Sunday Creek Project

Lake Moodemere & Sunday Creek Reconfiguration Project

Lake Level Management Plan

May 2025

The Yorta Yorta are acknowledged as the First Peoples of the of the rivers and plains of Lake Moodemere and its surrounds. The Yorta Yorta are recognised as primary guardians, keepers and knowledge-holders of Aboriginal cultural heritage of the area impacted by this Lake Level Management Plan.

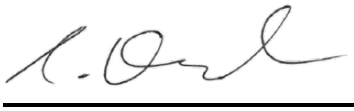
The Yorta Yorta Nation Aboriginal Corporation (YYNAC) is the Registered Aboriginal Party over the area encompassing Lake Moodemere. The Nation's Whole of Country Plan 2021–2030 (YYNAC 2021) reflects the aspirations and directions for Country, including natural resource management.

It is acknowledged that a future treaty could provide for different management arrangements between the State and YYNAC which could necessitate a change to the arrangements contemplated under this Lake Level Management Plan.

Citation

This plan may be cited as: Lake Moodemere & Sunday Creek Reconfiguration Project: Lake Level Management Plan, May 2025.

This Lake Level Management Plan was prepared in consultation with and is endorsed by the Department of Energy, Environment and Climate Action (DEECA), Goulburn-Murray Water and Parks Victoria.



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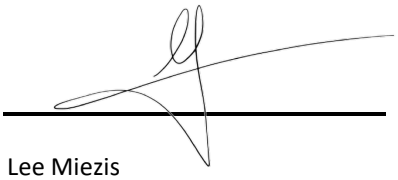

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1. Purpose and Background

1.1. Purpose

The purpose of this Lake Level Management Plan is to set out the agreed mechanisms and responsibilities for managing the water levels in Sunday Creek and Lake Moodemere.

This Lake Level Management Plan was prepared by the Project Team delivering the Sunday Creek Reconfiguration Project in consultation with the Sunday Creek Consultative Committee. The Sunday Creek Reconfiguration Project was commenced in 2021 to install a direct pump and pipeline connection from the Murray River to Sunday Creek, replacing the existing, inefficient regulator and private pump station which previously (before the reconfiguration of assets) filled Sunday Creek via Lake Moodemere.

This Lake Level Management Plan was formally endorsed by the Goulburn-Murray Water Murray Darling Basin Efficiency Measures Projects Project Control Group on 22 May 2025 following extensive consultation with the Department of Energy, Environment and Climate Action, Goulburn-Murray Water and Parks Victoria.

It is acknowledged that the operating arrangements for Sunday Creek and Lake Moodemere will be dependent on available supply from the Murray River. The development of this Lake Level Management Plan does not:

- prevent future review by the Victorian Government department responsible for the management of water resources (currently the Department of Energy, Environment and Climate Action; DEECA) or implementation of alternative management arrangements.
- place any obligation on DEECA, Goulburn-Murray Water or Parks Victoria to ensure supply of water to meet irrigation or recreational needs.

1.2. Background

1.2.1. Lake Moodemere and Sunday Creek

Lake Moodemere and Sunday Creek are approximately 6.5 km west of Rutherglen and are located on the floodplain of the Murray River (Figure 1).

Sunday Creek is principally operated for irrigation water supply purposes, supplying water to irrigators pumping water to vineyards in the Rutherglen wine region. The levels of water supplied through irrigation has and continues to support a range of regionally important cultural, recreational, environmental and socio-economic values (VEAC 2008, Parks Victoria 2018).

Since the establishment of river regulation and irrigated agriculture in the region, the water regime of Lake Moodemere has been managed using infrastructure to maintain a depth that suits recreational activities such as rowing and other water-based activities. These artificially high water levels have permanently inundated the wetland marshes that adjoin the lake. As the native vegetation in these wetlands requires fluctuating water levels and drying cycles to naturally regenerate, the diversity of species within them has reduced and simplified over time.

