lower Barwon Wetlands (Alluvium, 2022) and the anticipated review of FLOWS recommendations in 2025 (funding dependent). The operation of the Committee is underpinned by a Terms of Reference and any individual can apply to join LBCAC via the Corangamite CMA website.

Corangamite CMA also engages with community, Traditional Owners, and agencies throughout each water year in relation to the lower Barwon wetlands. Engagement in the 2023-24 water year that was linked to the watering of the lower Barwon wetlands includes:

- Monthly meetings with WTOAC to allow frequent two-way knowledge exchange and update.
- Corangamite CMA’s ‘City to Sea’ newsletter to promote recent or upcoming activities at the wetlands.
- Uploading reports/investigations to the Corangamite CMA KnowledgeBase (and advertising the link via email, social media, or newsletters) to share information with the community.
- Hosting VEWH staff at the wetlands to discuss complexities, challenges, and opportunities at the wetlands.
- Updating the e-water tool to provide live updates on watering that is publicly available.
- Field day with Field and Game Australia at Reedy Lake

In line with the Victorian Government best practice for public participation guidelines, Table 3 below defines the level of participation, method, and purpose of engagement with stakeholders during the development of the SWP.

Table 3. Summary of stakeholder engagement that informed this Seasonal Watering Proposal

| Stakeholder(s)   | Engagement method  | Engagement purpose  |
|--|--|---|
| <p><b>Government agencies:</b><br/> <b>Department of Energy &amp; Climate Action (DEECA), Parks Victoria- Western Basalt District, Barwon Water, Southern Rural Water, VEWH, Victorian Fisheries Authority (VFA)</b></p> | <p>Representation on LBCAC</p> <ul style="list-style-type: none"> <li>• Meeting to discuss and seek input on draft proposal.</li> <li>• Review of draft proposal and opportunity to provide formal feedback.</li> <li>• Response to stakeholder on how their feedback influenced the SWP and why.</li> <li>• Partnership meetings with links or relevance to seasonal water proposal development.</li> </ul> <p>Attendance at Community forums.</p> <ul style="list-style-type: none"> <li>• Direct engagement (one on one)</li> </ul> | <p>All stakeholders</p> <ul style="list-style-type: none"> <li>• Seek input to the development of the proposal.</li> <li>• Review previous environmental watering actions and seek feedback on any outcomes and capture observations.</li> <li>• Assist in increasing awareness and understanding of the purpose and objectives of the environmental watering program in the lower Barwon wetlands.</li> <li>• Provide an opportunity for individuals, agencies, and groups to contribute to the proposed watering actions and intended outcomes.</li> <li>• Identify opportunities to achieve shared benefits.</li> <li>• VEWH – to provide direct guidance and advice on draft proposal.</li> <li>• Parks Victoria, as the land manager – to review and endorse SWP.</li> </ul> |
| <p><b>Community groups and environment groups: Geelong Environment Council, Geelong Field Naturalists Club, EstuaryWatch, Friends of the Barwon</b></p>  | <p>Representation on LBCAC</p> <ul style="list-style-type: none"> <li>• Meeting to discuss and seek input on draft proposal.</li> <li>• Review of draft proposal and opportunity to provide formal feedback.</li> <li>• Response to stakeholder on how their feedback influenced the SWP and why.</li> </ul> <p>Attendance at Community forums.</p> <ul style="list-style-type: none"> <li>• Direct engagement (one on one)</li> </ul>   | <p>All stakeholders</p> <ul style="list-style-type: none"> <li>• Seek user input to the development of the proposal.</li> <li>• Review previous environmental watering actions and seek feedback on any outcomes and capture observations.</li> <li>• Assist in increasing awareness and understanding of the purpose and objectives of the environmental watering program in the lower Barwon wetlands.</li> <li>• Provide an opportunity for individuals, agencies, and groups to contribute to the proposed watering actions and intended outcomes.</li> <li>• Identify opportunities to achieve shared benefits.</li> <li>• Specific focus on specific group conservation interests through the SWP.</li> </ul>   |



| Stakeholder(s)   | Engagement method  | Engagement purpose   |
|--|--|--|
| <b>Wadawurrung Traditional Owners Aboriginal Corporation (Wadawurrung)</b>   | Face-to-face meeting during SWP drafting process.<br>Representation on LBCAC <ul style="list-style-type: none"> <li>• Meeting to discuss and seek input on draft proposal.</li> <li>• Review of draft proposal and opportunity to provide formal feedback.</li> <li>• Response to stakeholder on how their feedback influenced the SWP and why.</li> </ul>   | All stakeholders <ul style="list-style-type: none"> <li>• Seek user input to the development of the proposal.</li> <li>• Review previous environmental watering actions and seek feedback on any outcomes and capture observations.</li> <li>• Assist in increasing awareness and understanding of the purpose and objectives of the environmental watering program in the lower Barwon wetlands.</li> <li>• Provide an opportunity for individuals, agencies, and groups to contribute to the proposed watering actions and intended outcomes.</li> <li>• Identify opportunities to achieve shared benefits.</li> <li>• Specific focus on supporting Traditional Owner values through SWP.</li> </ul> |
| <b>Recreational users: Field and Game Australia (Geelong branch), Geelong Gun and Rod Association Inc., Victorian Recreational Fishing</b> | Representation on LBCAC <ul style="list-style-type: none"> <li>• Meeting to discuss and seek input on draft proposal.</li> <li>• Review of draft proposal and opportunity to provide formal feedback.</li> <li>• Response to stakeholder on how their feedback influenced the SWP and why.</li> </ul> Attendance at Community forums. <ul style="list-style-type: none"> <li>• Direct engagement (one on one)</li> </ul> | All stakeholders <ul style="list-style-type: none"> <li>• Seek user input to the development of the proposal.</li> <li>• Review previous environmental watering actions and seek feedback on any outcomes and capture observations.</li> <li>• Assist in increasing awareness and understanding of the purpose and objectives of the environmental watering program in the lower Barwon wetlands.</li> <li>• Provide an opportunity for individuals, agencies, and groups to contribute to the proposed watering actions and intended outcomes.</li> <li>• Identify opportunities to achieve shared benefits.</li> <li>• Specific focus on recreational interests</li> </ul>                           |
| <b>Landholders/Farmers: individual landholders and eel fishers</b>   | Membership of LBCAC <ul style="list-style-type: none"> <li>• Meeting to discuss and seek input on draft proposal.</li> <li>• Review of draft proposal and opportunity to provide formal feedback.</li> <li>• Response to stakeholder on how their feedback influenced the SWP and why.</li> </ul> Attendance at Community forums.<br>Direct engagement (one on one)  | All stakeholders <ul style="list-style-type: none"> <li>• Seek user input to the development of the proposal.</li> <li>• Review previous environmental watering actions and seek feedback on any outcomes and capture observations.</li> <li>• Assist in increasing awareness and understanding of the purpose and objectives of the environmental watering program in the lower Barwon wetlands.</li> <li>• Provide an opportunity for individuals, agencies, and groups to contribute to the proposed watering actions and intended outcomes.</li> </ul>   |