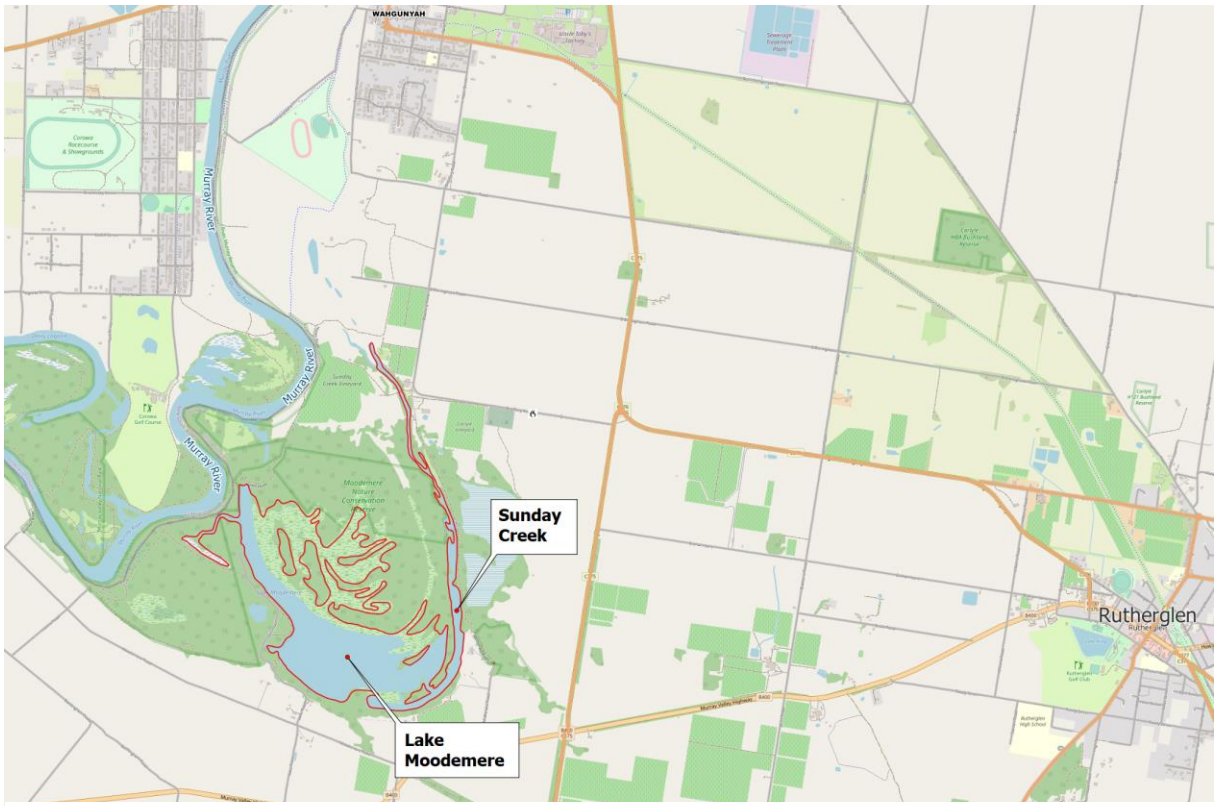

Figure 1: Location Map

1.2.2. Irrigation Diversions

Goulburn-Murray Water (GMW) is responsible for supplying irrigation and domestic and stock water to Victorian water users in this reach of the Murray River. There are more than 10 GMW diversion customers with pumped offtakes from either Sunday Creek or Lake Moodemere.

The diverters hold water entitlements which can be used for irrigation use and domestic and stock use. In total, the diverters supplied from either Sunday Creek or Lake Moodemere hold 2,714 ML of high-reliability water share entitlement.

GMW customers divert water from the water bodies through licensed privately-owned pumped offtakes equipped with water meters. Actual use across all customers in Sunday Creek and Lake Moodemere has averaged 358 ML over the 10-year period 2011/12 to 2020/21. The highest recorded usage over the period is 654 ML in 2008/09, toward the end of the Millennium Drought.

1.2.3. Sunday Creek Reconfiguration Project

The Sunday Creek Reconfiguration Project will ensure ongoing supply to diverters along Sunday Creek by reconfiguring the existing infrastructure to install a direct pump and pipeline connection from the Murray River to Sunday Creek.

The key outcomes of this project are:

- The replacement infrastructure secures ongoing access to water for irrigators with improved delivery efficiency.
- The revised infrastructure layout provides flexibility for supporting cultural, environmental and recreational values in Lake Moodemere through the ability to deliver water via a formal agreement.
- Construction of the new water infrastructure enables the demolition and rehabilitation of the diesel pump and pump shed near the Lake Moodemere regulator, improving the environmental, aesthetic and recreational values within the Lake Moodemere precinct.

1.3. Lake Level Management Plan

This Lake Level Management Plan formalises responsibility for the operation and maintenance of assets used to supply water to Lake Moodemere and Sunday Creek. Specifically, the plan is designed to facilitate the following outcomes:

- water depths are maintained to support recreational pursuits in Lake Moodemere in alignment with strategies within the Victorian Environmental Assessment Council (VEAC) Recommendation B3 for the Proposed Murray River Park (VEAC 2008) and Red Gum Parks Management Plan (Parks Victoria 2018);
- water can be accessed from Sunday Creek for existing authorised irrigation, domestic and stock purposes;
- roles and responsibilities for all relevant parties are outlined and are agreed;
- planned water levels and required operations in Sunday Creek and Lake Moodemere are delivered in accordance with this Lake Level Management Plan; and
- areas of land around the edge of Lake Moodemere will be given the opportunity to partially dry out (subject to Murray River water levels) from mid-summer to late winter to support ecological values that require a drying cycle.

2. Hydrology of the Lake Moodemere Complex

The Lake Moodemere-Sunday Creek precinct comprises an area of approximately 500 hectares that includes the two water bodies – Lake Moodemere and Sunday Creek – and associated wetland marshes fringing Lake Moodemere.

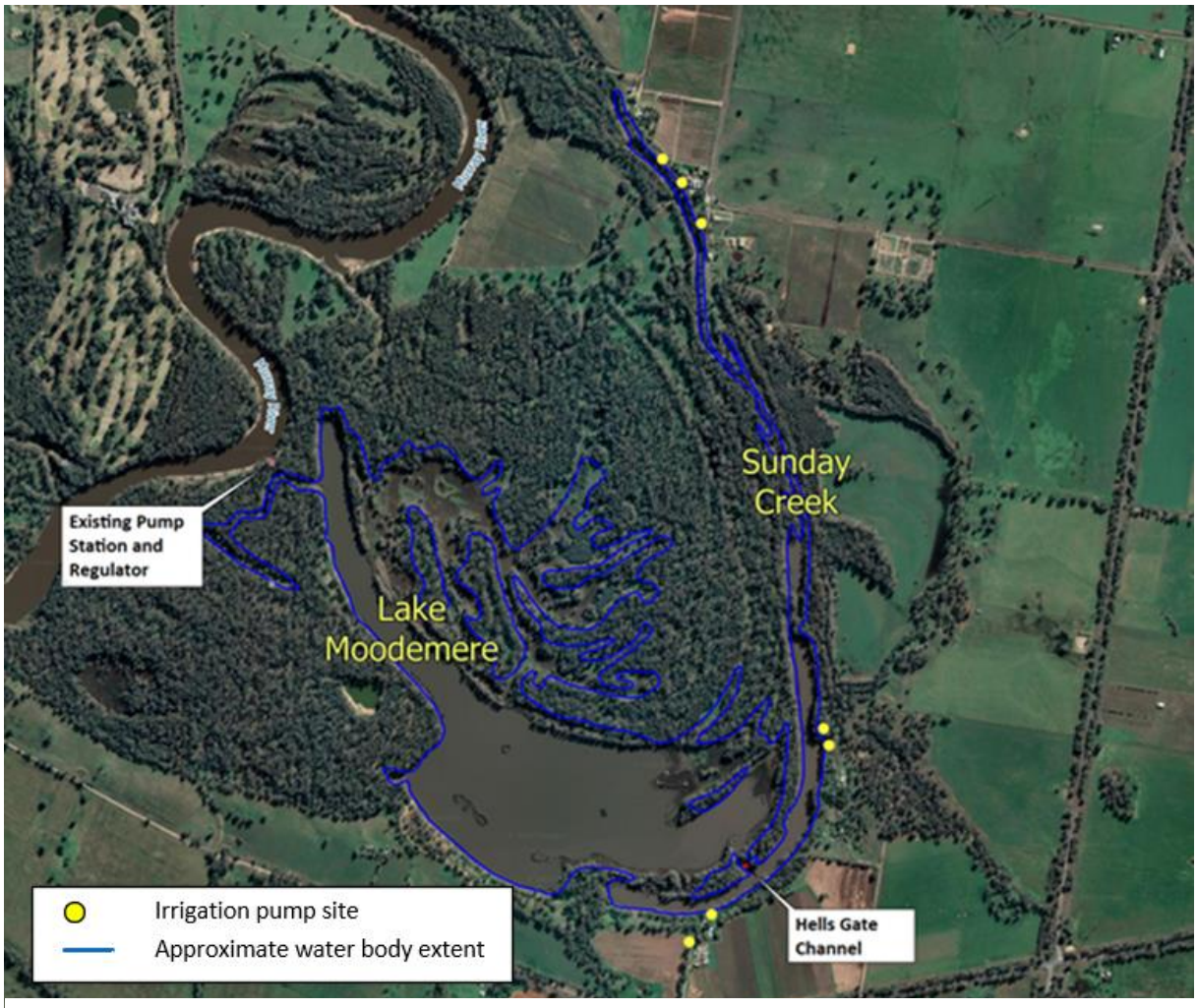

Figure 2: Sunday Creek and Lake Moodemere – Pre-Reconfiguration Irrigation Water Supply Infrastructure

2.1. Sunday Creek

Sunday Creek[1] was formerly a small anabranch or flood runner of the Murray River, which flowed from near the township of Wahgunyah to Lake Moodemere. The upstream reaches of Sunday Creek have been highly modified for agricultural development and the creek is now disconnected from the river at its upstream end.

Sunday Creek is approximately 3.5 km long and varies in width from 40 m at its southerly end to 5 m at its northerly terminus. The creek has a volumetric capacity of approximately 58 ML at 128.7 m AHD and 82 ML at 128.9 m AHD.

A channel through the creek was normally filled by Lake Moodemere backwater. The creek also receives a small volume of local catchment run-off and rainfall.

Sunday Creek is now used to supply irrigation and domestic and stock water. At its downstream end, Sunday Creek is separated from Lake Moodemere by a low-level embankment that is understood to have been constructed in the 1940s to hold water in the creek to supply irrigation water.