| Stakeholder(s)                           | Engagement method   | Engagement purpose   |
|--|---|--|
|  |   | <ul style="list-style-type: none"> <li>Identify opportunities to achieve shared benefits.</li> <li>Specific focus on commercial interests.</li> </ul>  |
| <b>Councils: City of Greater Geelong</b> | <p>Representation on LBCAC</p> <ul style="list-style-type: none"> <li>Meeting to discuss and seek input on draft proposal.</li> <li>Review of draft proposal and opportunity to provide formal feedback.</li> <li>Response to stakeholder on how their feedback influenced the SWP and why.</li> </ul> <p>Attendance at Community forums.</p> <p>Direct engagement (one on one)</p> <p>Corangamite CMA involvement on linked or related CoGG projects</p> | <p>All stakeholders</p> <ul style="list-style-type: none"> <li>Seek user input to the development of the proposal.</li> <li>Review previous environmental watering actions and seek feedback on any outcomes and capture observations.</li> <li>Assist in increasing awareness and understanding of the purpose and objectives of the environmental watering program in the lower Barwon wetlands.</li> <li>Provide an opportunity for individuals, agencies, and groups to contribute to the proposed watering actions and intended outcomes.</li> <li>Identify opportunities to achieve shared benefits.</li> <li>Specific focus on managing impact of urban development stormwater on environmental watering and reflecting that in the SWP.</li> </ul> |

## 8 Scope of environmental watering

The overarching watering objective for the lower Barwon wetlands was developed by the Lower Barwon Community Advisory Committee in 2013. It is to:

*“Maintain or improve the ecological character of the wetlands”.* Ecological character is defined as the combination of ecosystem components, processes, benefits, and services that characterised the wetland in 1982 when the wetlands were Ramsar listed. A change in ecological character is a human-induced adverse alteration of any ecosystem component, process and/or ecosystem benefit/service. This objective is consistent with Ramsar obligations.

Further to the agreed watering objective, the Lower Barwon Review (Sherwood et al., 2020) advised that

*It is important to note that the Expert Review Panel supports a wetting and drying regime for Reedy Lake. Both the (Lloyd et al. 2012) study and other research undertaken in coastal wetlands in Victoria (e.g. Raulings et. Al. 2010, 2011; Boon 2011) show that a permanently full lake will lead to a decrease in biodiversity. Wetting and drying regimes produce a mosaic of different habitat types as the water availability fluctuates providing specialist habitat for a wide variety of different flora and fauna species to utilise. Productivity at wetlands adapted to a wetting and drying regime, such as Reedy Lake, is driven by the disturbances caused by fluctuating water levels, occasional periods of high water and occasional periods of very low water. Occasional wet years would occur intermittently during unusually high flow years but should not be seen as “normal” or “desirable”.*

The Lower Barwon Flow Ecology study (Lloyd et al., 2012) advised that the whole water regime is required to meet the overall ecological outcomes and it is not possible to separate out which objective has priority. Therefore, the potential watering actions cannot be tiered nor prioritised, as they are part of a multi-year whole regime.

### **Reedy Lake**

The diversity and abundance of fauna in Reedy Lake, particularly waterbirds, is supported by variation in water levels. Wetting and partial drying cycles support a diversity of vegetation types, habitats, and species.

The Reedy Lake ecosystem includes sixteen ecological vegetation communities (EVCs), such as coastal saltmarsh, herbfIELDS, sedgELANDS, open water (semi emergent/macrophyte communities) and reed beds, which all play an important role in providing diverse habitat for a variety of flora and fauna species.

Due to the consistently high-water levels that were in place for many years until 2016-17, several vegetation communities that rely on low water levels or only periodic inundation – including the nationally vulnerable coastal saltmarsh – will have been negatively impacted. If the system is continually full, at some point these threatened vegetation communities may be lost from the system forever and will not be able to recover, regardless of watering activities. It is important to note that while wetland ecosystems are always in a state of change, it is critical to maintain a diversity of vegetation communities similar to those historically represented at the site (Yugovic, 1985). Periods of both higher and lower water levels will ensure the variety of species dependent on the seasonally fluctuating range of water levels within the wetlands can be protected for future generations.

Anecdotal observations collected in 2012 when the Flow Ecology study (Lloyd et al., 2012) was written suggested that tall reeds were taking over the wetland and outcompeting other species. This resulted in recommended watering actions partially targeted to control tall reeds, particularly the 10-year reset which was never implemented. The reset was unacceptable to community, and the long-term Lloyd recommendations were implemented straight away as a four-year trial. The expert panel engaged to conduct the Lower Barwon Review (Sherwood et.al., 2020) examined previously unavailable satellite imagery and concluded that there was no evidence to suggest tall reeds were taking over Reedy Lake and recommended further assessment to confirm this. Importantly, a wetting and partial drying regime was still recommended to drive wetland fertility and to support a diversity of vegetation communities and habitats, regardless of tall reed status. However, the timing and extent of draw-down actions could be relaxed if tall reed encroachment is not to be targeted going forward.

The Lower Barwon Review (Sherwood et.al., 2020) recommends that the Flow Ecology study (Lloyd et al., 2012) be updated, and this has now been captured under Action 8.5 in the Central and Gippsland Region Sustainable Water Strategy 2022. Until the study has been updated, the advice is to implement the long-term Lloyd recommendations with a seasonally adaptive approach, avoiding complete dry out years. At Reedy Lake this means having the wetland full 25% of years and doing a partial draw-down for 75% of years. This can be represented by a nominal four-year cycle (Figure 5).