A 35 m wide fixed crest weir, located in the Hells Gate, connects Sunday Creek and Lake Moodemere and enables Sunday Creek and Lake Moodemere to operate independently when water levels are below 129.0 m AHD.

Figure 3: Water flowing through Hells Gate Channel from Lake Moodemere to Sunday Creek (looking from Lake Moodemere to Sunday Creek), pre-Reconfiguration works

Prior to the implementation of works as part of the Sunday Creek Reconfiguration Project (i.e. Pre-Reconfiguration), Sunday Creek was filled for irrigation purposes by a diesel pump near the Lake Moodemere regulator on the Murray River that pumped water into the lake, which then flowed into the southern end of

[1] The creek system between Wahgunyah and Lake Moodemere is known as Sandy Creek in the upstream ephemeral reach and Sunday Creek within the reach flooded by the Lake Moodemere backwater. The reach within the project area is therefore referred to as Sunday Creek within this plan.

Sunday Creek. This pump provided water for Lake Moodemere when natural filling did not fill Lake Moodemere to a level sufficient to flow into Sunday Creek.
Post-Reconfiguration, Sunday Creek will be filled directly for irrigation purposes by an electric pump on the Murray River, upstream of the Lake Moodemere regulator. The pump also conveys water into Lake Moodemere, via Sunday Creek, when natural filling does not meet the planned lake levels outlined in this Lake Level Management Plan.

The water level in Sunday Creek is typically held between 128.7 and 128.9 m AHD during the irrigation season. When the creek is used to convey water to Lake Moodemere, the water level in Sunday Creek will be raised above 129.0 m AHD to pass over the Hells Gate weir.

2.2. Lake Moodemere

Lake Moodemere is located on the Murray River floodplain at the downstream end of Sunday Creek. The lake is the largest floodplain lake on the Murray River between Lake Hume and the Ovens River.

The regulated water level in the lake can vary from 127.0 m AHD (lowest surveyed lake invert level) to approximately 129.85 m AHD, which is the maximum water level at which the regulating gate can retain water within Lake Moodemere. The level can exceed this maximum regulated level during Murray River flood events.

The lake surface area is approximately 60.8 ha when the water level is at the target fill height of 128.7 m AHD. Once levels reach 129.3 m AHD the lake extends into the wetland marshes to the north.

The lake has a volumetric capacity of 436 ML at 128.7 m AHD.

Historically, Lake Moodemere would have received water via overbank flows from the Murray River and much of its water would have drained back into the river during periods of low flow in summer and autumn. Since the commencement of the regulation of the Murray River for consumptive water use, natural floods of a magnitude sufficient to flow into Lake Moodemere are far less common and summer/autumn river levels are higher than they were naturally to provide irrigation water to downstream users.

Prior to the implementation of works as part of the Sunday Creek Reconfiguration Project, Lake Moodemere was usually maintained at an artificially high level during the irrigation season by pumping water from the Murray River to meet the water supply requirements in Sunday Creek. Its level also rarely dropped significantly due to irrigation requirements.

Post-Reconfiguration, the lake level will be managed in accordance with sections 3.2 and 0 of this plan.

2.3. Operating Levels

The levels of key features in the Lake Moodemere-Sunday Creek precinct are summarised in Table 1.

Table 1: Lake Moodemere and Sunday Creek Key Operating Levels

Pre-Reconfiguration Level (RL m AHD)	Description	Post-Reconfiguration Level (RL m AHD)
125.174	Corowa river level gauge local zero level	125.174
127.0	Lake Moodemere lowest surveyed bed level (lake is empty)	127.0
128.3	Lake Moodemere regulator commences to flow (invert level)	128.05
128.7	Level required to support recreational values in Lake Moodemere	128.7
128.7 – 128.9	Operating level in Sunday Creek during irrigation events	128.7 – 128.9

Pre-Reconfiguration Level (RL m AHD)	Description	Post-Reconfiguration Level (RL m AHD)
Natural embankment overtopped when the level of Lake Moodemere exceeds	Top of the Hells Gate embankment or fixed crest weir (minimum height for hydrological connection between Lake Moodemere and Sunday Creek)	129.0 (fixed crest weir to be constructed)
129.3	Marshes surrounding Lake Moodemere commence inundation	129.3
129.85	Lake Moodemere regulator overtops. Above this height the flow of water between the Murray River and Lake Moodemere is uncontrolled.	129.93

3. Water Level Management

3.1. Flow Control Infrastructure

Following completion of the Sunday Creek reconfiguration project, the following infrastructure will be used in the operation of Sunday Creek and Lake Moodemere to supply irrigation water to adjoining landholders and to achieve planned lake levels in Lake Moodemere. The infrastructure will be located on public land and constructed, maintained and operated in accordance with this plan and licences issued by Parks Victoria and other regulatory agencies.

The existing diesel pump station and shed near the Lake Moodemere regulator will be decommissioned and the site rehabilitated.

3.1.1. Lake Moodemere regulator

The Lake Moodemere regulating structure will function both as a flow control device into Lake Moodemere and as a level control device holding water in the lake. The operating range of the regulator will be 128.0 m AHD (invert level) to 129.93 m AHD (top of gate).

When there are high flows in the Murray River (i.e. water level exceeds 128.0 m AHD) the regulating gate will be able to be opened to allow flow into the lake if the river height is above the lake level.

The regulating structure will be owned and operated by the Sunday Creek Irrigators Group in accordance with this Plan.

3.1.2. Hells Gate connecting channel and weir

A channel with a fixed level weir (set at 129.0 m AHD) connects Sunday Creek and Lake Moodemere at Hells Gate. When Sunday Creek is used to convey water to Lake Moodemere, the water level in Sunday Creek will be raised above 129.0 m AHD to pass over the Hells Gate weir. The channel and weir will be owned and maintained by the Sunday Creek Irrigators Group.

3.1.3. Sunday Creek pump station and pipeline

An electric pump station will be located on the bank of the Murray River. An underground pipeline will carry water from the pump to the northern end of Sunday Creek. The pump and pipeline will be owned and operated by the Sunday Creek Irrigators Group.

3.1.4. Lake Moodemere lake level monitoring station

Automated monitoring of the water level in Lake Moodemere will be facilitated by the installation of a device which will allow remote monitoring of the water level. Once installed and operational, the automated water level monitoring device will be owned and maintained by Parks Victoria.