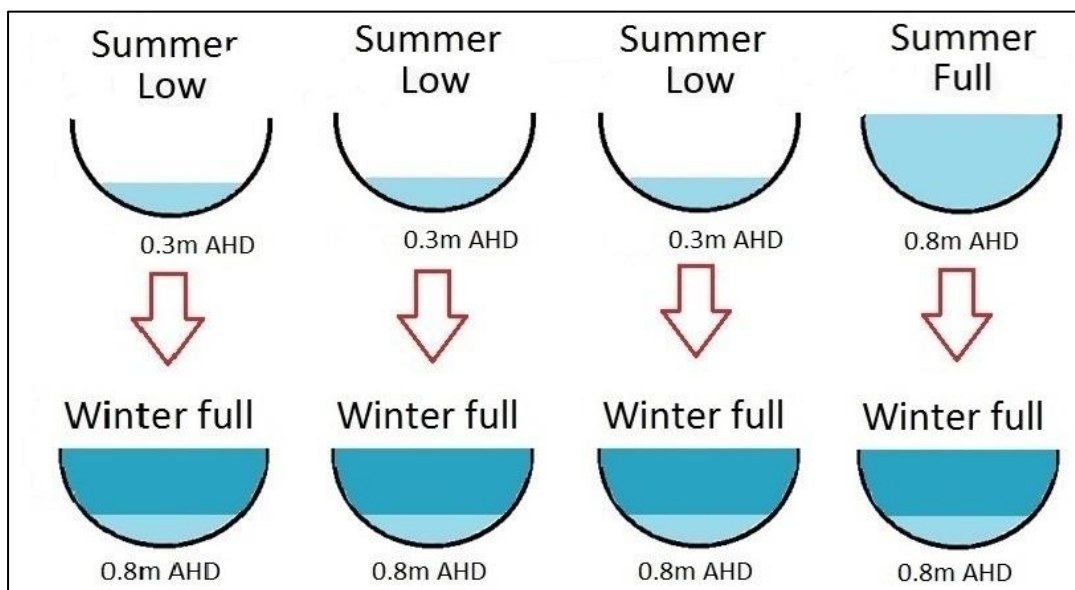


Figure 5. Reedy Lake's nominal four-year watering regime (2024-25 is draw-down year)

Table 4. Potential watering action 1 at Reedy Lake 2024-25


















| Potential environmental watering action (PWA)                            | Expected watering effects  | Environmental objectives   |
|--|--|--|
| <b>Reedy Lake (compliance point)</b>                                     |  |  |
| <p><b>PWA 1</b></p> <p><b>Environmental or hydrological triggers</b></p> | <p><b>Autumn refill to winter full</b> of approximately 0.8m AHD from April to March, topping as required and allowing for some natural variation. Wetland can be refilled and topped up any time from April 2024 through to March 2025.</p> <ul style="list-style-type: none"> <li>Initiate decomposition of organic matter on wetland bed</li> <li>Initiate growth of submerged aquatic macrophytes</li> <li>Initiate macroinvertebrate productivity</li> <li>Dilute accumulated soil and surface water salts</li> <li>Stimulate fish and waterbird breeding</li> <li>Allow fish to colonise wetland from the river</li> <li>Growth of submerged aquatic macrophytes</li> <li>Growth of <i>Schoenoplectus alidus</i> and other emergent aquatic macrophytes</li> <li>Persistent waterlogging and intermittent inundation of <i>Muehlenbeckia</i>, <i>Sarcocornia</i> and <i>Distichlis</i> vegetation communities</li> <li>Stimulate increase in invertebrate populations and biomass</li> <li>Create nesting habitat for colonial and other waterbirds</li> <li>Trigger fish spawning and sustain juvenile fish</li> <li>Provide connecting flows to the river</li> </ul> |  <p><b>F1:</b> Provide habitat for fish breeding and growth and improved conditions for migration and dispersal when wetlands are connected to the Barwon River.</p>  <p><b>CN1:</b> Maintain nutrient cycling and improve lake productivity.</p>  <p><b>V1:</b> Increase the diversity of ecological vegetation communities in the wetlands and increase the recruitment of aquatic vegetation.</p>  <p><b>V4:</b> Provide varying water levels and conditions to promote soil salinisation and support the persistence and growth of threatened, salt-dependent ecological vegetation communities.</p>  <p><b>B1:</b> Provide suitable feeding and breeding habitat for waterbirds, including flooded vegetation and wetland fringes.</p>  <p><b>B2:</b> Maintain waterbird feeding events.</p>  <p><b>WQ1:</b> Provide flushing inflows to remove accumulated salts.</p>  <p><b>WQ2:</b> Maintain surface water and groundwater interactions.</p>  <p><b>MI1:</b> Increase waterbug populations and its biomass.</p> |

Table 5. Potential watering action 2 at Reedy Lake 2024-25

| Potential environmental watering action (PWA)                            | Expected watering effects  | Environmental objectives   |  |
|--|--|--|--|
| <b>Reedy Lake (compliance point)</b>                                     |  |  |  |
| <p><b>PWA 2</b></p> <p><b>Environmental or hydrological triggers</b></p> | <p><b>Draw-down to summer low</b> – gradually reduce water levels to approximately 0.3 m AHD by natural evaporation or flow through adjustment and assisted draw-down (if required). Topping or drawing down as required to maintain approximately 0.3m AHD from December to May (as informed by expert bird monitoring advice). The wetland can be drawn down any time from December 2024, but is likely to occur later than this to ensure minimal impact on waterbird breeding.</p> <ul style="list-style-type: none"> <li>• Some reed beds exposed to retard growth</li> <li>• Aquatic habitat retained in big hole and deep channels</li> <li>• <i>Bolboschoenus</i> and herbland plants grow on exposed mudflats</li> <li>• Submerged aquatic macrophytes set seed and retreat to resting stages</li> <li>• Saline groundwater discharge to wetland bed</li> <li>• Restart wetland processes</li> <li>• Allow egg banks to be produced and laid</li> <li>• Provide waterbird food supply from access to tubers, seeds and invertebrates in shallow water</li> <li>• Reduce carp habitat</li> </ul> |         | <p><b>F2:</b> Reduce Carp populations.</p> <p><b>CN1:</b> Maintain nutrient cycling and improve lake productivity.</p> <p><b>V1:</b> Increase the diversity of ecological vegetation communities in the wetlands and increase the recruitment of aquatic vegetation.</p> <p><b>V2:</b> Increase the growth and extent of coastal saltmarsh, herbfields and lignum shrubland ecological vegetation communities.</p> <p><b>V3:</b> Retard colonisation of tall reed in low-lying areas and increase open-water habitat.</p> <p><b>V4:</b> Provide varying water levels and conditions to promote soil salinisation and support the persistence and growth of threatened, salt-dependent ecological vegetation communities.</p> <p><b>B1:</b> Provide suitable feeding and breeding habitat for waterbirds, including mudflats and shallow water for wading birds, flooded vegetation and wetland fringes.</p> <p><b>B2:</b> Maintain waterbird feeding events.</p> |

## Hospital Swamps

Hospital Swamps is subject to a strongly seasonal water regime, filling quickly in winter and spring and drying in summer and autumn when inflows from the Barwon River decline. Shallow water levels prevent significant recharge to the wetland bed and maintain saline soils that are hostile to the establishment of emergent macrophytes. On the northern banks of the main basin there is a cycling of water into the area, with winter inundation to establish a fresh groundwater lens and a subsequent discharge from the banks in summer, which limits the accumulation of salt and promotes the growth of reeds.

The diversity of vegetation types and associated fauna habitat is maintained by a complex interaction between freshwater inflows, water table depth cycles and salinity, movement patterns in freshening groundwater, the extent of overbank flooding, and surface water flows from other sources (Lloyd et al., 2012). The historical water regime of wetting and drying at Hospital Swamps is seen as currently beneficial to the ecosystem values of the site (Lloyd, et al., 2012) and available data indicates that the environmental watering recommendations are appropriate and ecological values are in good condition (Alluvium, 2020).

The Lower Barwon Review (Sherwood et.al., 2020) recommends that the Flow Ecology study (Lloyd et al., 2012) be updated by 2022, however this is now slated for 2025 in the Central and Gippsland Sustainable Water Strategy 2022. Until the study is updated, the advice is to implement the long-term Lloyd recommendations with a seasonally adaptive approach. At Hospital Swamps this means a partial draw-down most years (Figure 6). Lloyd also provided additional advice in 2013 around the operation of regulatory structures at Hospital Swamps primarily to increase connectivity. This advice is incorporated into operational arrangements, where practical.

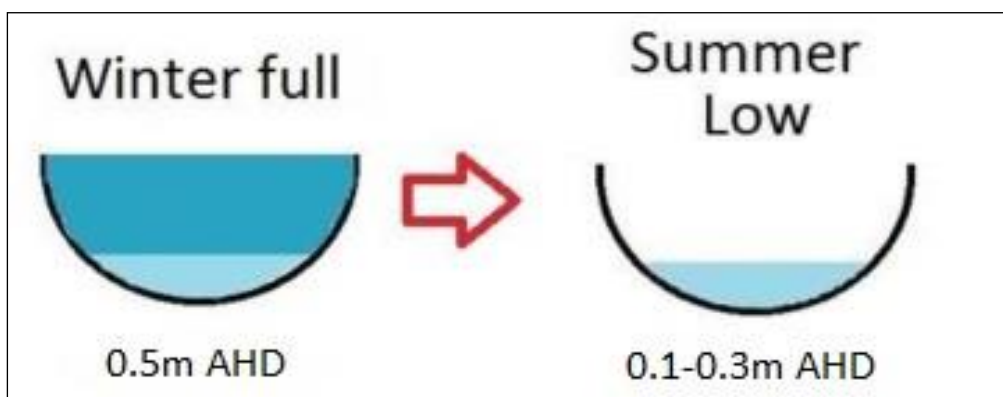


Figure 6. Hospital Swamps watering regime 2024-25

Table 6. Potential watering action 1 at Hospital Swamps 2024-25

















| Potential environmental watering action (PWA)                            | Expected watering effects   | Environmental objectives  |  |
|--|---|---|--|
| <b>Hospital Swamps (compliance point)</b>                                |   |   |  |
| <p><b>PWA 1</b></p> <p><b>Environmental or hydrological triggers</b></p> | <p><b>Autumn refill to winter full</b> of approximately 0.5m AHD from April to March, topping as required and allowing for some natural variation. Wetland can be refilled and topped up any time from April 2024 through to March 2025.</p> <ul style="list-style-type: none"> <li>Initiate <i>Stuckenia</i> and Chara growth</li> <li>Initiate decomposition of organic matter on wetland bed</li> <li>Dilute accumulated soil and surface water salts</li> <li>Create habitat and invertebrate populations</li> <li>Stimulate fish and waterbird breeding</li> <li>Allow fish to colonise wetland from the river</li> <li>Continuous flushing of salt from deep wetland basins</li> <li>Inundation of reedbeds and <i>Bolboschoenus</i> beds fringing the main basin</li> <li>Sustain growth of <i>Stuckenia</i> and Chara</li> <li>Promote growth of <i>Myriophyllum</i> in southern part of main basin</li> <li>Waterlog <i>Gahnia filum</i> sedgeland</li> <li>Stimulate increase in invertebrate populations and biomass</li> <li>Create nesting habitat for colonial and other waterbirds</li> <li>Continuous flushing of salt from deep wetland basins</li> <li>Inundate shallow wetland basins and promote growth of <i>Ruppia</i></li> <li>Inundate <i>Gahnia filum</i> sedgeland</li> <li>Create additional fish and waterbird habitat and invertebrate populations</li> <li>Trigger fish spawning</li> <li>Provide connecting flows to the river and between wetlands</li> </ul> |          | <p><b>F1:</b> Provide habitat for fish breeding and growth and improved conditions for migration and dispersal when wetlands are connected to the Barwon River.</p> <p><b>CN1:</b> Maintain nutrient cycling and improve lake productivity.</p> <p><b>V1:</b> Increase the diversity of ecological vegetation communities in the wetlands and increase the recruitment of aquatic vegetation.</p> <p><b>V4:</b> Provide varying water levels and conditions to promote soil salinisation and support the persistence and growth of threatened, salt-dependent ecological vegetation communities.</p> <p><b>B1:</b> Provide suitable feeding and breeding habitat for waterbirds, including flooded vegetation and wetland fringes.</p> <p><b>B2:</b> Maintain waterbird feeding events.</p> <p><b>WQ1:</b> Provide flushing inflows to remove accumulated salts.</p> <p><b>WQ2:</b> Maintain surface water and groundwater interactions.</p> <p><b>MI1:</b> Increase waterbug populations and its biomass.</p> |