3.2. Post-reconfiguration Operating Arrangements

3.2.1. General

The operating arrangements post-reconfiguration were developed to reflect, as far as possible, historical operating conditions over recent decades and to balance the environmental, social, recreational, and cultural values of Lake Moodemere and its surrounding wetlands.

Spring and early summer flows via the Lake Moodemere Regulator

From 1 September to 14 January, (and only when the level of the Murray River is higher than the level of Lake Moodemere), the Lake Moodemere Regulator will be opened to allow Murray River flows above 128.3 m AHD to flow into Lake Moodemere.

When the level of Lake Moodemere matches or exceeds the level of the Murray River, the Sunday Creek Irrigators Group will close the Lake Moodemere Regulator to retain the water in the lake.

Top up flows via the Sunday Creek Pump Station

Where regulator inflows have not raised the level of Lake Moodemere to 128.7 m AHD by 1 September, the pump station will be operated to achieve this level. Lake levels will be monitored again in December each year and if necessary, the pump station will again be operated to ensure the lake level is at a minimum of 128.7 m AHD by 1 January each year.

The Sunday Creek pump station may also be operated at other times, should environmental, cultural or recreational water allocations become available for Lake Moodemere.

Parks Victoria will monitor compliance with this Lake Level Management Plan. As the agency with technical knowledge of pumping infrastructure, GMW will, if needed, act on the written direction of Parks Victoria to operate the water supply infrastructure to fill or maintain the water level of Lake Moodemere, in accordance with this plan.

3.2.2. Authorisation and Limitations

Unless otherwise directed in writing by the Victorian Government department responsible for the management of water resources (currently DEECA) acting on the advice of the Resource Manager for River Murray Bulk Entitlements, the Sunday Creek Irrigator Group will be authorised to operate the Sunday Creek and Lake Moodemere water supply infrastructure (i.e. the regulator and pump station) to manage water levels in Lake Moodemere, as set out in Table 2.

The availability of water to achieve planned water levels in Lake Moodemere in severe drought years cannot be guaranteed. The Victorian Government department responsible for the management of water (currently DEECA) will have a role in assessing water availability in consultation with the Resource Manager for River Murray Bulk Entitlements and will advise all relevant agencies and the Sunday Creek Irrigators Group as to whether delivery of water to Lake Moodemere should cease as a result (whether or not on a temporary basis).

If implementation of the watering regime for Lake Moodemere outlined in this Lake Level Management Plan results in unforeseen detrimental impacts to the recreational, cultural or environmental values of the lake, the plan may be adjusted to mitigate these impacts.

The Victorian Government department responsible for the management of water resources (currently DEECA) may negotiate alternative water management arrangements and so alter this plan.

Figure 4: Sunday Creek and Lake Moodemere – Post-Reconfiguration Irrigation Water Supply Infrastructure

3.3. Detailed Water Level Management Rules

The operating rules for managing water levels in Sunday Creek and Lake Moodemere are detailed in Table 2. Unless stated elsewhere in this plan, the Sunday Creek Irrigators Group will be responsible for operating the flow control infrastructure in accordance with these rules.

Table 2: Lake Moodemere and Sunday Creek Water Level Operating Rules

Sunday Creek	Rationale
1. When natural inflows raise the water level of Sunday Creek above 128.9 m AHD, no pumping from the Murray River into Sunday Creek will take place for irrigation purposes, although water may be pumped for other purposes (e.g. Rules 4, 9, 10).	128.9m AHD is a sufficient level within Sunday Creek to facilitate authorised pumping for irrigation and domestic and stock purposes.
2. When natural filling of Sunday Creek does not raise the water level above 128.9 m AHD, water may be pumped from the Murray River and delivered to Sunday Creek for irrigation purposes.	The water level in Sunday Creek needs to be maintained at 128.7–128.9 m AHD during the irrigation season. Allowing pumping from the Murray River up to 128.9 m AHD will avoid unnecessary interruptions to supply.
3. Subject to Rule 9, the water level in Sunday Creek will be maintained by the Sunday Creek Irrigators Group between 128.70 – 128.90 m AHD during the irrigation season.	The water level in Sunday Creek needs to be maintained at 128.7 – 128.9 m AHD to enable delivery to irrigators' pumps.
4. Sunday Creek will be used to convey water to Lake Moodemere when required.	Refer Rule 9.
Lake Moodemere	**Rationale**
5. The Lake Moodemere Regulator will remain closed whenever the water level in the Murray River falls below the level held in the Lake (i.e. water should never pass through the regulator from the Lake into the River), unless directed in writing by Parks Victoria.	The function of the regulator, when closed, will be to retain water in Lake Moodemere. On rare occasions, the lake level might need to be lowered, by opening the regulator, for safety or other management needs.
6. From 1 September to 14 January, the Lake Moodemere Regulator will be opened to allow river flows between 128.0 m and 129.93 m AHD from the Murray River to pass into the lake if river levels exceed the lake level at any time.	The function of the regulator, when open, will be to allow high river flows to enter the lake.
7. From 15 January to 31 August, the Lake Moodemere Regulator will remain closed and will not be used to pass flows into the Lake.	This will be a designated drying period for the lake, to support environmental values in the lake complex. Natural flood events (> 129.93 m AHD) may still over-top the regulator.
8. Lake Moodemere will commence filling to a minimum height of 128.7 m AHD on 1 September. A second fill event will occur in December, if needed, to achieve a minimum level of 128.7 m AHD on 1 January, which should see adequate levels for recreation in the lake maintained to 31 January in a normal year.	Active intervention to manage the level of Lake Moodemere at these times is likely to ensure that Lake Moodemere can be used for recreational events from early spring to mid-summer.
9. When filling from natural flows and opening of the Lake Moodemere Regulator cannot achieve a required minimum fill height (Rule 8), the lake will be topped up using the Sunday Creek pump station. The water level in Sunday Creek will be raised to exceed 129.0 m, to over-top the fixed crest weir at Hells Gate so it can enter Lake Moodemere.	The Sunday Creek pump station will only be used to fill Lake Moodemere when natural flows and the opening of the regulator cannot achieve a minimum fill height.

Sunday Creek	Rationale
10. The Sunday Creek Irrigators group will not do anything to prevent GMW's operation of the Sunday Creek pump station in the event that GMW is given a written direction by Parks Victoria to operate the flow control infrastructure (described in Part 3.1) to ensure compliance with this plan.	If Parks Victoria considers intervention necessary to ensure compliance with this plan, it will direct GMW to operate the flow control infrastructure.

3.4. Roles and responsibilities

The roles and responsibilities of each group in implementing this plan are summarised in Table 3.

Table 3: Roles and responsibilities for implementing the Lake Level Management Plan

Group/Agency	Role and Responsibility
Sunday Creek Irrigators Group	▪ Actively monitor the level of Lake Moodemere to ensure compliance with this Lake Level Management Plan. ▪ Maintain the level of Lake Moodemere as prescribed in the Detailed water level management rules in section 0 of this Lake Level Management Plan. ▪ Own, operate, and maintain (including payment of all associated costs associated with) the Sunday Creek and Lake Moodemere water supply infrastructure (refer section 3.1) in accordance with this Lake Level Management Plan and any applicable licence conditions. ▪ Comply with any reasonable direction given by Parks Victoria for the purposes of meeting the requirements this Lake Level Management Plan.
Parks Victoria	▪ Monitor the level of Lake Moodemere to assess compliance with this Lake Level Management Plan. ▪ Direct any intervention required to ensure compliance with this Lake Level Management Plan. ▪ Land Manager, under the *Parks Victoria Act 2018* and *Crown Land (Reserves) Act 1978*, for most of the public land in the Lake Moodemere precinct, including Lake Moodemere Lake Reserve, Moodemere Nature Conservation Reserve and Murray River Reserve. Licensor of water management infrastructure located on that land. ▪ Waterway Manager for Lake Moodemere under the *Marine Safety Act 2010*. Responsible for managing and controlling vessel activities and maintaining navigational aids and signs.
GMW	▪ Construct flow control infrastructure described in Part 3.1.

References

Parks Victoria 2018. River Red Gum Parks Management Plan. Parks Victoria, Melbourne.

VEAC 2008. River Red Gum Forests Investigation. Final Report. Victorian Environmental Assessment Council, East Melbourne.

YYNAC 2021. Yorta Yorta Nation – Whole of country Plan 2021-2030. Yorta Yorta Nations Aboriginal Corporation, Shepparton/Barmah.