Table 7. Potential watering action 2 at Hospital Swamps 2024-25

| Potential environmental watering action (PWA)                            | Expected watering effects   | Environmental objectives   |
|--|---|--|
| <b>Hospital Swamps (compliance point)</b>                                |   |  |
| <p><b>PWA 2</b></p> <p><b>Environmental or hydrological triggers</b></p> | <p><b>Draw-down to summer low</b> – gradually reduce water levels to approximately 0.1-0.3m AHD by natural evaporation or flow through adjustment and assisted draw-down (if required). Topping or drawing down as required to maintain approximately 0.1-0.3m AHD from December to May (as informed by expert bird monitoring advice). The wetland can be drawn down any time from December 2024, but is likely to occur later than this to ensure minimal impact on waterbird breeding.</p> <ul style="list-style-type: none"> <li>• Increase wetland salinity as groundwater discharge increases in proportion to surface water</li> <li>• Shallow wetland basins exposed (creates open water habitat upon refilling)</li> <li>• Restart wetland processes</li> <li>• Allow egg banks to be produced and laid</li> <li>• Provide waterbird food supply from access to tubers, seeds and invertebrates in shallow water</li> <li>• Soil salinity increases in shallow wetland basins and deep wetland basin</li> <li>• Chara and <i>Stuckenia</i> die back</li> <li>• Limited colonisation of wetland bed by annual herbland plants</li> <li>• Exposed reeds and other emergent macrophytes become dormant</li> <li>• High soil salinity excludes reeds</li> <li>• Expose mudflats for waterbird feeding</li> <li>• Allow nutrient recycling</li> <li>• Control carp populations</li> </ul> |  <p><b>F2:</b> Reduce Carp populations.</p>  <p><b>CN1:</b> Maintain nutrient cycling and improve lake productivity.</p>  <p><b>V1:</b> Increase the diversity of ecological vegetation communities in the wetlands and increase the recruitment of aquatic vegetation.</p>  <p><b>V3:</b> Retard colonisation of tall reed in low-lying areas and increase open-water habitat.</p>  <p><b>V4:</b> Provide varying water levels and conditions to promote soil salinisation and support the persistence and growth of threatened, salt-dependent ecological vegetation communities.</p>  <p><b>B1:</b> Provide suitable feeding and breeding habitat for waterbirds, including mudflats and shallow water for wading birds, flooded vegetation and wetland fringes.</p>  <p><b>B2:</b> Maintain waterbird feeding events.</p> |

## 9 Scenario planning

The annual environmental water planning process in Victoria uses a seasonally adaptive scenario planning approach to account for the different conditions that may occur within a year. Each year the CMA is required to plan for drought/dry, average, and wet scenarios, taking account of antecedent climatic and environmental conditions.

Tier 1 PWAs are those that are required in the coming year to achieve the stated environmental objectives given the current environmental conditions and the planned environmental strategies under each planning scenario.

Table 8. Scenario Planning in 2024-25

| Planning scenario   | Drought / Dry   | Average  | Wet  |
|---------------------|---|--|--|
| Expected conditions | <ul style="list-style-type: none"> <li>Limited to no flow from the Barwon River in winter/spring.</li> <li>Disconnection between wetlands and the Barwon River for a long period.</li> <li>Natural drawdown may begin earlier than planned.</li> </ul>  | <ul style="list-style-type: none"> <li>Some natural inflow from the Barwon River in winter/spring.</li> <li>More gradual lowering of water levels during drawdown.</li> </ul>  | <ul style="list-style-type: none"> <li>Wetlands will be filled by overbank flow from the Barwon River.</li> <li>Stormwater inflow and local rain/run-off will provide regular top-ups.</li> <li>Proposed extent of drying of the wetland is unlikely.</li> </ul>   |
| Possible impact     | <p>Reedy Lake (Drought / Dry)</p> <ul style="list-style-type: none"> <li>Low water levels in the Barwon River in, prior to autumn fill, could delay or prevent the filling of Reedy Lake for the wetting. (Levels must be sustained above 0.7m AHD, usually by rainfall, to commence the fill.)</li> <li>Once full, increased evaporation would reduce water levels more quickly in the wetland.</li> <li>The Barwon River may fall below 0.7m AHD (trigger to close the inlet to avoid bank</li> </ul> | <p>Reedy Lake (Average)</p> <ul style="list-style-type: none"> <li>More gradual lowering of water levels during wetland drying (consistent with flow recommendations) and adaptive management for shared benefits.</li> <li>Unlikely that the Barwon River would fall below 0.7m AHD (trigger to close the inlet to avoid bank slumping of the lower Barwon River) resulting in Reedy Lake being connected to the Barwon River over the winter spring period.</li> </ul> | <p>Reedy Lake (Wet)</p> <ul style="list-style-type: none"> <li>Overbank flows and local runoff could result in water levels above 0.3m AHD during lowering of wetland water levels. It is expected that this additional water would drain through the outlet.</li> <li>Very low chance that the Barwon River would fall below 0.7m AHD (trigger to close the inlet to avoid bank slumping of the lower Barwon River) resulting in Reedy Lake being connected to the Barwon River over the winter spring period.</li> </ul> |

| Planning scenario   | Drought / Dry  | Average   | Wet   |
|---|--|---|---|
|   | <p>slumping of the lower Barwon River) resulting in Reedy Lake being disconnected from the Barwon River for a greater period than ideal.</p> <ul style="list-style-type: none"> <li>It is possible Reedy Lake may not reach 'full' levels during the winter months.</li> </ul>   | <ul style="list-style-type: none"> <li>Reedy Lake is likely to reach 'full' levels during the winter months and have that sustained until drying commences.</li> </ul>  | <ul style="list-style-type: none"> <li>Reedy Lake is likely to rise above full levels during the winter months because of overbank flows, stormwater inflows, and local rainfall/runoff. This should not have a significant impact as a temporary event but may result in a fuller wetland over summer than originally planned. Not significant in the long term.</li> </ul>  |
|   | Hospital Swamps (Drought / Dry)  | Hospital Swamps (Average)   | Hospital Swamps (Average)   |
|   | <ul style="list-style-type: none"> <li>Low water levels in the Barwon River in the summer, prior to autumn fill, could delay or prevent the filling of Hospital Swamps for the winter.</li> <li>Levels must be sustained above 0.7m AHD, usually by rainfall, to commence the fill.</li> <li>Hospital Swamps may experience less connectivity with the Barwon River if river levels drop to &lt;0.7m AHD during the Spring period.</li> <li>Increased evaporation and decreased flows in the Barwon River may result in water levels decreasing in Hospital Swamps earlier during November, before the planned draw-down.</li> </ul> | <ul style="list-style-type: none"> <li>Medium to high chance that Barwon River water levels would allow Hospital Swamps to be full at the end of December.</li> <li>Hospital Swamps would likely be low or dry in autumn when flows increase in the Barwon River and the wetland is reconnected to the river at the inlet.</li> <li>Hospital Swamps is likely to reach 'full' levels during the winter months.</li> </ul> | <ul style="list-style-type: none"> <li>Stormwater run-off from nearby developments would slow the draw-down of Hospital Swamps over summer, when it exceeds the diversion level to Sparrovale – Nubjitj Reserve.</li> <li>Hospital Swamps would be unlikely to dry out over the summer and autumn period. Not significant in the long term.</li> <li>Hospital Swamps is likely to rise above 'full' level during the winter months because of overbank flows, stormwater inflows, local rainfall runoff, and the limited capacity of the outlet structure.</li> </ul> |
| <b>Reedy Lake</b>   |  |   |   |
| Potential environmental watering – tier 1 (high priorities) | Tier 1a  |   |   |
|   | <ul style="list-style-type: none"> <li>Reedy Lake fill<sup>1</sup> and top up (as required)</li> <li>Reedy Lake drawdown</li> </ul>  | <ul style="list-style-type: none"> <li>Reedy Lake fill and top up (as required)</li> <li>Reedy Lake drawdown</li> </ul>   | <ul style="list-style-type: none"> <li>Reedy Lake fill and top up (as required)</li> <li>Reedy Lake drawdown<sup>2</sup></li> </ul>   |

| Planning scenario   | Drought / Dry   | Average   | Wet   |
|---|---|---|---|
| Hospital Swamps   |   |   |   |
| Potential environmental watering – tier 1 (high priorities) | Tier 1a   |   |   |
|   | <ul style="list-style-type: none"> <li>Hospital Swamps fill<sup>3</sup> and top up (as required)</li> <li>Hospital Swamps Drawdown</li> </ul> | <ul style="list-style-type: none"> <li>Hospital Swamps fill and top up (as required)</li> <li>Hospital Swamps Drawdown</li> </ul> | <ul style="list-style-type: none"> <li>Hospital Swamps fill and top up (as required)</li> <li>Hospital Swamps Drawdown<sup>4</sup></li> </ul> |

1 The planned fill of Reedy Lake might be difficult to achieve in the drought/dry planning scenario due to the wetland’s potential disconnection from the Barwon River for long periods.

2 The planned drying of Reedy Lake may be difficult to implement in the wet planning scenario, especially if there are multiple high-flow events in the Barwon River during summer and autumn.

3 The planned fill of Hospital Swamps might be difficult to achieve in the drought/dry planning scenario due to the wetland’s potential disconnection from the Barwon River for long periods.

4 The planned drying of Hospital Swamps may be difficult to implement in the wet planning scenario, especially if there are multiple high-flow events in the Barwon River during summer and autumn.

## 9.1 Scenario planning logic for Reedy Lake in 2024-25

The current recommended water regime for Reedy Lake involves a full wetland every winter and spring, and a partial draw-down over summer in 75% of years.

A partial summer draw-down is recommended in 75% of years. A draw-down no earlier than December will support waterbird and frog breeding and will also provide muddy margins for migratory shore birds when it is most needed between January and March. A slow draw-down rate will reduce the risk of disruption to any breeding marsh birds or colonial nesting birds. Exact timing of draw-down commencement will be informed by bird monitoring. A faster draw-down will be employed if water levels are not dropping sufficiently to provide muddy margins through January-March or later, depending on breeding activity.

### Operational arrangements:

In average or dry conditions this may involve closing the inlet and outlet gates and allowing natural evaporation, only assisting draw-down by opening the outlet gate if required.

In wet conditions this may involve adjusting the previous winter setting with inlet and outlet gates both open (see Potential Watering Action 1) to a partially closed inlet and an open outlet to achieve a gradual draw-down, but with the benefit of maintaining some connectivity for fish, particularly through the inlet which does not yet have a fish way.

### Top ups (via river upstream of barrage)

Inlet gate:- open or opening increased if Barwon River >0.7m AHD

Outlet gate:- closed or opening reduced

### Top ups (via tidal Barwon River downstream of barrage)

Inlet gate:- closed

Outlet gate:- open

## 9.2 Scenario planning logic for Hospital Swamps in 2024-25

The current watering regime recommended for Hospital Swamps involves drawing down the wetland over summer and refilling in autumn to provide a full wetland through winter and spring most years, including in 2024-25.

A draw-down no earlier than December, and guided by bird breeding monitoring, will support waterbird and frog breeding (where present) and will also provide muddy margins for migratory shore birds when they are most needed between January and March.

Specific timing of draw-down will be informed by water bird monitoring for breeding (if possible).

It will be slow in early summer to mimic natural dry out as flows in the Barwon decrease.

However, if draw-down at Hospital Swamps is delayed due to bird breeding, a faster draw-down may be carried out to make sure some muddy margins are provided to migratory waders through January-March.

Where draw-down at Hospital Swamps is delayed, offset habitat may be available at other nearby wetlands such as the CoGG-managed Sparrovale wetlands.

### Operational arrangements:

In average to dry conditions the inlet regulator may need to be opened to fill the wetland, with the outlet gate closed.

In wet conditions, local stormwater run-off can be more than sufficient to fill and maintain full wetland basins even with the outlet gate open.

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Connectivity via open gates will be maintained wherever possible.

In average or dry conditions this may involve closing the inlet and outlet gates and allowing natural evaporation, only assisting draw-down by opening the outlet gate if required.

In wet conditions this may involve adjusting the previous winter setting with inlet and outlet gates both open (see Potential watering action 1) to a partially closed inlet and an open outlet to achieve a gradual draw-down, but with the benefit of maintaining some connectivity for fish.

Top ups (via river upstream of barrage)

Inlet gate:- open if Barwon River >0.7m AHD

Outlet gate:- closed

Top ups (via tidal Barwon River downstream of barrage)

Inlet gate:- closed

Outlet gate:- open

### 9.3 Seasonal outlook

The Barwon Southwest region has a temperate climate, with mild to warm summers and cold winters. Summer average maximum temperatures are around 22-24°C near the coast and in elevated areas, and 25-27°C inland. Winter average maximum temperatures are around 12-14°C. Rainfall occurs mostly in winter and spring and is generally the result of rain-bearing weather systems coming from the west (DELWP, 2015). Climate change continues to influence Australian and global climates. Australia's climate has warmed by around 1.47 °C over the period 1910–2021. There has also been a trend towards a greater proportion of rainfall from high intensity short duration rainfall events, especially across northern Australia. (Climate Driver Update Archive BOM (2023 February)). Regarding long term climate projection based on a medium (RCP4.5) emissions scenario, annual rainfall totals are likely to decline by 25% by the end of the decade, with the greatest drying to occur in spring. As warming continues, more heat extremes will occur.

The Bureau of Meteorology (BOM) states that at the time of writing (April 2024) El Niño is near its end with the expectation that conditions will return to neutral before the start of the 2024-25 water year. The BOM also states that four out of seven climate models are predicting a La Nina by late winter 2024. However, the BOM also states that current forecasts beyond May should be used with caution (BOM, 2024). Considering this it is thought that on balance, average rainfall is likely for the upcoming water year and Corangamite CMA will plan watering in line with an average climatic scenario, noting adaptive management may be required to respond to ambient conditions if La Nina returns and influences the Corangamite Region.

## 10 Risk management

A risk assessment will be undertaken by Corangamite CMA for the 2024-25 season on the 4<sup>th</sup> of March 2024, with Barwon Water, the VEWH and Parks Victoria.

This assessment identifies the risks associated with delivering water for the priority actions. Mitigation actions to reduce risks have been identified and should be undertaken as part of the release plan.

An overview of the risk assessment and management for the current plan with potential risk mitigation measures and associated residual risk assessment is below in table 9.

Table 9. Risk assessment 2024-25


| Risk ID      | Risk Category | Risk Description  | Likelihood | Conseq   | Risk Rating | Mitigation actions  | Residual Risk Rating | Lead organism. for action | Risk type Static/Dynamic |
|--------------|---------------|---|------------|----------|-------------|---|----------------------|---------------------------|--------------------------|
| CEBA2 020-01 | Environment   | Ongoing implementation of low water regime for Reedy Lake is unable to be continued due to lack of stakeholder support leading to sub-optimal environmental outcomes. | Unlikely   | Moderate | Low         | <ul style="list-style-type: none"> <li>Continue to engage with the local community to build understanding and support.</li> <li>Continue engagement with the eel fishery representatives in relation to the environmental watering regime.</li> <li>Consult with Field &amp; Game to flag potential dry seasonal conditions issues.</li> </ul> <i>- residual risk based on 22-23 environmental conditions</i> | Low                  | CCMA                      | Static                   |
| CEBA2 020-02 | Reputational  | Inability to demonstrate outcomes from low water regime at Reedy Lake leading to a lack of public support for activities.   | Unlikely   | Moderate | Low         | <ul style="list-style-type: none"> <li>Plan and implement monitoring program when drying regime is implemented, when funding available.</li> <li>Communicate results of monitoring (including WetMAP) to community and stakeholders.</li> </ul>   | Low                  | CCMA                      | Static                   |

|                 |             |   |                |          |      |   |     |      |         |
|-----------------|-------------|---|----------------|----------|------|---|-----|------|---------|
| CEBA2<br>020-03 | Environment | Asset failure (including inability to operate unsafe structures) prevents implementation of planned environmental water management actions at the target site.<br><br><i>Note: Safety risk to staff was acknowledged however, accountability for individual staff safety lies with the employing agency via implementation of their own OHS safe work requirements and other associated policy and procedures. This risk is therefore not addressed within this assessment.</i> | Unlikely       | Moderate | Low  | <ul style="list-style-type: none"> <li>Carryout pre-delivery inspection of structures and undertake annual maintenance actions.</li> <li>Implement funded infrastructure upgrades on outlet structures, and continue to seek funding for automation and inlet structure upgrades (partly completed, Hospital Swamps structures not yet addressed and are continuing to decline).</li> </ul> <i>Note: Check indicates CCMA is asset owner at Hospital Swamp, however PV to offer support for funding applications as land manager</i><br>- residual risk based on 22-23 environmental conditions | Low | CCMA | Dynamic |
| CEBA2<br>020-04 | Environment | Unauthorised interference with structures may result in an inability to achieve planned watering actions, leading to a failure to achieve environmental objectives.   | Unlikely       | Moderate | Low  | <ul style="list-style-type: none"> <li>Ensure structures are locked and monitor structure regularly to minimise likelihood of interference.</li> </ul> - residual risk based on 22-23 environmental conditions  | Low | CCMA | Dynamic |
| CEBA2<br>020-05 | Environment | Deteriorated conditions of access tracks prevents CMA safely accessing Reedy Lake and Hospital Swamps regulators, which results in an inability to operate these structures to deliver environmental water to the sites.  | Almost certain | Moderate | High | <ul style="list-style-type: none"> <li>CMA undertake annual track maintenance activities (note this is on behalf of PV) in a timely manner to allow safe access.</li> </ul> - Installation of remote activation of Reedy Lake regulators to reduce need to traverse access tracks (in progress, completion expected in 24-25 year)  | Low | CCMA | Dynamic |
| CEBA2<br>021-06 | Safety      | A failure to share information regarding potential site-specific safety concerns related to illegal actions (e.g. firewood collection, drugs), duck hunting, homelessness or negative sentiment over government decisions/actions may result in staff travelling to wetlands for operational or monitoring activities being exposed to aggressive behaviour or accidentally injured.  | Possible       | Extreme  | High | - Share intelligence around any known instances of risky or aggressive behaviour at watering sites between partners.<br><br><i>Note: Accountability for individual staff safety lies with the employing agency via implementation of their own OHS safe work requirements and other associated policy and procedures. This risk is therefore not addressed within this assessment.</i>  | Low | All  | Static  |
| CEBA2<br>020-07 | Safety      | Drying regime and lower water levels in wetlands (in combination with extensive reed growth), may lead to access issues and inconvenience for duck hunters wading at these sites under changed conditions.  | Possible       | Minor    | Low  | <ul style="list-style-type: none"> <li>Undertake frequent communications and engagement with local duck hunting groups via Parks Vic networks to inform them about water level changes.</li> </ul>  | Low | CCMA | Dynamic |



|                 |                      |   |          |          |        |   |     |              |        |
|-----------------|----------------------|---|----------|----------|--------|---|-----|--------------|--------|
| CEBA2<br>020-08 | Reputational         | Inability to demonstrate outcomes achieved through environmental watering activities may lead to a loss of public/political support for activities  | Possible | Major    | Medium | <ul style="list-style-type: none"> <li>• Maintain strong communications with key local stakeholders, including via social media.</li> <li>• Include Lower Barwon Community Advisory Committee in development of seasonal watering proposals.</li> <li>• Communicate findings from WetMAP monitoring at Reedy Lake to the local community</li> <li>• Communicate benefits of environmental watering to the broader community.</li> </ul> | Low | CCMA<br>VEWH | Static |
| CEBA2<br>020-09 | Cultural<br>Heritage | Inability to incorporate Wadawurrung inputs and knowledge into planning may lead to a failure to address T.O. values or damage heritage/artifacts and may impact on values or heritage<br><i>Note: This risk assessment needs to be tested with T.O.s</i> | Possible | Minor    | Low    | <ul style="list-style-type: none"> <li>• Establish meaningful partnership arrangements with Wadawurrung people, leading to ongoing inclusion of T.O. values into watering proposals</li> <li>• Continue to partner and share knowledge with T.O.s to build capacity to actively engage in water related issues</li> </ul>   | Low | CCMA         | Static |
| CEBA2<br>020-10 | Environment          | Insufficient staff resources available to deliver all planned environmental watering actions, results in impacts on the environment   | Possible | Moderate | Medium | <ul style="list-style-type: none"> <li>• Continue to actively prioritise actions and ensure key actions are delivered.</li> <li>- Seek funding for remote actuation of relevant structures to reduce the need for staff visitation.</li> </ul> <p><i>- residual risk based on 22-23 environmental conditions</i></p>  | Low | CCMA         | Static |
| CEBA2<br>020-11 | Environment          | Environmental deliveries create improved conditions for pest plant and animal species (e.g. carp, tall reeds) leading to adverse environmental impacts.<br><i>Note: assessment has regard for previous permanent water regime as baseline</i>             | Unlikely | Minor    | Low    | <ul style="list-style-type: none"> <li>• Manage water regimes in wetlands to control pest plant and animal species.</li> </ul>  | Low | CCMA         | Static |

## 11 Approval, endorsement and consent

| WATERWAY MANAGER APPROVAL OF THE SEASONAL WATERING PROPOSAL  |  |
|--|--|
| I, Amber Clarke the authorised representative of the agency shown below, approve the Seasonal Watering Proposal for the lower Barwon wetlands system in 2024-25. |  |
| SIGNED FOR AND ON BEHALF OF Corangamite CATCHMENT MANAGEMENT AUTHORITY   |  |
| Signature of authorised representative:   |  |
| Name of authorised representative: Amber Clarke  |  |
| Position of authorised representative: CEO   |  |
| Date: 19 April 2024  |  |

| ENDORSEMENT OF THE SEASONAL WATERING PROPOSAL   |   |  |   |                                     |
|---|---|--|---|-------------------------------------|
| I, the authorised representative of the agency shown below, approve the Seasonal Watering Proposal for the lower Barwon wetlands system in 2024-25. |   |  |   |                                     |
| Role  | Endorsing partner                                     | Representative Role  | Status Date   | Notes/Comments                      |
| Land Manager  | Parks Victoria  | Jason Borg   | <input checked="" type="checkbox"/> Endorsed.<br>Date: 25/03/2024 | See letter of support in appendix 1 |
| Traditional Owner   | Wadawurrung Traditional Owners Aboriginal Corporation | Claire Mennen<br>Project Officer – Caring for Country Team | <input checked="" type="checkbox"/> Endorsed.<br>Date: 23/02/2024 | Approved via email.                 |

| CONSENT TO USE OF CONTENT |   |  |              |   |   |                               |
|---------------------------|---|--|--------------|---|---|-------------------------------|
| Role                      | Endorsing partner                                     | Delegate Role  | Content      | For use in the  |   | Notes                         |
|                           |   |  |              | Seasonal Watering Proposal  | Seasonal Watering Plan                              |                               |
| Traditional Owner         | Wadawurrung Traditional Owners Aboriginal Corporation | Claire Mennen<br>Project Officer – Caring for Country Team | All chapters | <input checked="" type="checkbox"/> Consent provided.<br>Date: 23/02/2024 | <input type="checkbox"/> Consent provided.<br>Date: | Excludes Wadawurrung language |

## 12 References

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# 1. Appendix 1. Letter of Support from Parks Victoria

## OFFICIAL



25 March 2024

**Parks Victoria**  
parks.vic.gov.au  
ABN 95 337 637 697

Rhiannon Glover  
Acting Senior Project Officer - Estuaries and Environmental Water  
Corangamite Catchment Management Authority  
PO Box 159  
Colac VIC 3250  
Email: [rhiannon.glover@ccma.vic.gov.au](mailto:rhiannon.glover@ccma.vic.gov.au)

Dear Rhiannon

### **Letter of support for the Corangamite Catchment Management Authority's Seasonal Watering Proposal for the water year 2024-25**

Parks Victoria has reviewed the seasonal watering proposals for the Lower Barwon Wetlands, and we support submission of this watering proposal to the Victorian Environmental Water Holder subject to consideration of following actions:

Prior to implementing any of the proposed watering actions on the Parks Victoria estate, the Corangamite Catchment Management Authority (CMA) should:

- Assess whether on-ground works are required to facilitate the delivery and seek advice to determine what approvals are required by Parks Victoria. This advice should be sought early to ensure approvals can be processed.
- Advise local Parks Victoria staff (cc Seema Karki) regarding the proposed opening and closing of the water regulating structures.
- Should Parks Victoria be required to operate delivery infrastructure, please provide sufficient notice (28 days) so as we can schedule timely actions, ensure resources are available, and safety requirements can be satisfied.

Protecting our water-dependent ecosystems in the face of climate change is a key to Parks Victoria's long-term strategies and plans. To improve our capacity to report against these plans, we will be collaborating with partners in the Victorian environmental watering program to ensure that watering actions and outcomes are better incorporated into our planning and evaluation systems. We encourage you to continue to share results with us so we can continue building these into our communications and land management processes.

As Landowner and Manager, Parks Victoria has co-responsibilities for mitigating risks at this site. To assist us in managing these risks, could you please ensure sufficient lead time is provided for planning and resourcing purposes.

Parks Victoria is looking for ways to better respond to environmental watering risks and we continue to seek opportunities to improve our capacity as a partner in Environmental Watering activities. We look forward to a continued collaboration through regular communication and inclusion in e-water planning and delivery on the sites.

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Parks Victoria is committed to working with Traditional Owner's to protect cultural values and landscapes. We encourage you to continue to engage with the relevant groups and individuals in the upcoming planning and delivery stages of the proposed watering actions, and to involve PV in these interactions.

For site specific queries, local matters or consultation related to Corangamite Catchment Management Authority's e-watering actions in the Lower Barwon Wetlands, please contact:

Ruth Woodrow  
Ranger Team Leader – Greater Geelong  
T (03) 8427 3485  
M 0437 741 325  
[ruth.woodrow@parks.vic.gov.au](mailto:ruth.woodrow@parks.vic.gov.au)

For broader environmental water queries across the Parks Victoria estate, please consult:

Seema Karki  
Program Leader – Ecological Water  
T: (03) 8427 3842  
E: [Seema.Karki@parks.vic.gov.au](mailto:Seema.Karki@parks.vic.gov.au)

Yours sincerely



Jason Borg  
Regional Director - Western Victoria